FLEXERA SOFTWARE®
FlexNet Manager® Suite

FlexNet Manager Suite System Reference

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Document Name: FlexNet Manager Suite 2017 R1 System Reference (for on-premises implementations)

Part Number: FMS-12.2.0-SR03

Product Release Date: April 6, 2017

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System Reference

This document gathers together a range of reference material for FlexNet Manager Suite release 2017 R1. This forms part of a reference library that includes the chapters here, together with separate PDF files on larger topics such as adapters and the database schema. This grouping strikes a balance between supplying too many small PDF files, and a PDF file of unwieldy size.

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Adding Custom Properties

It is possible to add properties to underlying database objects, and have these custom properties displayed in the web interface. If you have an on-premises implementation, with your own database, you can implement the changes yourself, following the guidelines in this chapter. If you use a cloud-based implementation, you can use these chapters to create a detailed specification of your requirements, and then submit a change request to your support contact from Flexera Software (or your third-party managed service provider) to implement your specified changes on your behalf.

Custom Properties

With a little technical effort, you can customize the properties of many objects presented in FlexNet Manager Suite.

The complexities of managing software licenses within your corporate processes inevitably means you will want additional fields to record data specific to your enterprise. This section explains how you can specify additional properties for various objects that are displayed in the property sheets and your custom reports within FlexNet Manager Suite.

Tip: *Since the 2015 R2 SP1 release of FlexNet Manager Suite, it is no longer necessary to download a SQL stored procedure to enhance the database for custom properties. This functionality is now built in to the database as installed.*

The broad overview of the process is:

1. Plan your custom property, including its control type, and where it should appear in the properties of its parent object.
2. In Microsoft SQL Server Management Studio, execute specific SQL procedures to declare your customization in a "top down" manner. For example, if you want an extra field in a new section of an entirely new tab of properties, you must first declare the tab, then the section, and then the field. Objects are positioned relative to others that already exist in the database. In running the procedures, you must also refer to all objects and properties by their internal names, or by numerical mappings. Those names and mappings are included below, in Internal Property Names for Applications and the following similar topics.
3. Customizations are available immediately after the SQL procedure is run, so you can review the results immediate in the web interface for FlexNet Manager Suite. You can also immediately commence storing

data in your new custom field through the web interface, as the database has been updated to store your data.

4. While the compliance database and the web interface are updated immediately, the data model for the Business Adapter Studio installed on your inventory beacon(s) is updated by a scheduled task running overnight. This means either waiting until next day before importing values with a business adapter to your new custom field; or you can trigger an immediate update as described in Triggering Immediate Update of the BAS Data Model.

Tip: *In general, customizations you make to the user interface and database are preserved through product upgrades. The one exception is the rare case where a product upgrade removes the 'anchor', the object used for positioning your custom control. In this case, both the anchor and your custom control disappear (although the data entered through the control is preserved and is still available in your customer reports). You can remedy this rare case by re-declaring the missing custom control relative to a new anchor. This restores your customization in the web interface, with full access to the previously-recorded data values.*

Limitations

In the web interface, a custom property is displayed in the property sheet of your chosen object, and it is automatically available in the report builder for inclusion in custom reports. However, the custom property is not available in the following:

- Standard, factory-supplied reports
- Grids in management views
- Search fields, including within property sheets.

As well, custom properties are always editable in property sheets (they cannot be made read-only in that context), and you cannot provide any validation to check data entered into the custom control.

In declaring internal names for your custom properties, you should adopt a stringent naming convention that starts with your own company name-space (a consistent abbreviation for your enterprise name, such as `AE` for Acme Enterprises). You'll next find it convenient to name the object type that you are adding (such as `Asset`). Finally, add the individual name of the property. Separate each of these naming elements with an underscore. Use only characters in the following ranges: `a-z`, `A-Z`, `0-9`, and underscore (_). (Specifically do not use a dot or dash.) A valid example name is:

```
AE_Asset_ChargeBackValue
```

Warning: *Do not use a naming convention that starts with the database object name and uses a dot as a separator. This combination produces obscure errors. Starting with your own name space makes it safe, and using an underscore separator also makes it safe.*

Triggering Immediate Update of the BAS Data Model

The data model exposed to the Business Adapter Studio installed on your inventory beacon(s) is updated by a scheduled task (`Regenerate Business Import config`) that runs overnight (by default, at 4am central server time). Therefore, if you add custom properties to FlexNet Manager Suite, you normally need to wait until next day before you can create a business adapter that loads data into your new custom field.

Alternatively, you can use the following process to trigger an immediate update to the data model for the Business Adapter Studio. This allows you to continue development from custom properties straight on to a custom business adapter that populates those properties.

To update the data model now:

1. On the batch server, open a Command Window.
2. Navigate to:

   ```
   InstallDir\DotNet\bin\
   ```

   The default value is

   ```
   C:\Program Files (x86)\Flexera Software\FlexNet Manager Platform\DotNet\bin\
   ```

3. Execute the following command:

   ```
   BatchProcessTaskConsole.exe run BusinessAdapterConfig
   ```

   This launches the task that generates the updated data model for the Business Adapter Studio. To check when it is finished, run:

   ```
   BatchProcessTaskConsole.exe list-tasks
   ```

   While the task is running, `BusinessAdapterConfig` is visible in the task list, and it disappears within a few minutes, when the task is successful. The updated data model is then automatically collected by all inventory beacons when they "phone home" for updates. By default, this happens every 15 minutes, but the interval is configured in the web interface under **Discovery & Inventory > Settings**, under the **Beacon settings** section. Thereafter, restarting the Business Adapter Studio forces it to reload the data model.

4. After the propagation time, restart the Business Adapter Studio on your chosen inventory beacon. If you are running the Business Adapter Studio in connected mode on your central server, simply exit and restart. If you are running the Business Adapter Studio in disconnected mode on an inventory beacon, use this process::

   a. If the Business Adapter Studio is already open on your inventory beacon, you must exit and restart the entire FlexNet Beacon interface.

   b. In the FlexNet Beacon interface, navigate to the **Business Importer** page.

   c. Edit an existing import, or create a new one, and click **Edit adapter...**.

      Your newly-created custom properties are included in the list of available properties with a distinctive icon.

Objects You Can Customize

The following database objects support the addition of custom properties. When you are adding a custom property to any of these objects, you refer to them by the `TargetTypeID` listed here.

You can also make your custom property specific to only certain sub-types within each object (where available). For example, you may want to add a custom property to your assets, except that you don't want the custom property to appear on records of routers or switchers. You can exclude these two kinds of assets using the `TargetSubTypeID` included in the listing below. You reference the target sub-types using the numbers in the list (for example, refer to a workstation with the value `1`).

Table 1: Objects supporting customization

Object	TargetTypeID	TargetSubTypeID
Application	13	
Asset	9	**1.** Workstation **2.** Server **3.** Monitor **4.** Desk **5.** Chair **6.** Printer **7.** Router **8.** Switch **9.** Telephone **10.** Cellphone **11.** Laptop **12.** Mobile Device

Object	TargetTypeID	TargetSubTypeID
Contract	10	**1.** General **2.** Lease **3.** Hardware Maintenance And Support **4.** Software License **5.** Software Maintenance And Support **6.** Blanket Purchase **7.** Consulting Services **8.** Insurance **9.** Rent **10.** Subscription **11.** Microsoft Business And Service Agreement **12.** Microsoft Select Agreement **13.** Microsoft Select Plus Agreement **14.** Microsoft Select Enrolment **15.** Microsoft Select Plus Enrolment **16.** Microsoft Enterprise Agreement **17.** Microsoft Enterprise Agreement Subscription
Purchases	20	**1.** Not Set **2.** Software **3.** Hardware **4.** Service **5.** Other **6.** Software Upgrade **7.** Software Maintenance **8.** Disk Kit **9.** Hardware Maintenance

Object	TargetTypeID	TargetSubTypeID
Software License	12	**1.** Enterprise **2.** Device **3.** Node Locked **4.** User **5.** Concurrent User **6.** Appliance **7.** Client Server **8.** OEM **9.** Evaluation **10.** Run Time **11.** Processor **12.** Site **13.** Named User **14.** Core **15.** Core Points **16.** Oracle DB Processor **17.** Oracle DB Named User Plus **18.** Processor Points **19.** Oracle DB Legacy **20.** Enterprise Agreement **21.** SAP Named User **22.** MS Server Processor **23.** CAL **24.** Tiered Device **25.** IBM PVU **26.** IBM Authorized User **27.** IBM Concurrent User **28.** IBM Floating User **29.** Custom Metric **30.** One Point Per Processor

Object	TargetTypeID	TargetSubTypeID
		31. IBM RVU **32.** IBM UVU **33.** MS Server Core **34.** Oracle Application User **35.** SAP Package **36.** MS SCCM Client Device **37.** MS SCCM Client User **38.** MSDN
Computer	14	**1.** Computer **2.** VM Host **3.** VM **4.** Remote Device **5.** Mobile Device **6.** VDI Template
User	15	
Vendor	24	

Controls You Can Add

When you declare a custom property to add to a database object, you must also declare the kind of control that is to appear in the property sheet for that object, within the web interface of FlexNet Manager Suite.

You can add an entirely new tab to the properties, or within any tab (new or existing) you can add a new section (a grouping for other controls). Both of these cases, tab and section, are special cases in that each has its own SQL procedure for its declaration. These do not need numeric references.

For other controls that you can add within a section (or, for that matter, within a tab without an intervening section if you wish), you specify them by a numeric reference called the `UIFieldTypeID`. The available controls and their `UIFieldTypeID` are shown below.

Prompts (the text beside the control telling the operator what to do) are declared as part of the declaration of each custom property.

Table 2: Supported UI controls

Control	UIFieldTypeID	Comments
Integer	3	A small single-line field combined with up and down arrows (a spinner), where operators may type in an integer value or use the arrows to 'spin up' the number required.
Text box	4	A standard, single-line text field for entering a value.
Text area	5	A rectangular area where the operator can enter free-form text.
Date	6	Provides a date entry field complete with date icon. If the operator clicks the icon, a date picker calendar appears.
Drop-down list	8	A pull-down list of fixed values from which an operator may choose. You declare the values for the list when adding the custom property.
Check box	9	Boolean: saves a `1` in the database when the check box is checked (ticked), and zero otherwise.

Positioning Your Custom Control

Within the web interface for FlexNet Manager Suite, you declare the position of your newly-added custom property in relationship to something that already exists in the interface layout. This prior control may be one that came as standard in the factory-supplied interface, or may be another custom control that you have previously declared. We call this previously-existing control the 'anchor' for your newly-added custom property.

Your custom property can have various positional relationships with its anchor. These relationships are declared with numeric values.

Table 3: Positioning of custom controls relative to anchor (mandatory)

Positioning	UIInsertTypeID	Comments
Before	1	Before the anchor
After	2	After the anchor
Start of	3	At the start of an existing tab or section (not applicable for other types of anchor)

When you specify the anchor (the existing control from which your custom control is positioned), you do so by its name. If the anchor is another custom control that you declared earlier, you use exactly the name you specified then. If it is a factory-supplied control that is part of the standard web interface for FlexNet Manager Suite, you must use the internal database name for the anchor control. See the following sub-topics for the available objects, their controls as they appear in the English-language standard web interface (these values may be localized), and the internal and unchanging database name for the same control that you must reference as an anchor.

With the web interface, all properties pages support two columns of controls. When you insert a custom control, the columns reflow to accommodate the change, subject to the additional setting for each of the controls on the page.

For example, you can specify whether the custom control occupies just one column, or spans across two columns.

Table 4: Column span for custom controls

Columns	Width	Comments
Single column	1	Left or right column of the layout (default)
Double column	2	Always left aligned

For single-column controls, you may have a preference for whether the control appears on the left, or on the right, of the property page.

Table 5: Alignment of controls within page

Alignment	Position	Comments
Next available spot	0	The "don't care" option, where the control takes either left or right side based on its positioning in relation to the anchor (default).
Left column	1	This control is forced to the left. If its positioning is "After" an anchor that is already in the left column, the adjacent right side is left blank. Flow resumes after this control.
Right column	2	This control is forced into the right column. If its positioning is "After" an anchor that is already in the right column, the left side of the next line is left blank, and this control occupies the right.

Internal Property Names for Applications

The properties for applications are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Limitations

Of all the database objects supporting custom values, only applications have the following limitations:

- The Business Importer does not current support importing data into custom fields for applications. When you create a custom property for applications, it is available for data entry within the web interface, and the data may be output in custom reports. This restriction is only that the bulk import of data using the Business Importer is not currently supported.

- The following tabs within application properties are excluded from customization:
    - **Evidence** tab (database identity Tab_Evidence)
    - **Precedence** tab (database identity Tab_Precedence)
    - **Usage** tab (database identity Tab_Usage)

Tab label: General

Database identity: Tab_General

Section	Control	Internal Name
Identification		Section_Identification
	Product	
	Table	Table
	Publisher	Publisher
	Version	Version
	Edition	
	Name	Name
	Source	Source
	FlexeraID	FlexeraID
	Classification	Classification
	Application category	Category
Details		Section_Details
	Status	Status
	Release date	ReleaseDate
	Supported until	SupportedUntil
	Extended support until	ExtendedSupportUntil
	Information	Notes

Tab label: Licenses

Database identity: Tab_Licenses

Section	Control	Internal Name
License consumption order		Section_LicenseConsumptionOrder
	Grid	LicenseOrder
	Automatically manage license priorities	ManagedLicenses

Tab label: Devices

Database identity: Tab_Computers

Section	Control	Internal Name
Related devices		Section_Computers
	Grid	RelatedComputers

Tab label: History

Database identity: Tab_History

Section	Control	Internal Name
History of changes to this application		Section_History
	Grid	ApplicationHistory

Internal Property Names for Assets

The properties for assets are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Tab label: General

Database identity: Tab_General.

Section	Control	Internal Name
General		Section_General
	Name	Name
	Asset type	AssetTypeId
	Linked inventory	LinkedComputer
	Serial number	SerialNumber
	Asset tag	Asset_tag
	Manufacturer	Manufacturer
	Part number	PartNumber
	Model	AssetModel
	Master asset	MasterAssetName

Section	Control	Internal Name
	Status	Status
	Category	CategoryPath
End of life		Section_EndOfLife
	Retirement date	RetirementDate
	Resale price	ResalePrice
	Retirement reason	Reason
	Disposal date	DisposalDate
	Recipient	Recipient
	Written off value	WrittenOffValue
Last inventory		Section_LastInventory
	Electronic	Electronic
	By	Electronic_Created_By
	Physical	Physical
	By	Physical_Created_By
	Installed on	Installed
	Information	Note

Tab label: Hardware

Database identity: Tab_Hardware

***Tip:** The **Hardware** tab appears only when the asset record is linked to an inventory device record.*

Section	Control	Internal Name
Hardware		Section_Hardware
	Operating system	OperatingSystem
	Service pack	ServicePack
	Processors	Processors
	Cores	Cores
	Threads	Threads
	Sockets	Sockets
	Partial No Of Processors	PartialNoOfProcessors
	Processor type	ProcessorType
	Clock speed (MHz)	ClockSpeed

Section	Control	Internal Name
	RAM (GB)	RAM
	Disk (GB)	Disk
	Hard drives	HardDrives
	Display adapters	DisplayAdapters
	Network cards	NetworkCards
	Assigned chassis type	AssignedChassisType
	Inventory Chassis Type	InventoryChassisType

Tab label: Ownership

Database identity: Tab_Ownership

Section	Control	Internal Name
User		*Do not reference.*
	Assigned	
	Calculated	Calculated
	Last logged on	LastLoggedOn

Tab label: Financial

Database identity: Tab_Financial

Section	Control	Internal Name
Financial		Section_Financial
	Acquisition mode	AcquisitionMode
	Delivery date	DeliveryDate
	Warranty type	Warranty
	End of warranty	EndOfWarranty
Lease information *(see note 1)*		Section_LeaseInformation
	Lease agreement	LeaseAgreement
	Lease number	LeaseNumber
	Start date	StartDate
	End date	
	Lease price	LeasePrice
	Buyout	BuyOut

Section	Control	Internal Name
	Payment	Payment
	Period	Period
Lease Termination *(see note 1)*		Section_LeaseTermination
	Date	TerminationDate
	Retirement reason	Reason
Depreciation *(see note 2)*		Section_Depreciation
	Current value	CurrentValue
	Residual value	ResidualValue
	Depreciation method	DepreciationMethod
	Period (years)	PeriodYears
	Rate	RatePercentage
Charges		Section_Charges
	Amount	Amount
	Frequency	Frequency

Note:

1. *These sections and the fields they contain are applicable only when **Acquisition mode** is set to `Leased`.*
2. *This section and the fields it contains are applicable only when **Acquisition mode** is set to `Purchased`.*

Tab label: Sub-assets

Database identity: Tab_Sub_Assets

Section	Control	Internal Name
Sub-assets		Section_SubAssets
	Grid	SubAssets

Tab label: Contracts

Database identity: Tab_Contracts

Section	Control	Internal Name
Related contracts		Section_RelatedContracts
	Grid	AssociatedContracts

Tab label: Purchases

Database identity: Tab_Purchases

Section	Control	Internal Name
Related purchases		Section_RelatedPurchases
	Grid	AssociatedPurchases

Tab label: Documents

Database identity: Tab_Documents

Section	Control	Internal Name
Related documents		Section_Documents
	Grid	DocumentChanges

Tab label: History

Database identity: Tab_History

Section	Control	Internal Name
History of changes to this asset		Section_AssetsHistory
	Grid	History
	Created by	CreatedBy
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated date	LastUpdatedDate

Internal Property Names for Computers

The properties for computers (presented in the web interface as inventory devices) are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Limitations

The Licenses tab (database identity: Tab_Licenses) within computer properties is excluded from customization.

Tab label: General

Database identity: Tab_Summary.

Section	Control	Internal Name
General		Section_Summary
	Status	Status
	Inventory device type	InventoryDeviceType
	Name	Name
	Compliance status	ComplianceStatus
	Linked asset	LinkedToAsset
	Domain name	Domain
	Inventory role	Role
	Manufacturer	Manufacturer
	Model	ComputerModel
	IP address	IPAddress
	MAC address	MACAddress
	Serial number	SerialNumber
	Chassis number	ChassisNumber
	Category	CategoryPath
Last inventory source		Section_InventorySource
	Last inventory date	LastInventoryDate
	Last inventory source	LastInventorySource
	Connection name	InventoryConnectionName
	You may override inventory values	OverrideInventoryValue
Service Provider		Section_ServiceProvider
	Located in service provider's datacenter cloud	LocatedServiceProviderCloud
	Service Provider	ServiceProvider

Tab label: Hardware

Database identity: Tab_Hardware.

Section	Control	Internal Name
Hardware		Section_Hardware
	Operating system	OperatingSystem

Section	Control	Internal Name
	Service pack	ServicePack
	Processors	Processors
	Cores	Cores
	Threads	Threads
	Sockets	Sockets
	Partial no of processors	PartialNoOfProcessors
	Processor type	ProcessorType
	Clock speed (MHz)	ClockSpeed
	RAM (GB)	RAM
	Disk (GB)	Disk
	Hard drives	HardDrives
	Display adapters	DisplayAdapters
	Network cards	NetworkCards
	Assigned chassis type	AssignedChassisType
	Inventory Chassis Type	InventoryChassisType
	* You may override inventory values	OverrideInventoryValue2

Tab label: Applications

Database identity: Tab_Applications.

Tip: *The* ***Applications*** *tab is displayed only when* ***Last inventory source*** *(in the* ***General*** *tab) has a value other than `Manual`.*

Section	Control	Internal Name
Applications installed on this device		Section_Applications
	Grid	Applications

Tab label: Ownership

Database identity: Tab_Ownership.

Section	Control	Internal Name
User		*Do not reference.*
	Assigned	

Section	Control	Internal Name
	Calculated	Calculated
	Last logged on	LastLoggedOn

Tab label: VM Properties

Database identity: Tab_VMProperties.

Section	Control	Internal Name
Virtual Machine Properties		Section_VMProperties
	Host	Host
	Friendly name	VM_Name
	Guest full name	VM_GuestFullName
	UUID	VM_UUID
	Location	VM_Location
	VM type	VM_Type
	Pool	VM_Pool
	Total memory (GB)	VM_TotalMemory
	Memory usage (GB)	VM_MemoryUsage
	CPU usage (MHz)	VM_CPUUsage
	Last known state	VM_LastKnownState
	Host affinity enabled	VM_AffinityEnabled
	Threads (max)	
	CPU affinity	
	Core affinity	
	Partition number	
	Partition ID	

Tab label: Virtual Machines

Database identity: Tab_VirtualMachines.

Section	Control	Internal Name
Virtual machines		Section_VirtualMachines
	Grid	VirtualMachines

Tab label: Virtual Desktop Templates

Database identity: Tab_VdiTemplates.

Section	Control	Internal Name
Virtual Deskop Templates accessed from this device		Section_VdiTemplates
	Grid	VdiTemplates

Tab label: History

Database identity: Tab_History.

Section	Control	Internal Name
History of changes to this device		Section_History
	Grid	ComputerHistory
	Created by	CreatedBy
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated by	LastUpdatedDate

Internal Property Names for Contracts

The properties for contracts are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Tab label: General

Database identity: Tab_General.

Section	Control	Internal Name
Identification		Section_Identification
	Contract no	ContractNo
	Status	Status
	Description	Description
	Contract type	ContractType

Section	Control	Internal Name
	Purchase program	PurchaseProgram
	Select applications level	ApplicationLevel
	Select systems level	SystemsLevel
	Select servers level	ServersLevel
	Initial platform quantity	InitialPlatformQuantity
	Replaced by	ReplacedContractBy
	Category	CategoryPath
Events		Section_Events
	Evergreen	Evergreen
	Start date	StartDate
	Next renewal date	NextRenewalDate
	Expiry date	ExpiryDate
	Review date	ReviewDate
	Last reviewed on	LastReviewedOn
Payments		Section_Payments
	Global amount	GlobalAmount
	Monthly amount	MonthlyAmount
	Information	Comments

Tab label: Ownership

Database identity: Tab_ Ownership.

Section	Control	Internal Name
Ownership		Section_Ownership

Tab label: Vendors

Database identity: Tab_Vendors.

Section	Control	Internal Name
Other vendors		Section_OtherVendors
Additional vendors		Section_Vendors
	Grid	Vendors
Third-party vendors		Section_3rdPartyVendors

Section	Control	Internal Name
	Grid	Contract3rdPartyVendors

Tab label: Assets

Database identity: Tab_Assets.

Section	Control	Internal Name
Assets		Section_Assets
	Grid	Assets

Tab label: Purchases

Database identity: Tab_Purchases.

Section	Control	Internal Name
Related purchases		Section_RelatedPurchases
	Grid	Purchases

Tab label: Licenses

Database identity: Tab_Licenses.

Section	Control	Internal Name
Related licenses		Section_RelatedLicenses
	Grid	Licenses

Tab label: Responsibilities

Database identity: Tab_Responsibilities.

Section	Control	Internal Name
Responsibilities		Section_Responsibilities
	Grid	Responsibilities

Tab label: Payment schedules

Database identity: Tab_Payment_Schedule.

Section	Control	Internal Name
Payment schedules		Section_Payment_Schedule
	Grid	PaymentSchedules

Tab label: Terms and conditions

Database identity: Tab_Terms_and_Conditions.

Section	Control	Internal Name
Terms and conditions		Section_Terms_and_Conditions
	Grid	TermsConditions

Tab label: Documents

Database identity: Tab_Documents

Section	Control	Internal Name
Related Documents		Section_Documents Grid
	Grid	DocumentChanges

Tab label: History

Database identity: Tab_History.

Section	Control	Internal Name
History of changes to this contract		Section_History
	Grid	History
	Created by	CreatedBy
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated by	LastUpdatedDate

Internal Property Names for Licenses

The properties for software licenses are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Tab label: Compliance

Database identity: Tab_Compliance.

Section	Control	Internal Name
Compliance		Section_Compliance
	Compliance status	ComplianceStatus
	Shortfall/Availability	Available
	Breach reason	BreachReason
Entitlements and consumption		EntitlementsAndConsumption
	Licensed from PO	PurchasedFromPO
	Allocated	NumberAllocated
	Extra entitlements	ExtraEntitlements
	Used	Used
	Raw consumption	RawConsumption
	Raw usage count	RawUserCount
	NUP minimum	NUPMinimum
	Peak consumed	PeakConsumption
	Raw installations	RawInstallation
	PUR savings	PURSavings
	Total licensed	TotalPurchased
	Consumed	AdjustedConsumption
	Consumption as at	ConsumedDate

Tab label: Identification

Database identity: Tab_Identification.

Section	Control	Internal Name
Identification		Section_Identification
	Publisher	Publisher
	Name	Name
	License type	LicenseType
	Subject to true up	SubjectToTrueUp
	Copy Version and Edition from the most recent application	CopyVersionEdition
	Version	Version
	Edition	Edition

Section	Control	Internal Name
	Duration	Duration
	Purchased as	PurchasedAs
	Expiry date	ExpiryDate
	Status	LifeCycle
	Retirement date	RetirementDate
	Retirement reason	RetirementReason
	Resale price	ResalePriceLink
	Metric	SoftwareLicenseMetricID
	Set Compliance status manually	ManuallySetComplianceStatus
	Resources consumed	ResourcesConsumed
	SAP type	SAPType
	Measurement date	MeasurementDate
	Tier type	TierType
	Tier code	TierCode
	Processors limit	ProcessorsLimit
	Cores limit	CoresLimit
	Legacy type	LegacyType
	Maximum sockets	MaximumSockets
	Minimum users	MinimumUsers
	Apply user limit per processor core	ApplyUserLimitPerCore
	Minimum processors	MinimumProcessors
	Points rule set	PointsRuleSet
	Category	CategoryPath
	Information	Notes
License keys		Section_LicenseKeys
	Rule	RuleType
	License key	LicenseKey

Tab label: Applications

Database identity: Tab_Applications.

Section	Control	Internal Name
Licensed software		Section_LicensedSoftware
	Title	ApplicationTitle
	Highest version	HighestVersion
Applications included in this license		Section_IncludedApplications
	Grid	Applications

Tab label: Purchases

Database identity: Tab_Purchases.

Section	Control	Internal Name
Purchase price		Section_PurchasePrice
	Override unit price	PurchasePrice
Purchases		Section_PurchaseOrderLineItems
	Grid	Purchases

Tab label: Financial

Database identity: Tab_Financial

Section	Control	Internal Name
Charges		Section_Charges
	Amount	Amount
	Frequency	Frequency
Resale		Section_Resale
	Resale price	ResalePrice
	Recipient	Recipient

Tab label: Contracts

Database identity: Tab_Contracts.

Section	Control	Internal Name
Related contracts		Section_Contracts
	Grid	Contracts

Tab label: Consumption

Database identity: Tab_Consumption.

Section	Control	Internal Name
Normal user equivalents		Section_UserEquivalents
	Infrequent user	InfrequentUser
	External user	ExternalUser
Bulk user counts		Section_BulkUserCounts
	Additional infrequent users	AdditionalInfrequentUsers
	Additional external users	AdditionalExternalUsers
Related users		Section_RelatedEmployees
Related devices		Section_RelatedComputers
Alternate bulk user count		Section_AlternateBulkUserCount
	Non-inventoried users	AlternateNonInventoriedUsers
Users related to this license		Section_OracleUsers
	Grid	OracleUserConsumption

Tab label: Restrictions

Database identity: Tab_Restrictions.

Section	Control	Internal Name
Scope restrictions		Section_ScopeRestrictions
	Restrict to OS	Restrict_OS
	Grid	Restrictions

Tab label: Ownership

Database identity: Tab_Ownership.

Section	Control	Internal Name
Ownership and access rights		Section_Ownership

Tab label: Documents

Database identity: Tab_Documents

Section	Control	Internal Name
Related documents		Section_Documents

Section	Control	Internal Name
	Grid	DocumentChanges

Tab label: History

Database identity: Tab_History.

Section	Control	Internal Name
History of changes to this license		Section_History
	Grid	History
	Created by	CreatedBy
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated date	LastUpdatedDate

Internal Property Names for Purchases

The properties for purchases are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Tab label: General

Database identity: Tab_General.

Section	Control	Internal Name
Purchase details		Section_PurchaseDetails
	Item	SequenceNumber
	Description	Description
	Part no./SKU	SKUDetails
	Purchase quantity	PurchaseQuantity
	Quantity per unit	QuantityPerUnit
	Effective quantity	EffectiveQuantity
	Publisher	Publisher
	Status	ItemStatus

Section	Control	Internal Name
	Purchase type	Type
Related contract		Section_RelatedContract
	Contract	Contract
Maintenance		Section_Maintenance
	Purchase includes support, maintenance, or other service Ö	MaintenanceOrServiceAgreemen
	Agreement date	AgreementDate
	Expiry date	ExpiryDate
Volume purchase program		Section_VolumePurchaseProgram
	Product pool	ProductPool
	Product points	ProductPoints
Notes		Section_Notes
	Comments	Comments

Tab label: Financial

Database identity: Tab_Financial

Section	Control	Internal Name
Invoice		Section_Invoice
	Invoice number	InvoiceNumber
	Invoice date	InvoiceDate
Shipping		Section_Shipping
	Shipping date	ShippingDate
	Shipping location	ShippingLocation

Tab label: Ownership

Database identity: Tab_Ownership.

Section	Control	Internal Name
Ownership		Section_Ownership

Tab label: Assets

Database identity: Tab_Assets.

Section	Control	Internal Name
Assets		Section_Assets
	Grid	Assets

Tab label: Licenses

Database identity: Tab_Licenses.

Section	Control	Internal Name
Related licenses		Section_Licenses
	Allocate assigned entitlements	AllocateAssignedEntitlements
	Grid	Licenses

Tab label: Documents

Database identity: Tab_Documents.

Section	Control	Internal Name
Related documents		Section_Documents
	Grid	DocumentChanges

Tab label: History

Database identity: Tab_History.

Section	Control	Internal Name
History of changes to this purchase order		Section_History
	Grid	History
	Created by	CreatedBy
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated by	LastUpdatedDate

Internal Property Names for Users

The properties for users are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Tab label: General

Database identity: Tab_General.

Section	Control	Internal Name
Identification		User
	Title	UserTitle
	First name	FirstName
	Middle name	MiddleName
	Last name	LastName
	Suffix	Suffix
	Full name	Fullname
Employment		Section_Employment
	Job title	JobTitle
	Employee ID	EmployeeID
	Enployment Status	EmploymentStatus
	Manager	Manager
	Status	ComplianceUserStatus
Account		Section_Account
	Account name	AccountName
	Domain name	Domain
	Last inventory source	LastInventorySource

Tab label: Details

Database identity: Tab_Details.

Section	Control	Internal Name
Enterprise groups		Section_EnterpriseGroups
Contact		Section_Contact
	Phone	Phone
	Fax	Fax
	Mobile	Mobile
	Email	Email

Section	Control	Internal Name
Address		Section_Address
	Street address	StreetAddress
	City	City
	State/Province	State
	Country	Country
	Postal code	PostalCode

Tab label: Hardware

Database identity: Tab_Hardware.

Section	Control	Internal Name
Assets		Section_Assets
	Grid	Assets
Devices		Section_Computers
	Grid	Computers

Tab label: Software

Database identity: Tab_Software.

Section	Control	Internal Name
Related software licenses		Section_Software
	Grid	Software

Tab label: Responsibilities

Database identity: Tab_Responsibilities.

Section	Control	Internal Name
Responsibilities		Section_Responsibilities
Licenses		Section_Licenses
	Grid	Licenses
Contracts		Section_Contracts
	Grid	Contracts

Tab label: Documents

Database identity: Tab_Documents.

Section	Control	Internal Name
Related documents		Section_Documents
	Grid	DocumentChanges

Tab label: History

Database identity: Tab_History.

Section	Control	Internal Name
History of changes to this user		Section_History
	Grid	History
	Created by	CreatedBy
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated by	LastUpdatedDate

Internal Property Names for Vendors

The properties for vendors are represented in the tables below, with a separate table for each tab displayed in the web interface (or UI). The first column (for sections with their own heading) and second column (for fields and other kinds of UI controls displayed within each section) show the labels displayed in the default culture `en-US`. The right-most column displays the identity of that control within the underlying system. You must use these identity names when you reference any UI control as an anchor for relative positioning of your new custom control.

Tab label: General

Database identity: Tab_General.

Section	Control	Internal Name
Identification		Section_Identification
	Name	Name
Contact information		Section_ContactInformation
	Phone	PhoneNumber
	Fax	Fax
	Email	Email
	Web	Web
Address		Section_Address

Section	Control	Internal Name
	Street address	StreetAddress
	City	City
	State/Province	State
	Country	Country
	Postal code	PostalCode

Tab label: Purchases

Database identity: Tab_Purchases.

Section	Control	Internal Name
Related purchases		Section_PurchaseOrderLineItems
	Grid	VendorPurchases

Tab label: Assets

Database identity: Tab_Assets.

Section	Control	Internal Name
Related assets		Section_AssociatedAssets
	Grid	VendorAssets

Tab label: Contracts

Database identity: Tab Contracts.

Section	Control	Internal Name
Related contracts		Section_AssociatedContracts
	Grid	VendorContracts

Tab label: History

Database identity: Tab_History.

Section	Control	Internal Name
History of changes to this vendor		Section_History
	Grid	History
	Created by	CreatedBy

Section	Control	Internal Name
	Creation date	CreationDate
	Last updated by	LastUpdatedBy
	Last updated by	LastUpdatedDate

Creating a New Properties Tab

Execute the following in SQL Server Management Studio against your FNMSCompliance database.

Syntax:

```
EXEC dbo.AddTabToWebUIPropertiesPage
        @TargetTypeID = TargetTypeID,
        @ExcludeTargetSubTypeIDs = 'TargetSubTypeID,TargetSubTypeID,...',
        @Name = 'My_Unique_Name',
        @CultureType = 'ISOCultureCode',
        @DisplayNameInPage = 'Prompt value',
        @UIInsertTypeID = UIInsertTypeID,
        @RelativeTabName = 'RelativeTabName'
```

where

@TargetTypeID

Mandatory. Integer that identifies the type of object to which you are adding a custom property. For supported objects and their integer equivalents for `TargetTypeID`, see Objects You Can Customize.

@ExcludeTargetSubTypeIDs

Mandatory. A comma-separated list (enclosed in single quotation marks) of integer subtype IDs. For the default case of no exclusions, give this parameter an empty list:

```
@ExcludeTargetSubTypeIDs = '',
```

Many types of target objects have subtypes (for example, assets may be workstations, routers, and so on). By default, a custom property added to an object (identified by its `TargetTypeID`) is added to all subtypes of that object. However, you can exclude any subtypes you choose with this parameter. For supported subtypes and their integer equivalents for *`TargetSubTypeID`*, see Objects You Can Customize.

@Name	Mandatory. The internal name (in code and database) of the new tab you are adding. This name must be unique across all tabs in the system (including the factory-supplied tabs, and including all database objects). For this reason, it is strongly recommended that you adopt a stringent naming convention, such as a company name space, an object type, and a tab name, each separated by an underscore (example: `MyCo_License_Chargebacks`). The name is limited to 256 characters. ***Warning:*** *Do not use a naming convention that starts with the database object name and uses a dot as a separator. This combination produces obscure errors. Starting with your own name space makes it safe, and using an underscore separator also makes it safe.*
@CultureType	Default value is `en-US`. Value is a five-character ISO code for culture (enclosed in single quotation marks). The permitted values are available at http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx.
@DisplayNameInPage	Mandatory. This is the label (enclosed in single quotation marks) displayed on the tab in the web interface for FlexNet Manager Suite when the culture setting for the interface matched the one you declare in `CultureType`. You can also provide localized values for this label using different culture settings, for which see Localizing Display Names of Custom Properties.
@UIInsertTypeID	Mandatory. An integer indicating the position of this new tab relative to the tab identified in `RelativeTabName`. For integer values and their meaning, see Positioning Your Custom Control. Note that in this case of creating a new tab, the value `3` is not relevant.
@RelativeTabName	Mandatory. The internal name of the anchor tab relative to which you are positioning your new custom tab. For internal names of factory-supplied tabs, see subtopics of Positioning Your Custom Control.

Creating a New Section Within a Tab

Execute the following in SQL Server Management Studio against your FNMSCompliance database, referencing an existing tab.

Syntax:

```
EXEC dbo.AddSectionToWebUIPropertiesPage
        @TargetTypeID = TargetTypeID,
        @ExcludeTargetSubTypeIDs = 'TargetSubTypeID,TargetSubTypeID,...',
        @Name = 'My_Unique_Name',
        @CultureType = 'ISOCultureCode',
        @DisplayNameInPage = 'Prompt value',
        @TabName = 'tabInternalName',
        @UIInsertTypeID = UIInsertTypeID,
        @RelativePositionTo = 'RelativePositionTo'
```

where

@TargetTypeID

Mandatory. Integer that identifies the type of object to which you are adding a custom property. For supported objects and their integer equivalents for `TargetTypeID`, see Objects You Can Customize.

@ExcludeTargetSubTypeIDs

Mandatory. A comma-separated list (enclosed in single quotation marks) of integer subtype IDs. For the default case of no exclusions, give this parameter an empty list:

```
@ExcludeTargetSubTypeIDs = '',
```

Many types of target objects have subtypes (for example, assets may be workstations, routers, and so on). By default, a custom property added to an object (identified by its `TargetTypeID`) is added to all subtypes of that object. However, you can exclude any subtypes you choose with this parameter. For supported subtypes and their integer equivalents for *`TargetSubTypeID`*, see Objects You Can Customize.

@Name

Mandatory. The internal name (in code and database) of the new section you are adding. This name must be unique across all sections in the system (including the factory-supplied sections, across all database objects). For this reason, it is strongly recommended that you adopt a stringent naming convention, such as a company name space, an object type, optionally a tab name, and a section name, each separated by an underscore (example: `MyCo_License_Chargeback_General`). The name is limited to 256 characters.

Warning: *Do not use a naming convention that starts with the database object name and uses a dot as a separator. This combination produces obscure errors. Starting with your own name space makes it safe, and using an underscore separator also makes it safe.*

@CultureType

Default value is `en-US`. Value is a five-character ISO code for culture (enclosed in single quotation marks). The permitted values are available at http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx.

@DisplayNameInPage

Mandatory. This is the label (enclosed in single quotation marks) displayed above the section in the web interface for FlexNet Manager Suite when the culture setting for the interface matched the one you declare in `CultureType`. You can also provide localized values for this label using different culture settings, for which see Localizing Display Names of Custom Properties.

@TabName	Optional when `@UIInsertTypeID = 3`, and ignored for any other value. Provides the internal name the tab at the start of which the new section is to be inserted. If used, the tab name must be 80 characters or less, and enclosed inside single quotation marks. (If `TabName` is not specified, the value of `RelativePositionTo` is used.) For internal names of factory-supplied controls, see the subtopics under Positioning Your Custom Control.
@UIInsertTypeID	Mandatory. An integer indicating the position of this new section relative to the control identified in `RelativePositionTo`. For integer values and their meaning, see Positioning Your Custom Control. Note that in this case of creating a new section, the value `3` means at the start of the tab identified in `TabName`, meaning that `RelativePositionTo` is irrelevant in that case.
@RelativePositionTo	Mandatory when `UIInsertTypeID` has a value other than `3`; and when `@UIInsertTypeID = 3`, one of `RelativePositionTo` or `TabName` is required. The internal name of the anchor control relative to which you are positioning your new custom section. For internal names of factory-supplied controls, see the subtopics under Positioning Your Custom Control. When used with `@UIInsertTypeID = 3`, `RelativePositionTo` must be the name of a tab that has already been defined (and not any other kind of control).

Creating Other Custom Properties

Execute the following in SQL Server Management Studio against your FNMSCompliance database. The relative anchor from which positioning is determined must already be defined.

Syntax:

```
EXEC dbo.AddPropertyToWebUIPropertiesPage
         @TargetTypeID = TargetTypeID,
         @ExcludeTargetSubTypeIDs = 'TargetSubTypeID,TargetSubTypeID,...',
         @Name = 'My_Unique_Name',
         @CultureType = 'ISOCultureCode',
         @DisplayNameInPage = 'Prompt value',
         @DisplayNameInReport = 'Column heading',
         @TabName = 'MyTabName',
         @UIInsertTypeID = UIFieldTypeID,
         @UIFieldTypeID = UIFieldTypeID,
         @RelativePositionTo = 'RelativePositionTo'
         @SequenceNumber = 'IntegerCount'
         @Position = Position,
         @Width = Width,
         @DataSource = 'List, Of, Values',
         @DataSourceDelimiter = ',',
         @Required = 0,
         @StringLength = IntegerMaxLength,
         @ReadOnly = 0
```

where

@TargetTypeID

Mandatory. Integer that identifies the type of object to which you are adding a custom property. For supported objects and their integer equivalents for `TargetTypeID`, see Objects You Can Customize.

@ExcludeTargetSubTypeIDs

Mandatory. A comma-separated list (enclosed in single quotation marks) of integer subtype IDs. For the default case of no exclusions, give this parameter an empty list:

```
@ExcludeTargetSubTypeIDs = '',
```

Many types of target objects have subtypes (for example, assets may be workstations, routers, and so on). By default, a custom property added to an object (identified by its `TargetTypeID`) is added to all subtypes of that object. However, you can exclude any subtypes you choose with this parameter. For supported subtypes and their integer equivalents for *`TargetSubTypeID`*, see Objects You Can Customize.

@Name

Mandatory. The internal name (in code and database) of the new custom property you are adding. This name must be unique across all properties in the system (including the factory-supplied properties, across all database objects). For this reason, it is strongly recommended that you adopt a stringent naming convention, such as a company name space, an object type, and a property name, each separated by an underscore (example: `MyCo_License_DailyCharge`). The name is limited to 256 characters.

> ***Warning:*** *Do not use a naming convention that starts with the database object name and uses a dot as a separator. This combination produces obscure errors. Starting with your own name space makes it safe, and using an underscore separator also makes it safe.*

@CultureType

Default value is `en-US`. Value is a five-character ISO code for culture (enclosed in single quotation marks). The permitted values are available at http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx.

@DisplayNameInPage

Mandatory. This is the label (enclosed in single quotation marks) displayed as a prompt in the web interface for FlexNet Manager Suite when the culture setting for the interface matched the one you declare in `CultureType`. You can also provide localized values for this label using different culture settings, for which see Localizing Display Names of Custom Properties.

@DisplayNameInReport	Mandatory. This is the label (enclosed in single quotation marks) displayed as a column heading in custom reports you prepare, when the culture setting for the interface matched the one you declare in `CultureType`. You can also provide localized values for this label using different culture settings, for which see Localizing Display Names of Custom Properties.
@TabName	Optional when `@UIInsertTypeID = 3`, and ignored for any other value. Provides the internal name the tab in which the new control is to be inserted. If used, the tab name must be 80 characters or less, and enclosed inside single quotation marks. (If `TabName` is not specified, the value of `RelativePositionTo` is used.) For internal names of factory-supplied tabs, see the subtopics under Positioning Your Custom Control. For details about creating custom tabs, see Creating a New Properties Tab.
@UIInsertTypeID	Mandatory. An integer indicating the position of this new section relative to the control identified in `RelativePositionTo`. For integer values and their meaning, see Positioning Your Custom Control. Note that in this case of creating a new section, the value `3` means at the start of the tab identified in `TabName`, meaning that `RelativePositionTo` is irrelevant in that case.
@UIFieldTypeID	Mandatory. An integer indicating the kind of control used to display your custom property. For integer values and their meaning, see Controls You Can Add.
@RelativePositionTo	Mandatory. The internal name of the anchor control relative to which you are positioning your new custom section. For internal names of factory-supplied controls, see the subtopics under Positioning Your Custom Control.
@SequenceNumber	Optional (when omitted, the default value is null). Where two or more custom properties are declared with the same anchor in their **@RelativePositionTo** parameters, they are ordered by the sequence number. If there is no sequence number declared, they are ordered by the execution order of the SQL commands.
@Position	Optional (when omitted, the default value is `0`). The alignment of your custom control within the two-column layout of a properties page. For the integer values and their meanings, see Positioning Your Custom Control.
@Width	Optional (when omitted, the default value is `1`). The number of columns spanned by this control in the two-column layout of a properties page. For more information, see Positioning Your Custom Control.

@DataSource

Mandatory when `UIFieldTypeID = 8`, and otherwise ignored. Within single quotes, this is an ordered list of the values to be displayed within the option list. By default, the list is comma-separated, but see **@DataSourceDelimiter**. Values (between delimiters) may include white space, and leading white space on a value is ignored. Every value must be unique. One of the values may be a null, creating a blank row in the drop-down list in the web interface. Example:

```
@DataSource = ', Apples, Oranges, Ripe Pears, Tangerines'
```

This example creates a drop-down list with the first position blank (this displays an empty value until the operator selects another value from the list).

> ***Restriction:** When you add a custom drop-down list (when `UIFieldTypeID = 8`), it is not possible to localize the values for the individual options within the custom drop-down list. (This is in contrast to adding a custom option within a drop-down list included in the standard product: the standard lists allow for customization of any options, including added custom options; whereas drop-down lists that are in entirety custom cannot be localized.)*

@DataSourceDelimiter

Optional (when omitted, the default value is the comma `,`). A single ASCII character (a punctuation character is expected) that does not occur in your data set and is used as a delimiter between values in **@DataSource**. The separator character must be enclosed in single quotation marks. If `UIFieldTypeID` has any value other than `8`, this parameter is ignored.

@Required

Optional (when omitted, the default value is zero). May have the following values:

- `0` means that input to the custom field in the web interface is optional, such that the value may be left blank.
- `1` means that in the web interface, the custom field is mandatory, and may not be left blank by an operator completing the enclosing tab.

This integer value must *not* be surrounded by quotation marks.

> ***Note:** This parameter affects only data input through the web interface of FlexNet Manager Suite. It does not have any effect, for example, on data imports using the Business Importer.*

@StringLength

Optional (when omitted, the default value is `256`). Ignored unless the **@UIFieldTypeID** has either of the values `4` (text box, or field) or `5` (text area, multi-line). Specifies the maximum length of the input string in the web interface. The largest permissible string length is 4000 bytes.

@ReadOnly	Optional (when omitted, the default value is zero). May have the following values: • `0` means that the control is read/write, and can be updated in the web interface. • `1` means that the control is read-only, and cannot be changed in the web interface. This value is illegal if `@Required = 1`, and will produce an error when executed.

Localizing Display Names of Custom Properties

Execute the following in SQL Server Management Studio against your FNMSCompliance database, once the custom properties already exist in the database.

Syntax:

```
EXEC dbo.CustomPropertyUpdateDisplayName
        @Name = 'My-Unique-Name',
        @CultureType = 'ISOCultureCode',
        @DisplayNameInPage = 'Prompt value',
        @DisplayNameInReport = 'Column header'
```

where

@Name	Mandatory. The internal name (in code and database) of your custom property, declared when you added it to the database. Never localize this internal name.
@CultureType	Mandatory. A five-character ISO culture name (enclosed in single quotation marks). The permitted values are available at http://msdn.microsoft.com/en-us/goglobal/bb896001.aspx. This is the culture for the localized values in this declaration. Notice that localized values are only displayed in FlexNet Manager Suite when your enterprise has installed the corresponding language pack that provides localized values for the factory-supplied controls as well.
@DisplayNameInPage	Mandatory. This is the localized label (enclosed in single quotation marks) displayed on the tab in the web interface for FlexNet Manager Suite when the culture setting for the interface matched the one you declare in `CultureType`.
@DisplayNameInReport	Mandatory. The localized label (enclosed in single quotation marks) that is available for you to include in custom reports that display this custom property.

You can repeat this procedure as often as required to define localized display names in all cultures in use in your enterprise.

***Tip:** The appearance of the web interface for different locales is controlled in two separate places:*

- *The formatting of dates and numeric values is taken from the settings on your web browser.*
- *The language presented in the web interface is controlled in the **My Preferences** page (under the configuration menu available in the top-right corner of the web interface. Options for other languages are only present when your enterprise has purchased appropriate language pack options.*

This separation allows for the common case where a single language (such as English) may have different date formats (such as 12/31/14 and 31/12/14) in different parts of the world.

Removing a Custom Property

Defined a custom property incorrectly? Execute one of the following in SQL Server Management Studio against your FNMSCompliance database, referencing the faulty custom property.

***Warning:** Removing a custom property (tab, section, or other control) in one of the following ways deletes the control from the web interface of FlexNet Manager Suite, removes the custom property from the custom report builder, and optionally can also delete the property from the underlying database. If you specify removal of the data from the database (`@DeleteFromDB = 1`), any custom reports previously built that included the custom property will fail to load until you modify the report definition to remove this custom property.*

Deletion is specific to each individual custom property you have previously declared, and does not cascade down to other items they may contain. For example, suppose you had declared `My.LicenseTab.Charges`, containing `My.LicenseSection.Monthly`, in which there was a custom control `My.Chargeback.Amount`. Subsequently you delete `My.LicenseTab.Charges`. Because the tab disappears, obviously everything it contained is also 'hidden'. However, `My.LicenseSection.Monthly` and `My.Chargeback.Amount` have not been deleted, and are waiting in the database. You can repeat the creation process for these controls using the same name for each (this performs an update), and declaring a new anchor point for them in the web interface (for instance, in this example you might move them into the **Financial** tab). Thereafter these controls reappear in the web interface, and display any data previously saved through the custom controls.

Syntax:

```
EXEC dbo.RemoveTabFromWebUI
        @TargetTypeID = TargetTypeID,
        @Name = 'My-Unique-Name'
```

```
EXEC dbo.RemoveSectionFromWebUI
        @TargetTypeID = TargetTypeID,
        @Name = 'My-Unique-Name'
```

```
EXEC dbo.RemovePropertyFromWebUI
        @TargetTypeID = TargetTypeID,
        @Name = 'My-Unique-Name',
        @DeleteFromDB = 0
```

where

@TargetTypeID	Mandatory. Integer that identifies the type of object from which you are removing the custom property. For supported objects and their integer equivalents for `TargetTypeID`, see Objects You Can Customize.
@Name	Mandatory. The internal name (in code and database) of the custom property you are removing. You defined this name when you create the custom property.
@DeleteFromDB	Optional (default is zero when omitted). Boolean. When omitted or given the value zero, the custom property (and the data it may contain if it has already been in use) remains in the database, although it is no longer available in the web interface of FlexNet Manager Suite. When this parameter is set to `1`, the custom property is removed (along with any stored values) from the database. This parameter is only available when removing properties, as tabs and sections do not have any data component stored in the database.

Customizable Drop-Down Lists

Operators can select values from drop-down lists of available options. If you have system administration rights, you can customize some of these lists. The following table contains all customizable drop-down lists and their corresponding SQL database tables.

***Tip:** Many of these drop-down lists of static values can also be updated using the FlexNet Business Importer. For details, see the separate PDF Using the FlexNet Business Importer.*

Database table	Notes
`AcquisitionMode`	A list of methods that can be used to obtain an asset. You may add methods, but it is recommended that you do not rename or remove the existing items. Examples include `Purchased`, `Leased`, `Rented`. Sample location: Asset properties, **Financial** tab.
`AssetStatus`	The status of an asset. You can add states, but existing items must not be renamed or removed. Examples include `Purchased`, `In storage`, `Retired`. Assets with a status of `Retired` or `Disposed` do not consume from software licenses during compliance calculations. No other status values (including any you may add) affect consumption calculations. Sample location: Asset properties, **General** tab, shown as **Status**.
`AssetWarrantyType`	The type of warranty that applies to an asset. This list can be replaced with your own values. Examples include `One year on site`, `Three year on site`. Sample location: Asset properties, **Financial** tab, as **Warranty type**.

Database table	Notes
`ComplianceComputerRole`	The kinds of role that a computer might have. This list can be replaced with your own values. Examples include `Failover`, `Training`, `Backup`, `Test`. Sample location: Inventory device properties, **General** tab, as **Device role**.
`ComplianceUserStatus`	The status of a user within an organization. You can add status values, but existing items must not be renamed or removed. Examples include `Active`, `Retired`, `Pending` (perhaps for an employee just starting with the company). ***Note:*** *The `ComplianceUserStatus` list differs from the other lists in that it has an additional `IsUserActive` property that must be specified whenever a new status entry is added. Set the value of this property to `1` if you want end users with your new status to be included in compliance calculations, and `0` if you want them omitted. By default, end users with a status of `Retired` or `Inactive` are not counted in license reconciliation calculations, because they are assumed to not be active members of the organization.* Sample location: User properties, **General** tab, as **Status**.
`ComputerChassisType`	The chassis type, that is, that casing, of a computer. You can add types, but existing items must not be renamed or removed. Examples include `Notebook`, `Sealed-Case PC`, `Mini Tower`. Sample location: Inventory device properties, **Hardware** tab, as **Assigned chassis type**.
`ContractType`	The type of a contract. You can add types, but existing items must not be renamed or removed. Examples include `Lease`, `Support`. Sample location: Contract properties, **General** tab, as **Contract type**.
`ContractStatus`	The state of a contract. You can add states, but existing items must not be renamed or removed. Examples include `Active`, `Completed`, `Draft`. Sample location: Contract properties, **General** tab, as **Status**.
`EmploymentStatus`	A user's type of employment within your organization. This list can be replaced with your own values. Examples include `Employee`, `Part-time`, `Casual`. Sample location: User properties, **General** tab.
`EndOfLifeReason`	A list of disposal methods for an asset. This list can be replaced with your own values. Examples include `Lost`, `Stolen`, `Sold`. Sample location: Asset properties, **General** tab, shown as **Retirement reason** (only visible when **Status** is set to `Retired`).

Database table	Notes
`InstanceRole`	The possible roles of an instance of a piece of software (such as an Oracle Database). In some cases, vendors can attribute different licensing terms to an instance depending on its role within the organization. This list can be replaced with your own values. Examples include `Backup`, `Failover`, `Mirroring`. Sample location: Oracle instance properties, **General** tab, as **Role**.
`InstanceEnvironment`	The possible environments in which an instance of software can be deployed. For some vendors, the environment may affect the cost of licensing. This list can be replaced with your own values. Examples include `Development`, `Staging`, `Production`. Sample location: Oracle instance properties, **General** tab, as **Environment**.
`LeaseEndReason`	A list of reasons why a lease can be terminated. This list can be replaced with your own values. Examples include `Early Termination - Asset Returned`, `Buyout`, `Trade`. Sample location: Payment schedule properties, **Lease** tab (which is visible only when the **Payment schedule type** is `Lease`), as **Lease termination reason**.
`LicenseStatus`	A list of license states. You can add new status values, but existing items must not be renamed or removed. Examples include `Active`, `Retired`. Sample location: License properties, **Identification** tab, as **Status**.
`OracleLegacyLicenseType`	While the compliance of your older Oracle licenses is not tracked automatically, you may still record them and manually set their compliance status. Update this list to include any Oracle legacy license types in use at your organization. It is recommended that you do not rename or remove existing items. Examples include `Concurrent Device`, `Developer - Network License`. Sample location: Properties for an Oracle Legacy license type (only), **Identification** tab, as **Legacy type**.
`PurchaseOrderDetailType`	The possible types of purchases. You can add types to this list, but existing items must not be renamed or removed. Examples include `Software`, `Software Upgrade`, `Hardware maintenance`. Sample location: Purchase properties, **General** tab, as **Purchase type**.
`ResponsibilityType`	A list of responsibilities that can be assigned to users who are involved in contract management. You can add types to this list, but it is recommended that you do not rename or remove existing items. Examples include `Owner`, `Signatory`, and `Interested Party`. Sample location: Contract properties, **Responsibilities** tab, in the **Responsibility** column of the list of users.

Database table	Notes
SoftwareLicenseDuration	A list of license periods. You can add items to this list, but it is recommended that you do not rename or remove existing items. Examples include `Perpetual`, `Time Limited`. Sample location: License properties, **Identification** tab, as **Duration**.
SoftwareTitleClassification	A classification for the applications used in your enterprise. You can add items to this list, but existing entries must not be renamed or removed. Examples include `Freeware`, `Malware`, `Update`. Sample location: Application properties, **General** tab, as **Classification**.
TermAndConditionType	Shown as the **Type** of a term or condition in the properties of a contract, it is used to classify the terms or conditions being documented for a contract. You can customize these types only on the **Terms and conditions** tab of the contract properties. Examples include `Acceptance Period`, `Renewal`, `Limitation`. Sample location: Contract properties, **Terms and conditions** tab, after selecting a term or condition from the list and clicking **Open**.
UserTitle	The titles that can be used before a person's name. This list can be extended with your own values. Examples include `Mr.`, `Miss`. Sample location: User properties, **General** tab, as **Title**.
UserSuffix	Additional information about the user's name, for example, `Jr.`, `Sr.`, and so on. This list can be extended with your own values. Sample location: User properties, **General** tab, as **Suffix**.

Columns in SQL DB tables

The table above lists the SQL database tables that you can modify to add, change, or remove entries. Each of these tables contains least three columns:

- An identifier field (for example, `UserTitleID`).

> ***Remember:*** *If you add a new value, it is automatically assigned a unique identifier greater than 1000. The first 1000 identifiers are reserved for internal use, do not manually adjust this field.*

- A resource name column (usually called `ResourceString`). This is a unique field that must exist for every row. It is used to find the internationalized text to be displayed on the screen so that different language versions of FlexNet Manager Platform will display different text for the same value. It should contain the name of a resource string to be loaded from the internationalized system. If the string does not exist for a particular language version, then the value in the default value column will be used instead. Every value in the `ResourceString` column is also represented as a row in the `ComplianceResourceString` table.

> ***Tip:*** *Because options in a drop-down list change infrequently, they are cached to improve database performance. Therefore, after adding a custom option in one of the drop-down lists mentioned in the table above, restart Microsoft IIS on the web application server (or, on smaller implementations, the server hosting that functionality).*

- The default value (usually called `DefaultValue`). It is displayed on the user interface if no localized string is available.

Customizing a Drop-Down List

Tip: *You might need to check if the drop-down list you are about to modify can be customized: for details, see Customizable Drop-Down Lists.*

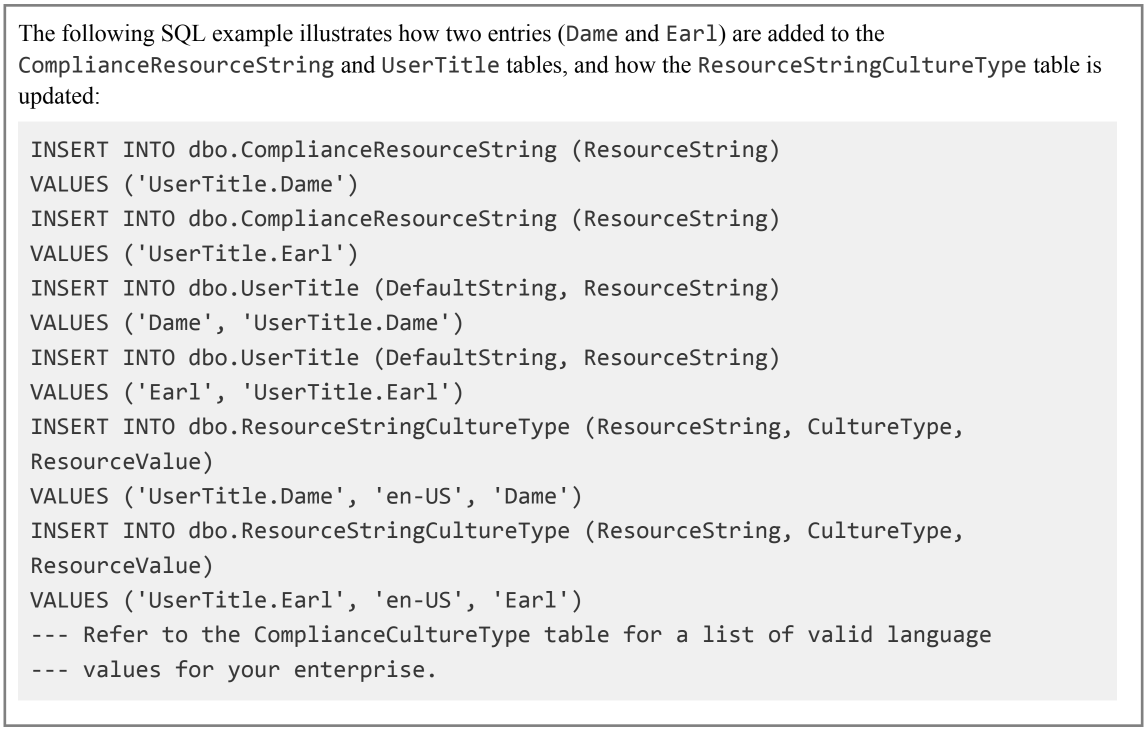
Restriction: *While you can use this process to add a custom option (including localization) within a standard drop-down list shipped with FlexNet Manager Suite, it is not currently possible to localize the options within an entirely new custom drop-down list.*

Before adding, removing, or changing a value on one of the customizable lists, you must make an equivalent change to the `ComplianceResourceString` database table. You can then update the database table that corresponds to the drop-down list you are modifying.

To customize a drop-down list:

1. Run SQL Server Management Studio and modify the rows in the `ComplianceResourceString` database table.
2. Open an SQL database table that corresponds to the drop-down list you want to customize, and add the new values.

Note: *The values that you add must be unique within the table they are being added to.*



The following SQL example illustrates how two entries (`Dame` and `Earl`) are added to the `ComplianceResourceString` and `UserTitle` tables, and how the `ResourceStringCultureType` table is updated:

```
INSERT INTO dbo.ComplianceResourceString (ResourceString)
VALUES ('UserTitle.Dame')
INSERT INTO dbo.ComplianceResourceString (ResourceString)
VALUES ('UserTitle.Earl')
INSERT INTO dbo.UserTitle (DefaultString, ResourceString)
VALUES ('Dame', 'UserTitle.Dame')
INSERT INTO dbo.UserTitle (DefaultString, ResourceString)
VALUES ('Earl', 'UserTitle.Earl')
INSERT INTO dbo.ResourceStringCultureType (ResourceString, CultureType,
ResourceValue)
VALUES ('UserTitle.Dame', 'en-US', 'Dame')
INSERT INTO dbo.ResourceStringCultureType (ResourceString, CultureType,
ResourceValue)
VALUES ('UserTitle.Earl', 'en-US', 'Earl')
--- Refer to the ComplianceCultureType table for a list of valid language
--- values for your enterprise.
```

2

Importing Inventory Spreadsheets and CSV Files

Among many supported methods of importing software and hardware inventory details, FlexNet Manager Suite supports the import of inventory information in either comma-separated value (`.csv`) files, or Microsoft Excel spreadsheets (`.xlsx` files). To differentiate these from other imports of spreadsheet information (such as for purchases, enterprise groups, and user assignments), these are called 'inventory spreadsheets', a convenient term covering both file formats (unless specifically excepted).

Inventory spreadsheets can be imported in either of two ways:

- A 'one-off' import through the web interface of FlexNet Manager Suite
- A repeatable, scheduled import through an inventory beacon.

This chapter covers the processes for both kinds of imports of inventory spreadsheets.

The formats of these imported files are fixed, and defined by downloadable templates. The documentation of each of these templates, and the mapping of all the spreadsheet columns to the compliance database, is included in the *Inventory Spreadsheet Templates* chapter of the companion volume, *FlexNet Manager Suite Schema Reference*.

Overview of Inventory Spreadsheets

You can upload inventory data from spreadsheet files to FlexNet Manager Suite in two ways:

- A one-off, one-time upload that you might need to do for workflow validation, demonstration or proof-of-concept purposes.
  The data will be saved on the application server and created as a unique connection. Once data from this connection is processed, the connection is disabled (and cannot be re-enabled). Inventory from this connection ages, and eventually appears in the **Out-Of-Date Inventory** list. To clear the stale data, delete the connection: everything imported (only) from that connection is then removed from the operations databases.

- Ongoing import of spreadsheet inventory data.
  To set up this workflow, you must use an inventory beacon. This workflow allows scheduled, repeated imports, and data updates, in just the same way as regular inventory imports from other (non-spreadsheet) data sources.

***Remember:** The complete set of inventory data should be uploaded whenever updating the data previously imported from a pre-existing spreadsheet. That is, all original rows, along with the new rows of inventory data, get imported every time the data has to be updated. As with all other inventory imports, records that disappear from the source connection (in this case, your spreadsheets) are automatically removed from the operations databases to maintain synchronization with the data source.*

If you need to collect inventory from a source FlexNet Manager Suite cannot directly connect to (for example, a source inaccessible for security or any other reasons), you can export this software, hardware or virtualization data from your source into a comma-separated value (`.csv`) or Excel (`.xlsx`) file. This inventory spreadsheet acts as an intermediate file for data upload through an inventory beacon. For repeated use, you can use custom, in-house scripts to populate these spreadsheets with current data, saving them to your chosen upload folder. You can then schedule regular imports from your upload folder to keep the data current.

The following inventory types are supported:

- Computers and VMs
- CAL usage inventory, called access evidence (see the *FlexNet Manager Suite System Reference Guide* for details)
- Installation evidence
- File evidence
- Windows Management Instrumentation (WMI) evidence
- Oracle evidence
- Virtual machine (VM) pool data
- Cluster evidence
- Cluster group data
- Cluster host affinity rule data
- File evidence and installer evidence for remote access (use these templates for lists of all users who can access a cloud-based service, or virtual desktops and applications).

Each type of inventory has a fixed file format, and you can access the corresponding inventory templates in either of two ways:

- You can download them from the web interface of FlexNet Manager Suite
- You can open them from an inventory beacon, where local copies are automatically synchronized with the central application server.

You can then populate your chosen templates with your inventory data, and import the completed files back into FlexNet Manager Suite.

One-Off Import of an Inventory Spreadsheet

You can manually upload your inventory data from a spreadsheet to FlexNet Manager Suite.

The **Inventory Data One-Off Upload** page (accessible through the **Inventory Data** tab of the **Data Inputs** page) is for a single import of inventory data from spreadsheets. If you need to repeat the inventory data import (for example to make a data correction), you must first delete the previously set-up connection (the corresponding server-side copy of the spreadsheet is automatically deleted as well). For details, see Deleting Spreadsheet Inventory Data from the Database.

Each one-off upload creates a separate import connection. This is true even if two uploads have an identical name: updates are not possible through the web interface, and two uploads of the same name produce two identically-named connections, functioning separately.

***Important:** Do not allow two or more one-time connections for inventory spreadsheets to exist at the same time, even with different import names. Data from every upload is persisted on the central application server, and is imported afresh from the central spreadsheet copies into the operations databases for every inventory import and license calculation. Having multiple connections to spreadsheets that contain the same computers (for example, from the mandatory `Computer` spreadsheet, reflected in lists of inventory devices) can cause data 'toggling' between imported values, based on the which connection for spreadsheet data was most recently processed. Therefore you must delete the previous one-off upload connection before uploading a newer batch of inventory data.*

Scheduling regular imports of inventory spreadsheets is not supported through the web interface: it is a one-time connection. Once data from this connection is processed, the connection is disabled (and cannot be re-enabled). Inventory from this connection ages, and eventually appears in the **Out-Of-Date Inventory** list. To clear the stale data, delete the connection: everything imported (only) from that connection is then removed from the operations databases. (In contrast, you can arrange regularly scheduled spreadsheet imports through an inventory beacon, as described in Setting Up Scheduled Imports of Inventory from Spreadsheets.)

The data from an individual spreadsheet file may affect several database tables in FlexNet Manager Suite. For more details about the template’s column names and their corresponding database fields, see the corresponding section in *FlexNet Manager Suite Schema Reference*. You can download this document from the title page of the online help.

***Remember:** Within your spreadsheets, the column names and column order cannot be modified from those supplied in the template files. Any such change results in an import failure. (Here, for a one-off import, you may rename the spreadsheet files themselves, since their purpose is made clear by the field through which you identify and upload each spreadsheet. In contrast, when the same templates are used on an inventory beacon for scheduled uploads, the file names as well as the column names and column order must all be maintained.)*

1. Navigate to the system menu (⚙▼ in the top right corner), and click **Data Inputs**.
2. Click the **Inventory Data** tab, and ensure that the inventory data **Name** which is marked as `Primary` has a **Task status** of `Completed`.

   At least the first occurrence of the primary inventory import must have completed successfully before any secondary source (including the one-off inventory spreadsheet) can be imported. If you attempt a one-off import of an inventory spreadsheet before the first successful primary import, it results in an error `Inventory import failed because data has not been imported from the primary data source`. This is because of the rules for data merging, explained in more detail in Making a Data Source Connection the Primary One. By default, the primary connection is the internal inventory connection, named **FlexNet Manager Suite** in this list. If it has not yet completed, a member of the `Administrator` role can run an import and compliance calculation manually by navigating to **License Compliance > Reconcile** (in the **Events** group). Be sure to select **Update inventory for reconciliation** (available only to administrators) before clicking **Reconcile**.

3. Click **One-off upload**.
4. Download the `InventoryTemplates-`*`version`*`.zip` file, and populate the template that you need with the inventory data.

__Tip:__ When you process spreadsheets uploaded through the __Application virtualization__ section, there are two possible paths:

- *You may want to record consumption against existing users on their computers that are already recorded in the operations databases. In this case, be certain that the user's ID from the central database is exactly recorded in the `UserID` column in (either or both of) the spreadsheets used for __Application virtualization__, which are identified in the __Access shown by file evidence__ or __Access shown by installer evidence__ fields of this __Inventory Data One-Off Upload__ page. When the user is matched, the installation is recorded against a computer that the user 'owns' (that is, is linked as either the assigned user or calculated user).*
- *You may want to create new records for remote devices and remote users who are not already recorded in your operations databases. To do this, make sure that both these statements are true:*
    - *The `Computer` spreadsheet (identified in the __Computers and VMs__ field) contains data in both the `ComputerName` and `LastLoggedOnUser` columns.*
    - *The value in that `LastLoggedOnUser` column matches the value in the `UserID` column in (either or both of) the spreadsheets used for __Application virtualization__, which are identified in the __Access shown by file evidence__ or __Access shown by installer evidence__ fields.*

5. In the **Upload name** field, enter a name for this inventory data upload.

   It is best practice to specify an easily recognizable name, because this name is used in lists of data connections. In particular, when the time comes to delete the connection to this one-off import, you will value a self-evident name. Perhaps consider a name space prefix, such as `OOIIS-` or some other convention to help you isolate one-off imports of inventory spreadsheets.

6. From the **Spreadsheet type** drop-down list, select the inventory file format you are going to upload.

__Attention:__ The files are processed depending on the option you selected from the __Spreadsheet type__ list. Therefore in a single upload, you can include several distinct inventory files (one of each of the kinds listed on this page), but within a single upload all of the uploaded files must be of the same spreadsheet type.

7. For each kind of inventory that you wish to import from spreadsheets:

a. Next to the field for the appropriate data type, click **Browse**, and select the matching `.csv` or `.xlsx` template-based file containing your inventory data.

> 🚫 ***Restriction:*** *As a minimum, you must upload one file through the* ***Computers and VMs*** *field. This file is mandatory because it contains computer names and serial numbers, plus the* `Processor Cores` *field required for license optimization.*

b. Next to each identified data file, click **Upload**.

"`File uploaded successfully`" message is displayed.

c. Repeat the identification and upload process for all files included in this named upload.

8. Scroll down to the bottom of the web page, and click **Start processing**.

The name of your inventory connection is added to the table at the bottom of the page, and `In progress` gets displayed in the **Status** column. When the inventory file is fully processed, and the license reconciliation is finalized, `Completed` is displayed instead. Note that all inventory sources area reconciled, regardless of type.

Depending on the file type you imported, its data is available from the corresponding area of the web interface. For example, if you imported computer-related data, navigate to **Discovery & Inventory > All Inventory** to view the uploaded records.

> ***Note:*** *License reconciliation does not imply that there are no validation errors: you might need to click ⊞ in the* ***Task/Step*** *name column to see the results of individual steps. If there are any errors, click the hyperlink and troubleshoot as needed. For example, an error that occurred during the* `Import into staging` *step indicates an issue with the staging, in-memory tables or an invalid spreadsheet type. File-import tasks with the* `Failed` *status are displayed below the ⚙▾ menu, and are indicated with a red dot:*

You can also view a detailed log of any step within the inventory import: click ⊞ to expand its task, and in the **Logs** column for the step in question, click **Download log**.

Setting Up Scheduled Imports of Inventory from Spreadsheets

On an inventory beacon, you can set up a repeatable, automatic uploading of selected spreadsheet files of inventory data to FlexNet Manager Suite.

> ***Important:*** *If it is not the first time that you are importing a spreadsheet file into FlexNet Manager Suite, the values already imported with the previous file will be updated and overwritten accordingly. Any update of a previously uploaded spreadsheet file:*

- *Updates the data saved from any modified rows.*
- *Inserts data found in new rows.*
- *Deletes the data from the operational database that was previously imported from rows that have since been removed from the new spreadsheet file.*
- *Deletes duplicate rows. If a duplicate row is identified, only a single entry is created. Identification is based on matching the values in key columns. For example, if the keys match, but some of the other data is different, the first row of the two is kept, while all duplicate rows that follow are discarded.*

Templates are available through the inventory beacon (as described below), or can reuse templates downloaded for one-off uploads through the web interface of FlexNet Manager Suite (provided that these have not been renamed).

1. Start FlexNet Beacon.

   Note: *To run FlexNet Beacon, you must have system administrator rights.*

2. in the **Data collection** group, click **Inventory systems**.
3. Click the arrow on the **New** button, and click **Spreadsheet**.
4. From the **Spreadsheet Type** drop-down list, select the type to be used.
5. To prepare your inventory spreadsheets:

   a. Click the **Templates** hyperlink displayed in the **Create Spreadsheet Source Connection** dialog box.

   b. Populate the template(s) you choose with the appropriate type of inventory data.

      When scheduling an automatic, scheduled inventory import, you can populate and update spreadsheet files either by a purpose-built script, or through a work flow applicable to your organization. It is good practice to edit spreadsheet files in a work folder separate from your upload folder. This prevents a clash between file updates and file uploads that could result in incomplete data being processed.

      Important: *Remember that you cannot change the file name, nor any columns (number, names, or order) supplied in the template.*

   c. Create an upload folder, and save your completed inventory spreadsheet files to that folder.

      All spreadsheet files located in the one folder are included in the scheduled uploads.

      Note: *The folder can also be located on a shared network drive (make sure that an account running the inventory beacon has **Read** permissions on the folder).*

6. In the **Connection Name** field, type in a name for this inventory data upload.
7. In the **Connection Folder** field, browse to the folder with inventory spreadsheets you created in the steps above.

   Tip: *If you do not want to import the inventory data as yet, select the **Connection is in test mode (do not import results)** check box. (Remember that data from any secondary inventory source, including this one, cannot be imported until after the first successful import from your primary inventory source.)*

8. Select the overlapping inventory filter that you need.
9. Click **Save**.

   The new connection is added to the list of available inventory connections.
10. Select the new connection, and either:
    - Click **Execute Now**.
    - Click **Schedule...**, and choose the schedule on which to run repeated imports from the **Connection Folder**. (For details on creating schedules, see the online help for the inventory beacon.)

Making a Data Source Connection the Primary One

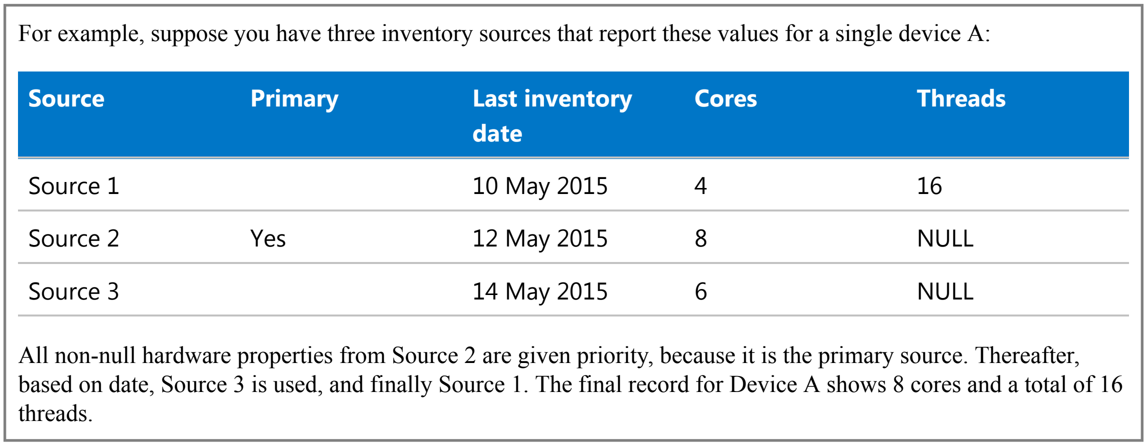
If you import hardware inventory fields from multiple sources, some fields duplicated across the sources may receive conflicting data. A common case is that one inventory tool returns a particular hardware property, while another tool does not collect the same property and returns a null. There are also differences in the ways tools collect inventory, so that sometimes values vary across tools.

***Tip:** This section applies only to hardware inventory values. Software inventory is always merged across all sources regardless of any source being marked as primary.*

FlexNet Manager Suite resolves conflicting hardware data in two ways:

- A non-null value received from an inventory connection designated as primary is never overwritten. (Nulls can be replaced.)
- Among values received from secondary sources, generally data with the most recent inventory date is used.

***Note:** There are some other settings for the secondary sources (related to whether duplicate inventory should be merged, ignored, or ignored only if older than* x *days).*



For example, suppose you have three inventory sources that report these values for a single device A:

Source	Primary	Last inventory date	Cores	Threads
Source 1		10 May 2015	4	16
Source 2	Yes	12 May 2015	8	NULL
Source 3		14 May 2015	6	NULL

All non-null hardware properties from Source 2 are given priority, because it is the primary source. Thereafter, based on date, Source 3 is used, and finally Source 1. The final record for Device A shows 8 cores and a total of 16 threads.

An inventory spreadsheet is treated exactly like any other inventory connection in this regard. You can use a repeated import of an inventory spreadsheet to correct specific values reported incorrectly by other inventory tools.

Tip: *You cannot make a one-off inventory spreadsheet upload primary. After a single upload, this source is disabled, and its inventory data ages. Only a repeated upload of an inventory spreadsheet through an inventory beacon should be considered as a possible primary source. Even then, you cannot make it primary until after its first import, so that the source is recognized by the central application server.*

To make a source connection the primary one, click **Make primary** displayed on its row on the **Inventory Data** tab of the **Data Inputs** page of the web interface.

Viewing Validation Errors for Uploaded Inventory Spreadsheets

Diagnose the source of any spreadsheet validation errors.

A page is available that analyzes validation errors in all uploaded inventory spreadsheets (both one-off through the web interface, and scheduled through an inventory beacon). This page is not directly available through the menus, but you can reach it in either of the following ways:

1. To access through the **Inventory Data One-Off Upload** page:

    a. Scroll to the bottom to the **Last 5 uploads** list.

    b. If necessary, click the **+** expander in the **Task/Step** column to reveal individual steps in the processing until the error is revealed.

    c. In the **Summary** column, click the **Validation errors** hyperlink.

    The **Inventory Upload Validation Errors** page is displayed.

2. To access through the **Data Inputs** page:

    a. Navigate to the system menu (⚙▼ in the top right corner), and click **Data Inputs**.

    b. Click the **Inventory Data** tab.

    c. Identify the connection for your inventory spreadsheet import, and click the expander arrow on its far right.

    The **Last completed import** section shows the count of validation errors. You may click the count (if it is more than zero).

    d. If necessary, click on **Show/hide task status and history** to expose the matching panel.

    e. In the **Summary** column, click the **Validation errors** hyperlink.

    The **Inventory Upload Validation Errors** page is displayed.

3. Use the diagnostic information to locate and fix the problem. (See the online help for this page for further details.)

4. Repeat the upload using the modified spreadsheet(s).

Important: *For a one-off upload, remember that you must delete the connection for your previous upload before attempting another.*

Deleting Spreadsheet Inventory Data from the Database

To remove data imported from an inventory spreadsheet, delete its connection.

When any inventory data source is removed from FlexNet Manager Suite, the data imported exclusively from that source is removed from the database as well.

***Tip:** Any data imported from multiple sources remains until its last source is removed. This means that if you want to delete from the database those inventory records that you imported only from a spreadsheet, you need only remove the connection to that inventory spreadsheet.*

You may want to delete the connection to an inventory spreadsheet for several possible reasons:

- You made a mistake with some values in a one-time import of an inventory spreadsheet. To correct this, you must first delete the previous connection to that spreadsheet, and then do a new one-off upload of the amended inventory spreadsheet.
- A one-time upload failed in some way, and is now disabled. You must delete this connection to retry.
- You accidentally have multiple connections to one-time inventory spreadsheet imports existing to exist at the same time. All but one of these must be deleted.
- Inventory imported from a one-time spreadsheet import has aged, and you want to remove it from the **Out-Of-Date Inventory** listing.
- You want to change details about a scheduled import of inventory spreadsheets through an inventory beacon.

You can delete the connections separately for:

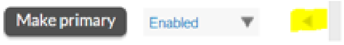
- One-time data uploads (for details about one-off uploads, see One-Off Import of an Inventory Spreadsheet). These connections are deleted only in the web interface.
- Scheduled, repeated uploads through an inventory beacon (for more information about these uploads, see Setting Up Scheduled Imports of Inventory from Spreadsheets). Connections established on an inventory beacon must be deleted both in the web interface and separately in the FlexNet Beacon interface.

Starting in the web interface for FlexNet Manager Suite, use this process to delete a connection to an inventory spreadsheet.

1. Navigate to the system menu (⚙▼ in the top right corner), and click **Data Inputs**.
2. Click the **Inventory Data** tab.

   ***Tip:** For connections through inventory beacons, if you do not want to delete your set-up connection, and plan to re-use it in future, select **Disabled** from the **Connection status** drop-down list displayed on its row. Manually disabled connections can be re-enabled when you are ready. (In contrast, one-off upload connections are automatically disabled after a single processing run, and cannot be re-enabled.)*

3. Click the light-grey triangle displayed at the far right of your data connection's row:



A panel expands to reveal more details about the connection.

4. Inside this panel, click **Delete connection**.
5. Click **OK** on the confirmation dialog.
6. If this is a scheduled inventory spreadsheet import (that is, one running through an inventory beacon):

    a. Log in to the appropriate inventory beacon (for example, through Remote Desktop Connection), and start FlexNet Beacon.

    Tip: *You must log in with an account that has administrator privileges on the inventory beacon.*

    b. Ensure that the **Inventory systems** page is selected, and select the connection from the list.

    Your connection shows `Spreadsheet` in the **Type** column.

    c. Click **Delete**, and on the confirmation dialog, click **OK**.

The saved copy of your spreadsheet is removed (from the central application server for one-off uploads, or from the inventory beacon for repeatable uploads). At the next import and compliance calculation, the records created from that spreadsheet are removed from the database.

3

Introduction to Client Access License

A Client Access License (CAL) is a software license that is required to access the services of certain server products like `Microsoft Exchange Server` or `Microsoft SharePoint Server`. A CAL is required for each accessing user or device that accesses the server product unless a processor-based or core-based license is procured for the accessed server application, or an External Connector License is procured to cover the external users' access to the server applications. A CAL provides the access rights to physical, virtual, and (sometimes) online services. Most of the Microsoft server products, including Windows Server, SQL Server, Exchange Server, SharePoint Server, and Microsoft Skype for Business Server (previously Microsoft Lync Server) require a CAL for each accessing user or device. With detailed information about CALs and CAL management, this chapter may help you in managing CALs through FlexNet Manager Suite.

CAL Types

A single (User or Device) CAL covers any number of servers for that product. For example, a user with a User CAL for Microsoft SharePoint Server can access any number of Microsoft SharePoint servers within the organization. Some Microsoft server products include client access rights in the server license itself. For products such as SQL Server, instead of buying CALs, you may choose to buy processor-based or core-based licenses for the accessed server applications instead of licensing under the server/CAL licensing model. Certain products like Microsoft SQL Server can be licensed based on the number of processors or cores in the host server.

The licensing rules for CALs differ depending on whether the accessing users are employees of the licensee organization or are external users accessing the licensed servers. Some versions of Microsoft SharePoint Server, such as SharePoint 2013 and SharePoint 2016 require CALs for employee access to those servers, but include rights for external users accessing those same servers. For example, a website powered by an external web server could be accessed by a possibly-unpredictable number of users and should be licensed via a version of SharePoint that includes external access rights or, for earlier versions, an External Connector License is required in addition to the server license. You may wish to check the usage required for servers in your environment and evaluate the various license models available for those servers before making your purchase decision.

For Microsoft servers that have underlying server system requirements, the relevant CALs are required for each server product accessed. For example, Microsoft SharePoint Server installations require both Microsoft Windows Server and Microsoft SQL Server. As such, each accessing user or device must have a Microsoft SharePoint CAL, Microsoft Windows Server CAL and Microsoft SQL Server CAL to comply with license requirements, unless access is provided by the server license itself (as is the case of servers licensed per core or covered by an External Connector License).

CAL types

This section outlines the different license types used in the context of CALs. FlexNet Manager Suite only supports Microsoft User and Microsoft Device CALs via the `FlexNet Manager for Microsoft` product.

License Type	Description
User CAL	An alternative to a Device CAL, a User CAL is required per user per server product that requires a CAL. A user with a User CAL for a server product can access any instance of that server product within the enterprise via any number of devices. For example, if a user `Peter` has a single User CAL for Microsoft SQL Server product, he can access any installation of Microsoft SQL within the enterprise.
Device CAL	An alternative to a User CAL, a Device CAL is required per device per server product that requires a CAL. An accessing device with a Device CAL for a server product can be used by any number of users to access any instance of that server product. For example, if you have a Microsoft Device CAL for `Microsoft SharePoint Server` for an inventory device, any number of users can access any instance of `Microsoft SharePoint` from this device.

Other related license types

The following related license types are not directly supported by FlexNet Manager Suite. To manage any of these licenses, creation of custom license is required.

- **Client Management License (CML)**: Required per management server (SCCM) that is managing devices with non-server operating system (for example, Windows 10). If you procure device CALs for those devices that access the server, you do not require a CML.
- **External Connector License**: Required per server for each server product that is to be accessed by external users (non-employees) from outside the company network. For example, if some users of an external organization have been granted access to your `Microsoft Exchange Server`, that server requires an External Connector license.
- **Additive CALs**: A CAL required for a specific server, in addition to a User or Device CAL. Additive CAL is required per server when some advanced server functionality is accessed, in addition to the base server functionality. For example, `Windows Server Rights Management Services (RMS) CAL` is required in addition to Windows Server User or Device CAL.

Selecting a CAL Type

You can buy individual CALs for each accessing user or accessing device, or you may choose to buy CAL Suites (for a user or device). To make an effective decision about which CALs you should buy, you may want to know the usage details for the server products that require CALs. Organizations typically use a mixture of CAL licensing types based on their usage needs and the profiles of their user population.

Choosing Between User and Device CALs

If you choose to license servers via the Server/CAL license model, you may choose from user-based or device-based licenses. The **User CAL** approach requires you to purchase a CAL for every user that accesses a Microsoft server product (such as `Microsoft SharePoint Server`), regardless of the number of devices used to access that particular product. This enables users to access the services from multiple client devices, including any computers from outside the organization. The User CAL also covers access via mobile devices, such as users checking their email via smartphones or tablets. One User CAL for a server product enables you to access any number of instances of that server product. For example, if you have purchased a User CAL for Windows Server for a user, that user can access multiple Windows Servers.

Alternatively, the **Device CAL** approach requires you to purchase a CAL for every device through which the services of a server product are accessed. With an appropriate Device CAL for a device, any number of users can access the server product through that accessing device. This is often a desirable option in environments such as call centers, retail outlets or manufacturing sites in which multiple users share a single PC or kiosk. The ability to mix Device and User CALs in a single environment depends on your license agreement terms, but you must assign individual CALs to either a device or a user.

To clarify this concept, take an example of an organization with 600 users accessing Windows and Exchange servers. These 600 users work in three shifts of 200 at any time. The organization may choose to purchase 600 User CALs for Windows and 600 User CALs for Microsoft Exchange Server. However, a simple analysis shows that at any time, only 200 users are using the same computers to access the servers. Therefore, the organization is likely to buy 200 Device CALS for Exchange Server and 200 Device CALs for Windows. However, if these same 200 users are also accessing servers via their smartphones, tablets or home computers, you may find the User CAL option to be more affordable.

***Note:** Microsoft typically recommends you not to mix User and Device CALs.*

For external users who connect to your organization’s computers (for example, guest users or business partners), you can buy additional User CALs for each accessed server or an External Connector License, if appropriate for the quantity of external users involved.

Choosing Between Individual CALs and CAL Suites

A CAL Suite is a special license prodviding CALs for several different server products. This may make a CAL Suite more cost effective than buying an individual CAL for each distinct server product. For example, if 100 users in your organization have access to Microsoft SharePoint, Microsoft Exchange, Microsoft Skype for Business (previously Microsoft Lync Server), and Microsoft System Center Servers, it is more cost effective to purchase 100 Core CAL Suite licenses instead of 100 standalone product CALs for each of these servers. Microsoft has the following two Server CAL Suite offerings:

- Microsoft Core CAL Suite
- Microsoft Enterprise CAL Suite.

Consider the following points before you purchase CAL Suites:

- You can license these suites on per user or per device basis, and cannot split between users and devices.
- CAL Suites can only be purchased with Software Assurance (maintenance) coverage. If you do not renew the Software Assurance, the CALs are locked into the current version of each CAL available at the expiry date.

- As CAL Suites contain licenses for independently-released products, CAL Suites are version-less. CAL Suites provide the right to use the most recent version of every product in the suite.

Tip: *For detailed information about Microsoft CAL Suites, see the Microsoft website.*

Virtualization and CALs

As CAL consumption is based on the access to a server product, it does not matter whether the server product has been installed on a virtual or a physical machine. You are required to buy CALs based on the number or users or devices accessing the server software. A User CAL grants access to any instance of that server product within the enterprise. Similarly, when you buy a Device CAL for a server product, any user can access any instance of the server product through that device.

How Does FlexNet Manager Suite Calculate CAL Compliance

To determine an installation of a server application on an inventory device, FlexNet Manager Suite uses evidence (any combination of installer, file, or WMI). An additional evidence type called access evidence is separately used to measure access to the server applications, such as `Microsoft SharePoint Server`.

Note: *You need the `FlexNet Manager for Microsoft` product to create and manage CALs in FlexNet Manager Suite. To gather CAL usage inventory, you must set **CAL inventory options** while creating an inventory target to `Allow CAL access evidence collection on these targets`. For more information, see **Creating a Target** in the online help.*

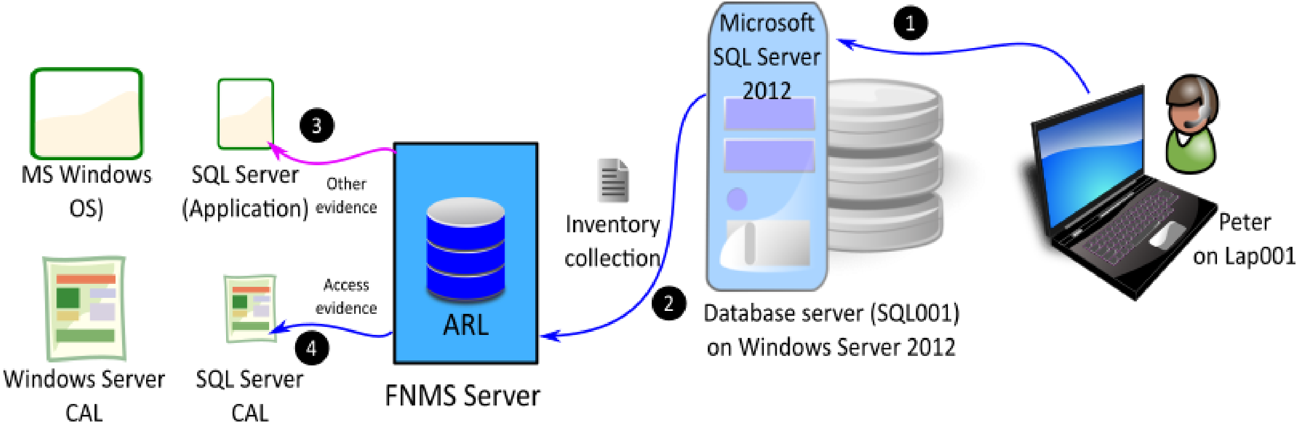
When linked to an application, the access evidence records any access event to a particular server application such as `Microsoft SharePoint Server 2013`. An access evidence record provides information about the accessed application, accessing user, and accessing device. The access evidence information is collected in a separate file (`.swacc`) as a part of the discovery and inventory process. This file is only generated for the inventory devices that have the supported server products installed on Windows Server 2012 or later and for which Microsoft's User Access Logging (UAL) capability has been enabled. Access evidence is collected through various services including User Access Logging (UAL) and PowerShell scripts for some products. FlexNet Manager Suite can collect the access evidence through any of the following methods:

- The locally-installed FlexNet inventory agent
- Zero touch inventory collection through inventory beacon(s)
- Inventory uploads from SCCM (CAL usage inventory only for SCCM)
- Manual upload of access evidence through the **Inventory Data One-Off Upload** page

The inventory collected from any of these sources is transferred from an inventory beacon to the central application server through regularly scheduled uploads.

For conventional device licenses, during the reconciliation process the Application Recognition Library (ARL) matches the available evidence to record an application installation. For CALs, while access evidence is linked to an application, it is not used to recognize the linked application installation; instead, it is used to identify access to that application. Like other product licenses, a CAL is also linked to the appropriate application record. However, in the case of CALs, the compliance position is generated based on the usage data (how many clients accessed the server application). The default license priorities are used to consume the appropriate license entitlement against a piece of access evidence. The collected access evidence records are visible on the **All Evidence** > **Access evidence** page.

The following diagram illustrates how FlexNet Manager Suite manages CALs:



1. A user `Peter` accesses the `Microsoft SQL Server 2012` installation on `SQL001` database server, installed on Microsoft Windows 2012. The access event is recorded for Microsoft Windows and Microsoft SQL Server.
2. During the next inventory collection process, FlexNet Manager Suite gathers hardware, software, and access inventory for the `SQL001` inventory device.
3. During reconciliation, FlexNet Manager Suite uses evidence to report an installation of Microsoft SQL Server 2012 and Microsoft Windows 2012.
4. The collected access evidence identifies that `Peter` accessed `Microsoft Windows Server 2012` and `Microsoft SQL Server 2012` on `SQL001`.
5. Assuming that neither `Peter` nor `Lap001` has already consumed a CAL for accessing any other Windows server, FlexNet Manager Suite consumes an entitlement of Microsoft User or Device CAL for each of Microsoft SQL Server and Microsoft Windows based on the set license priorities. For more details on license priorities, see **How Does License Consumption Order Work?** in the online help.

Variations to the above example

- If you have a per-processor or per-core license for Microsoft SQL Server on `SQL001`, CALs are not required.
- If `Peter` is an outside user (for example, a consultant on a customer site), an External Connector license may also be required.
- If this Microsoft Server Installation is used by both internal and external users, you need CALs and an External Connector license, or you can buy a Processor or Core-based license of `Microsoft SQL Server`.

  If the collected access evidence does not match a known server product, it is preserved as unrecognized evidence (visible on the **Unrecognized Evidence** page). By default, FlexNet Manager Suite retains the CAL usage inventory data for 90 days from the date of inventory collection, unless the value of the **Number of days to keep CAL usage inventory** control is changed. For details, see the **System Settings** > **Inventory tab** in the online help.

Access evidence collection methods

FlexNet Manager Suite supports multiple Microsoft Server applications for CAL management. Different underlying methods are used to collect access evidence data for different versions of these products. Here is a list of access evidence collection methods used to identify access to a server application:

- **User Access Logging (UAL):** When this access method is used, FlexNet Manager Suite collects the access evidence through the User Access Logging (UAL) service of Windows Server, enabled by default in Windows Server 2012 or later. This service records the client device and user request events used to access Windows Server and other installed Microsoft server applications (such as `Microsoft SharePoint Server`) into a local database. FlexNet Manager Suite collects the access evidence data through a PowerShell script that uses specific Microsoft APIs for UAL. The access events are recorded for both physical and virtual clients and servers. To use this service for a particular Microsoft server application, the UAL service should be enabled on the host Windows Server. The accessed server application should be registered with the UAL service (as happens automatically during installation). For more information about enabling the UAL service, see Microsoft documentation for the `Get-Service UALSVC` Powershell cmdlet. For more information about products registered with UAL, see Microsoft documentation for the `Get-UALOverview` PowerShell cmdlet.

  The appropriate inventory beacon automatically runs specific scripts to determine which user accessed which server over the last 90 days, and through which inventory device. These scripts are run as a part of the discovery and inventory process.

- **PowerShell**: When this access method is used (for Microsoft Exchange and Microsoft Skype for Business), FlexNet Manager Suite collects access data using a PowerShell script that uses specific Microsoft APIs to track the server applications accessed by users. This data is collected as a part of the discovery and inventory process. The following details are not imported when this method is used:

  - Accessing device
  - Access date
  - Access count

  Note: *FlexNet Manager Suite only gets the accessing user details (who accessed the server product) and not the accessing device details (the device through which the server product was accessed). These details are specific only to the date and time when inventory was collected, and not for the last 90 days. Therefore, Device CALs are not supported for this method. Also, when a supported server application (such as Microsoft Exchange, SharePoint, or Skype for Business) is installed on versions of Microsoft Windows Server prior to Microsoft Windows Server 2012 (for example, Microsoft Windows Server 2008 R2, Windows Server 2008, Windows Server 2003 and earlier), the server application will not have UAL support. In these instances, for each access to the supported server application, FlexNet Manager Suite creates an access evidence record for Microsoft Windows Server too. This is because a User or Device CAL for Microsoft Windows is also required, in addition to a User or Device CAL for the accessed server application.*

- **SCCM Adapter**: The SCCM adapter has been enhanced to collect the access evidence for SCCM accesses. The operator can create the corresponding core CAL license in FlexNet Manager Suite.

- **Spreadsheet imports**: You can download the CAL usage inventory template, populate it with evidence data, and upload it to create access evidence records. This method is recommended when you cannot collect access evidence. For example, when UAL service is disabled, or for servers running versions of Microsoft Windows Server prior to Microsoft Windows Server 2008 (with no UAL support). You can also use the `CAL Legacy` license type for manual management of CALs. For more information about spreadsheet imports, see the *Importing Inventory Spreadsheets and CSV Files* chapter of this guide.

CAL consumption mode

The consumption of CALs is calculated based on the consumption mode set in the **Use rights & roles** tab of the license properties for each CAL. You can select one of the following two options:

- **Consume entitlements based on Access**: If you set the consumption mode to `Access`, FlexNet Manager Suite consumes a User CAL for all the users listed on the **All Users** page, or a Device CAL for all the devices listed on the **All Inventory** page, unless any restrictions are applied through the **Restrictions** tab of license properties. If you restrict the scope of this license to a specific enterprise group, a CAL is consumed for each user (in case of User CALs) or each device (in case of Device CALs) that are members of that enterprise group. For more information on license consumption restrictions, see the online help.

  Note: *No access evidence is required when entitlements are consumed based on access.*

- **Consume entitlements based on Usage within the time limit**: If you set the consumption mode to `Usage`, FlexNet Manager Suite consumes User or Device CAL for users or devices whose access to a server application has been reported by the appropriate access evidence. The usage tracking must be enabled for the accessed application.

Supported server products for CAL management

The following table outlines the access evidence collection methods and CAL consumption modes supported for the named Microsoft Server applications.

Table 6: Microsoft server products supported for CAL management

Microsoft Product	Product Version	User CALs Consumption		Device CALs Consumption		Inventory Data Source		Notes
		Access based	Usage based	Access based	Usage based	User CAL	Device CAL	
Windows Server	2012	Full	Full	Full	Partial	UAL	UAL	
	2012 R2	Full	Full	Full	Partial	UAL	UAL	
	2016	Full	See notes	Full	See notes			To be supported once Windows Server 2016 is released
SQL Server	2012	Full	Full	Full	Partial	UAL	UAL	Supported only on Windows Server 2012 or later
	2014	Full	Full	Full	Partial	UAL	UAL	Supported only on Windows Server 2012 or later

Microsoft Product	Product Version	User CALs Consumption		Device CALs Consumption		Inventory Data Source		Notes
		Access based	Usage based	Access based	Usage based	User CAL	Device CAL	
	2016	Full	Full	Full	Partial	UAL	UAL	Supported only on Windows Server 2012 or later
Exchange Server	2010	Full	Partial	Full	Limited	PowerShell	Spreadsheet Import	
	2013	Full	Partial	Full	Limited	PowerShell	Spreadsheet Import	
	2016	Full	Partial	Full	Limited	PowerShell	Spreadsheet Import	
SharePoint Server	2010	Full	Limited	Full	See notes	Spreadsheet Import	Spreadsheet Import	Partial support to be added later
	2013	Full	Full	Full	Partial	UAL	UAL	Supported only on Windows Server 2012 or later
	2016	Full	Full	Full	Partial	UAL	UAL	Supported only on Windows Server 2012 or later
Skype for Business (Lync)	2010	Full	Partial	Full	Limited	PowerShell	Spreadsheet Import	
	2013	Full	Partial	Full	Limited	PowerShell	Spreadsheet Import	
	2015	Full	Partial	Full	Limited	PowerShell	Spreadsheet Import	
SCCM	2012	Full	Full	Full	Full	SCCM	SCCM	Requires SCCM inventory
	2012 R2	Full	Full	Full	Full	SCCM	SCCM	Requires SCCM inventory
	2016	Full	Full	Full	Full	SCCM	SCCM	Requires SCCM inventory

Where:

- Full: Full support (UAL user data or SCCM data)
- Partial: Partial support (PowerShell script data or UAL device data)
- Limited: Limited support (requires spreadsheet import of access or usage data)

Note: *FlexNet Manager Suite collects the access evidence from the target Microsoft Windows Server, Microsoft SQL Server, and Microsoft SharePoint Server only if the* `UAL` *service of Microsoft Windows has been enabled on each accessed server. The accessed server application should be registered with the UAL service (which happens automatically during installation).*

Application usage versus CAL usage

It is important to understand the difference between application usage and CAL usage. In the above diagram, Microsoft SQL Server 2012 is an application installed on the server and recognized by FlexNet Manager Suite through imported evidence. When this application is accessed by a user (such as the database administrator) or another application installed on SQL001 device, the application usage is recorded for Microsoft SQL Server. The usage record is linked to the inventory device record of the physical server where the database has been installed.

When the service of this instance of Microsoft SQL Server is requested through a client device (for example, `Lap001`), the access event is recorded (by Microsoft UAL service) and collected for Microsoft SQL Server as CAL usage. The same process is used for Microsoft Windows 2012 on `SQL001`.

How to Manage CALs with FlexNet Manager Suite

You should undertake the following steps to manage CALs for Microsoft server applications supported by FlexNet Manager Suite:

1. Ensure that the inventory import is complete and FlexNet Manager Suite contains evidence data (including access evidence) for the devices installed with the supported Microsoft server applications that require CALs. You can verify this from the **All inventory** and **All evidence** pages.
2. Generate the **CAL Usage Inventory Report** to ensure that the access evidence has been collected.
3. Identify any server applications accessed without a CAL, by navigating to **License Compliance > Unlicensed CAL Usage**. Available only after a compliance calculation, this page displays a list of server products that have been accessed without a valid CAL. For each accessed application, you can click the number mentioned in the **Accessing devices** or **Accessing users** column to access the **CAL Usage Inventory Report** and view the related access evidence records. It is important to note that the numbers indicate the distinct users and devices, but the report displays all access evidence records.
4. On the **Access evidence** tab of the **All evidence** page, ensure that each access evidence is linked to the appropriate application. A null value for the **Name** column indicates that the evidence is not linked to the appropriate application. In such a case, link the evidence to the appropriate application. For more information, see the online help topics under **Evidence**.
5. Use the **All Licenses** page to check the usage of the existing CALs. You can set a filter `License type= Microsoft User CAL` or `License type= Microsoft Device CAL`, and check the value of the **Consumed** and **Used** columns.
6. Use the **CAL License Summary** report to view the consumption and compliance status for licenses of the type `Microsoft User CAL` and `Microsoft Device CAL`. For detailed assignment information, you may

check the **Consumption** tab in the license properties of a particular license. Note that some users may be accessing servers from their mobile devices.

7. For every CAL, ensure that you have selected the correct CAL consumption mode value through the **Consume entitlements based on** field on the **Use rights and rules** tab of the license properties. No access evidence is required if this field is set to `Access`.

8. Ensure that you have enough CALs or CAL Suite licenses to cover the usage. If you have some unused CALs, you can assign them to other users. You can use any of the following methods to create licenses:

    - **Processing purchases**: Use the **Unprocessed Purchases** page to recalculate and accept the recommendations to automatically create and link CAL purchases to the recommended CALs. For more information, see **Unprocessed Purchases** in the online help.

    - **Manual creation and linking**: You can create a license manually and link it to the appropriate server application. For more information, see **Creating a License** in the online help.

    Note: *The CAL Legacy license type is still supported for backward compatibility. You can use this license type to manually manage CALs when the access evidence cannot be collected for any reason.*

9. If required, configure the use rights for each CAL license, as well as for every product of a CAL Suite license. See the **Use Rights & Rules Tab** in the online help.

10. If required, configure the required exemptions and use rights and rules on CALs. See **License Properties > Use rights & rules** and **Consumption** tabs in the online help.

11. If required, you may allocate users and devices to appropriate CALs. Consider the following example use cases:

    - For a particular access event, you want a user to consume a CAL Suite license instead of a single-product CAL.

    - You need to exempt a user from consuming a CAL. To exempt, you need to allocate first.

    See **License Properties > Consumption tab** in the online help. Note that in the case of CALs, allocations always consume entitlements.

    Tip: *In usage scenarios where many external application users use a single server account to access a server, the **Allocated points** column value (on the **Consumption** tab of license properties) should be adjusted to show the actual consumption. For example, if multiple external-product users are using the same Microsoft SQL Server user to access the database, the UAL data will reveal access evidence for only one user of Microsoft SQL Server. In such cases, the usage should be adjusted to actual number of users to remain license compliant. The value of the **Allocated points** column should be edited to reflect the actual usage.*

12. When consuming CALs in the Access mode, you can apply restrictions to ensure that the CALs are consumed by appropriate users or devices. For more information, see **License Properties > Restrictions tab** in the online help.

13. You may use the following reports to review the CAL usage in your organization:

    - CAL License Summary

    - Licenses Consumed and Allocated by Enterprise Groups

Example Use Cases for CAL Management

This topic highlights some example scenarios for CAL management, and describes how each one of them should be managed using FlexNet Manager Suite.

Restricting CAL consumption to a specific group

You can restrict the consumption of a particular CAL to a specific enterprise group. For example, an installation of Microsoft SharePoint should only be accessed by users from the `Support` group. The following are the steps to implement this scenario using FlexNet Manager Suite:

1. Create a license of the type `Microsoft User CAL` for Microsoft SharePoint Server.
2. Ensure that all the required users have been added to the `Support` corporate group.
3. In the **Restrictions** tab of the license properties, search and add the `Support` group.
4. After the reconciliation is complete, the Microsoft SharePoint User CAL should be consumed only for the users of the added group.

Managing User and Device CALs together

Your CAL procurement strategy may include a mix of User and Device CALs. Consider the following example scenario:

- Out of the 150 users of Microsoft Exchange, 100 engineering users are full time, and work from dedicated devices.
- The remaining 50 users are in the Support department and work in two shifts, sharing 25 computers.

The following are the steps to implement this scenario using FlexNet Manager Suite:

1. Create two corporate units: `Engineering` and `Support`.
2. Create a license of the type `Microsoft User CAL` for the accessed Microsoft Exchange Server.
3. Ensure that all 100 full-time users have been added to the `Engineering` group.
4. In the **Restrictions** tab of the license properties of the `Microsoft User CAL`, search and add the `Engineering` group. The license will now be consumed only for the users of the added group.
5. Create a license of the type `Microsoft Device CAL` for the accessed Microsoft Exchange Server.
6. Ensure that all 25 support computers have been added to the `Support` group.
7. In the **Restrictions** tab of the license properties of the `Microsoft Device CAL`, search and add the `Support` group. The license will now be consumed only for the users of the `Support` group.

Note: *If the Support department users are also allowed to access the Microsoft Exchange Server via their mobile devices, home PCs, or laptops, Microsoft User CALs may be a more cost effective option to consider.*

Managing CALs for accesses from unknown external devices

The device details may not be available when Microsoft Windows Server are accessed by external users (such as consultants away on customer sites). The access evidence records will just show the IP address of the accessing device. You can adjust the CAL consumption to stay license compliant in such cases. The following are the steps to manage CALs in this scenario:

1. Navigate to the **Unlicensed CAL Usage** page and note the number in the **Accessing devices** column for the accessed product (such as Microsoft Windows Server).
2. Go to the **All Licenses** page and search the CAL for that product.
3. Open the license properties of the license and click the **Consumption** tab.
4. Add the number mentioned in the **Accessing devices** column on the **Unlicensed CAL Usage** page to the count mentioned in the **Allocated point** for this license. This will adjust the number of unknown accesses being made to the server application.

Managing CALs for multiple indirect accesses to a server application

Multiple users of a web application or website may access a server application through the same account. For example, 100 users of an ERP solution may access Microsoft SQL Server through an internally-configured `ErpQuery` account. As only one user-account of SQL server is accessing the application, the access evidence will only indicate access by one user, instead of reporting access by 100 users. To be license compliant, you should consume 100 User CALs for Microsoft SQL Server. The following are the steps to manage CALs in this scenario:

1. Check the CAL Usage Inventory report to find a very high value in the **Access Count** column in an access record. This would provide a hint that multiple users are accessing a server application.
2. Using any method to record the number of indirect accesses, make a note of the number of users of the ERP application that are indirectly accessing the Microsoft SQL Server installation.
3. Go to the **All Licenses** page and search the appropriate User CAL license for Microsoft SQL Server.
4. Open the license properties of the license and click the **Consumption** tab.
5. Add the number noted in step 1 to the count mentioned in the **Allocated point** for this license. This will adjust the consumption for the accesses being made to the server application.

Note: *The license requirements would be different In the case of unknown external users or devices accessing an Internet-facing site that is running on Microsoft SharePoint Server. If Microsoft SharePoint version 2013 or 2016 is being used, the server license itself covers unlimited external accesses, and no additional CALs are required. For Microsoft SharePoint version 2010 and earlier, you need an External Connector Licenses to cover the anonymous access.*

Appendix A- Template Details for CAL Usage Inventory Upload

You can import CAL usage inventory through spreadsheet imports when you cannot collect access evidence for the accessed server applications. You can schedule regular inventory imports through the FlexNet Beacon, or you can use the Inventory Data One-Off Uploads feature (see *Data Inputs* in the online help) to upload CAL usage inventory spreadsheet. For more information on inventory uploads, see *Importing Inventory Spreadsheets and CSV Files*.

To upload CAL usage inventory, the spreadsheet template should be populated with at least all mandatory (**Required**) columns, and uploaded to FlexNet Manager Suite. The following table describes the columns of the CAL Usage Inventory spreadsheet template, accessible through the Inventory **Data One-Off Upload** page:

Column	Description	Mandatory
AccessCount	The number of times that the server application was accessed.	No
AccessDate	The date on which the server application was accessed.	No
AccessingDeviceComputerName	The **ComputerName** of the accessing device (through which the server application was accessed).	No, if **AccessingUser** is specified.
AccessingDeviceDomain	The domain name of the accessing device.	No
AccessingDeviceIPAddress	The IP address of the accessing device.	No, if **AccessingUser** is specified.
AccessingDeviceSerialNo	The serial number of the accessing device.	No
AccessingUser	The `DOMAIN/SAMAccountName` for the accessing user.	No, if **AccessingDeviceIPAddress** or **AccessingDeviceComputerName** is specified.
ComputerID	The ComputerID of the accessed device (where the server application has been installed). It must match the **ComputerID** specified for this device in the **Computer** spreadsheet, or the row will be ignored. Uploading the Computer spreadsheet is mandatory with the CAL inventory upload.	Yes
Edition	The edition of the accessed server application as reported by the access evidence. This data is not used for access recognition.	No

Column	Description	Mandatory
InventoryDate	Inventory date of the evidence. If not provided, defaults to the current Coordinated Universal Time (UTC).	No
ProductName	The product name of the accessed application as reported by the access evidence. For all supported server applications (except SCCM), the Version and Edition (if present) is included in the ProductName. For example, `Microsoft SharePoint Server 2013 Enterprise Preview`	Yes
Version	The version of the accessed server application as reported by the access evidence. ***Note:** This column should be populated only for SCCM.*	No

4

Introduction to Microsoft Office 365

Microsoft Office 365 is a set of productivity tools available online (through a cloud-based subscription method) and offline (installed locally). Microsoft Office 365 subscriptions include a range of productivity tools from Microsoft Office, Microsoft Exchange, Microsoft SharePoint, Microsoft Yammer, and Microsoft Skype for Business product lines. Multiple subscription plans (such as E1, E3, and E5) are available. Some of these plans allow you to install Office applications locally.

With detailed information about Microsoft Office 365, this chapter may help you in managing Microsoft Office 365 licenses through FlexNet Manager Suite.

Microsoft Office 365 License Management Considerations

Microsoft Office 365 licenses that allow local Office installations, also allow you to install Microsoft Office 365 on up to five PCs or Macs, and up to five tablets (subject to the chosen plan) per `Named User` license. The following section provides an overview of the tools provided in each enterprise plan. With the *FlexNet Manager for Microsoft* product, you can use FlexNet Manager Suite to manage your Microsoft Office 365 subscriptions. You can:

- Validate that the desired users have the right plan
- Determine how many Office 365 licenses you need to purchase while negotiating license agreements
- Ensure that business units are not under or over-subscribed.

Based on the selected plan, a subscription of Microsoft Office 365 may allow you to access multiple Office applications online as well as offline (local installations) on up to five computers, and five tables or smart phones. Due to this change, the compliance calculations for Microsoft Office 365 licenses are different from other applications.

For example, the *`E3`* plan allows you to install and use the following applications:

- Exchange Online Plan 2 for Office 365
- Skype for Business Online for Office 365

- Office Professional Plus for Office 365
- Azure Rights Management for Office 365
- SharePoint Online for Office 365
- Yammer for Office 365

***Note:** For a detailed description of the available Microsoft Office 365 subscription plans, and the applications supported in each plan, see Microsoft Office 365 website.*

Considerations for managing Microsoft Office 365 licenses

- **Mobile devices**: Because FlexNet Manager Suite does not collect inventory from all mobile devices (such as iPads), you may have to deactivate Microsoft Office 365 from one of the mobile devices when the number of devices used to author and edit Microsoft Office 365 documents exceeds five. Note that you can read or present documents on a deactivated copy of Microsoft Office 365. You can get the details of installed devices from the Office 365 Admin Center.
- **Local installations**: As Microsoft Office 365 is a `Named User` license, FlexNet Manager Suite assumes that an installation on a device owned by the primary user (who has a subscription for Office 365) is licensed. Microsoft manages the access to the Microsoft Office 365 Online Service.
- **Devices**: Though the installed device information is available to Office 365 admins through the Office 365 Admin Center, FlexNet Manager Suite imports no device information from the Microsoft Office 365 Online Service. The imported users are mapped to the compliance users, and the devices assigned to those users are considered as the accessing devices. If an imported user is not assigned with any inventory device, a dummy remote device is created by using the naming convention *`User Name`* `(Remote)`. Such a dummy device is not treated as a managed device by FlexNet Manager Suite. If an installation of Office 365 is detected on a device, and the device is not found in the Microsoft Office 365 Online Service, the installation should consume an existing perpetual license.
- **Users**: Each user imported from the Microsoft Office 365 Online Service is mapped to the appropriate compliance user record (by matching the **Email** or **Alternate email** field values). If an imported user cannot be mapped to any compliance user, a compliance user record is created with a dummy inventory device assigned to it. These users consume against the Microsoft Office 365 multi-product license created for the Microsoft Office 365 tenant.
- **Office versions**: A perpetual license of Office 365 enables you to downgrade to an earlier version but the subscription license does not. If you have a perpetual license of the older Office version, and you buy a subscription, the license validity of the older version gets extended until the subscription expiry date.
- **License Entitlements**: The entitlements data for Microsoft Office 365 is directly imported from the Microsoft Office 365 Online Service. If no license exists for Microsoft Office 365, a Named User license is created for each Microsoft Office 365 tenant (with available entitlements); otherwise, the available entitlements are added to an existing license of Microsoft Office 365. If you want to add purchases for Microsoft Office 365 (only for tracking purposes), the value of the **Assigned** column on the **Purchases** tab of the license properties is set to `0`. The **Entitlement status** displays a value `Not contributing` for any Microsoft Office 365 purchases.

Managing Office 365 Licenses through FlexNet Manager Suite

The following is the procedure to manage Microsoft Office 365 licenses through FlexNet Manager Suite:

1. Ensure that you have created and configured a connector for each tenant of the Microsoft Office 365 Online Service. For details on how to create a connector to Microsoft Office 365, see Managing Connections to Microsoft Office 365 Online Service.
2. After the next discovery and inventory collection, FlexNet Manager Suite imports the following objects:
   - **Users**: Each imported user from the Microsoft Office 365 Online Service is mapped to the appropriate compliance user record (by matching the **Email** or **Alternate email** field values). If an imported user cannot be mapped to any compliance user, a compliance user record is created with a dummy inventory device assigned to this user.
   - **Licenses**: A `Named User` multi-product license (`Microsoft Office 365`) is created with multiple linked applications for each Microsoft tenant. The name of the Microsoft tenant is prefixed to the name of each of these licenses. This helps to distinguish licenses when you have multiple Microsoft Office Online Service accounts. If a particular plan is not supported by FlexNet Manager Suite, a license with no application is created. When the support for such plan is added during subsequent automatic updates to the Application Recognition Library, a recommended change to link applications will appear.
   - **Applications**: The information about the subscribed applications is imported and a multi-product license containing these applications is created.
3. See the **All Users** and **All licenses** pages to ensure that the required users and licenses have been created.
4. After license reconciliation has been completed, the **Product Summary** page should show the compliance status for Microsoft Office 365.
5. Navigate to **License Compliance > All Licenses** and filter the records to view Microsoft Office 365 licenses. You can check the **Consumed** and **Used** columns to know how many subscriptions are being used.
6. You can also view the following reports for insights on Microsoft Office 365 license consumption:
   - `User license details`
   - `License Overlap`.

> ***Note:*** *A subscription of Microsoft Office 365 enterprise plan (except E1) allows you to install Microsoft Office 365 on up to five PCs or Macs, and up to five tablets. FlexNet Manager Suite can only track the installation on devices that are present within your enterprise network. If you wish to include any installation outside the enterprise network, you can create a dummy inventory device and allocate a Microsoft Office 365 license to track the usage.*

Changes in subsequent imports

Any subsequent imports from the Microsoft Office 365 Online Service updates the following for each license of Microsoft Office 365:

- Entitlement count.
- Expiry date.
- Sets the **Allocations consume license entitlements** check box under **License consumption rules** accordion on the **Use rights & rules** tab of the properties of the `Named User` multi-product license created for each Microsoft Office 365 Service tenant. This is because Microsoft Office 365 is a `Named User` license and allocations must consume entitlements.
- Sets the **Allocated** check box in the **Consumption** tab of the license properties.

Connecting to The Microsoft Office 365 Online Service

To generate the compliance position for Microsoft Office 365 licenses, FlexNet Manager Suite needs information about subscription and usage of Microsoft Office 365 licenses (both online and offline). The inventory collection process returns the local installations of Microsoft Office that are tied to Microsoft Office 365 subscription. To get the subscription and usage information from Microsoft Office Online Service, the FlexNet Beacon should be configured with an inventory connection of the type `Microsoft Office 365` for each tenant of Microsoft Office 365.

When created and configured with the Microsoft Office 365 connection, the inventory beacon imports the licenses, users, and usage information from the Office 365 Online Service account and uploads it to FlexNet Manager Suite according to the defined schedule. For details on how to create a connector to Microsoft Office 365, see Managing Connections to Microsoft Office 365 Online Service.

Note: *The Microsoft Office 365 support is available only with the FlexNet Manager for Microsoft product.*

Managing Connections to Microsoft Office 365 Online Service

Use the following procedure to create a connection to the Microsoft Office 365 Online Service on FlexNet Beacon. A connection is required for each tenant of the Microsoft Office 365 online service. The inventory beacon requires this connection to import entitlements, users, and usage information from the Microsoft Office 365 online account.

Ensure that the Microsoft Office 365 Online Service tenant user has the required privileges for this operation. For more information, see .

Also make sure that the following prerequisites are met on each inventory beacon that needs to download data from the Microsoft Office 365 Online Service (noting that the order of installation of prerequisite software may be significant). These requirements should have been met when the inventory beacon was installed:

- You have licensed the FlexNet Manager for Microsoft product.
- The inventory beacon that will collect inventory for Office 365 in the cloud is a 64-bit machine (prerequisite software is not available for 32-bit architectures)

- Microsoft .NET framework version 4.5.2 or later is running on the inventory beacon.
- PowerShell 3.0 or later is running on Windows Server 2008 R2 SP1 or later, or Windows 7 SP1 or later; with the PowerShell execution policy set to `RemoteSigned`.
- Microsoft Online Services Sign-in Assistant for IT Professionals RTW is installed (instructions , direct link to the MSI).
- Windows Azure Active Directory Module for Windows PowerShell is installed (instructions , direct link to the MSI).
- Skype for Business Online, Windows PowerShell Module () is installed on the inventory beacon.

Tip: *The PowerShell execution policy can be correctly set with the following command:*

```
Set-ExecutionPolicy RemoteSigned
```

To create a connection to the Microsoft Office 365 Online Service:

1. Select the **Inventory Systems** page in the FlexNet Beacon interface.
2. Choose either of the following:
   - To change the settings for a previously-defined connection, select that connection from the list, and click **Edit...**.
   - To create a new connection, click the down arrow on the right of the **New** split button, and choose **Powershell**.
3. Complete (or modify) the values in the dialog that appears. All of the following values are required:

   Note: *If you have multiple subscriptions to Microsoft Office 365 (for example, separate subscriptions for different corporate units or locations), you need to create a separate connector for each subscription using its own credentials.*

   - **Connection Name**: The name of the inventory connection. When the data import through this connection is executed, the data import task name is same as the connection name.
   - **Source Type**: Select `Microsoft Office 365` from this list.
   - **Username**: The Microsoft Office 365 Online Service tenant user name.
   - **Password**: The Microsoft Office 365 Online Service tenant password.

   Tip: *The account used requires at least the following privileges in Office 365:*

   - *Member of the **Limited/Customized Administrator** role*
   - ***Billing administrator** option selected*
   - ***Skype for Business administrator** option selected.*
4. Save the connection.

After a successful data import, the users, applications, licenses, and usage data are all visible in the appropriate grids of FlexNet Manager Suite.

***Note:** To know more about the operations available on the **Inventory Systems** page, see Inventory Systems Page in the online help. For scheduling data imports through this connection, see Scheduling a Connection, also in help.*

5

Oracle Discovery and Inventory

Discovery and inventory information is a prerequisite for performing license compliance calculations in FlexNet Manager Suite. In addition to the general inventory collection features, FlexNet Manager Suite also offers specialized features for Oracle inventory collection. With a detailed description of each of the supported methods, this chapter may help you in deciding and implementing the appropriate inventory collection method for Oracle systems in your computing estate.

The chapter begins with introductory topics comparing the different approaches to help you choose between them.

These are followed by a section covering each approach:

- The first topic introducing each section lists the prerequisites required for that approach.
- Then the credentials (accounts and privileges) required for that approach are listed in detail.
- There is a topic detailing how the particular approach operates.
- Finally, trouble-shooting that applies to the particular approach is covered.

The concept is that you will choose just one approach that best fits your needs, and then read only the one related section to drill into detail, without needing to work through the variations for the other approaches. This separation should reduce possible confusion about the differences between the approaches.

To reduce cross-linking, each section *repeats* the content that is common to other approaches, so that reading only your chosen one section gives you complete coverage. You will not miss anything by skipping over the sections that are not relevant to your approach.

The chapter concludes with a number of appendices of less commonly required details that are (in general) common to all approaches.

Introduction to Oracle Discovery and Inventory

The term *Oracle discovery and inventory* refers to the process of examining a network to find and collect hardware and software inventory for every device with one or more Oracle applications installed on it. FlexNet

Manager Suite performs software license compliance calculations on the collected inventory data to provide information about what software you have licensed against what software you have installed.

Oracle discovery and inventory collection, and the resulting license consumption calculations, include the following steps:

1. **Discovery:** Identifying the devices on the network that have Oracle software installed. (Discovery is not needed for devices that already have the FlexNet inventory agent locally installed on them.)

2. **Inventory:** Collection of hardware and general software inventory, together with specific Oracle inventory.

3. **Compliance calculations:** Calculation of the number of license entitlements consumed, and comparison with the number that have been purchased.

***Tip:** The discovery and inventory collection works in the same way on physical and virtual machines.*

At the high level, there are two main ways to collect Oracle inventory in FlexNet Manager Suite:

1. You can deploy the FlexNet inventory agent, and in particular its core inventory collection executable `ndtrack`. This is the optimal collection method, as it not only collects Oracle inventory, but also collects hardware and other software inventory at the same time. The hardware data is important for correct calculation of consumption for Oracle license types. Methods of deployment are fully discussed in the *Gathering FlexNet Inventory* PDF, available through the title page of online help. Relevant deployment methods for Oracle inventory include the following cases defined in that document:

    - **The Adopted case**, where the FlexNet inventory agent is deployed automatically through an inventory beacon directly onto the target Oracle server.

    - **The Agent third-party deployment case**, where you use a tool or process external to FlexNet Manager Suite to deploy (and perhaps also manage) the FlexNet inventory agent. One of these possibilities is to deploy the FlexNet inventory agent to a shared network folder, and set up a process to execute it on target Oracle servers.

    - **The FlexNet Inventory Scanner case**, where the lightweight FlexNet Inventory Scanner is used instead of the full agent.

    - **The Zero-footprint case**, where the inventory beacon temporarily downloads the FlexNet inventory agent to the target device, executes it there, and subsequently removes it again (leaving no permanent footprint).

2. You can use FlexNet Beacon on any conveniently-located inventory beacon to connect *directly* to the listener service for an Oracle database instance and collect inventory information through it. This method, called 'direct' inventory gathering, may be helpful, but it has the following limitations:

    - It does not gather hardware inventory. Hardware details are needed for calculating Oracle license positions; so gathering direct database inventory alone is not sufficient for Oracle license management. If you take this path, you must augment the direct database inventory with additional hardware inventory information (which may come from third-party inventory tools).

    - It does not gather inventory for other Oracle applications like Oracle WebLogic that may be installed on the same server; you may plan to collect this inventory with third-party tools as well.

    - Direct inventory gathering combined with a network scanning discovery method cannot operate with Oracle 12c and beyond (as explained in Direct Collection of Oracle Inventory).

For all these reasons, the recommendation is to choose your preferred method to deploy the FlexNet inventory agent, as listed above.

While FlexNet Manager Suite can also import inventory data using `.xlsx` or `.csv` file uploads, these are not normally convenient for regular updates about Oracle software. They are available as a method of last resort when simpler approaches are not possible in your environment. For details about importing data through spreadsheets, see Importing Inventory Spreadsheets and CSV Files, or see *Managing Inventory Spreadsheet Connections* in the online help.

***Tip:** When Oracle Enterprise Cloud Control 12c is used to manage Oracle databases, the licensing information is stored in the Oracle Management Repository on the Oracle Enterprise Cloud Control instance, instead of on each database instance. To get the complete licensing data, you need to collect inventory from the instance with Oracle Enterprise Cloud Control 12c, as well as from each database instance being managed by it. FlexNet Manager Suite automatically merges and resolves the inventory data to generate an accurate licensing position.*

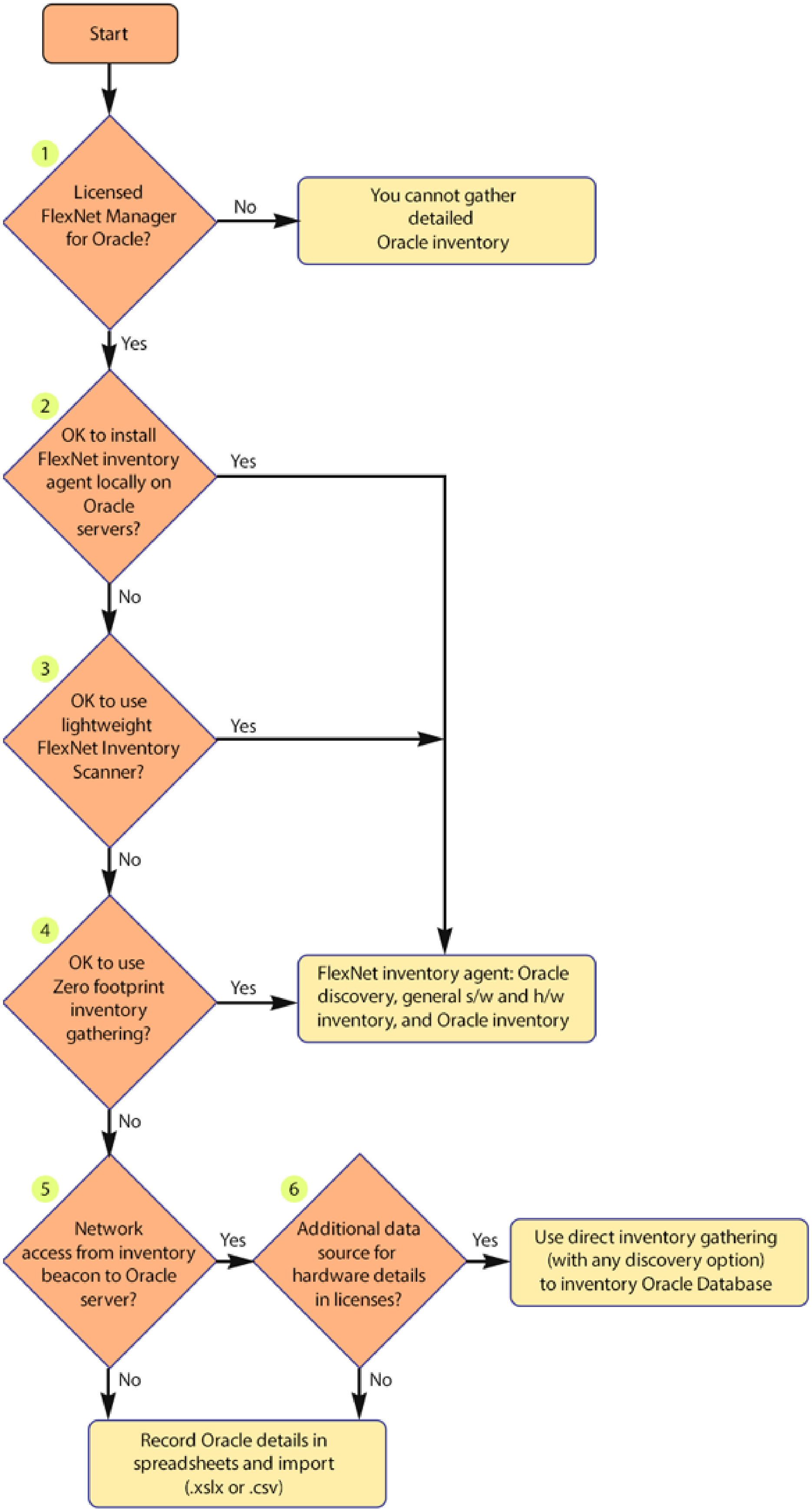
Selecting an Oracle Inventory Collection Method

The selection of a particular Oracle inventory gathering method depends on your software installation policies, and your network and database access policies determined by your network and Oracle Database administrators. For example, you may prefer either

- To deploy the FlexNet inventory agent on each of your Oracle servers
- To collect database-only inventory using one or more inventory beacons connecting through a listener to each database instance (called 'direct' inventory, and corresponding with the Zero-footprint case defined in the *Gathering FlexNet Inventory* PDF).

The following diagram provides a broad overview for selection of an Oracle inventory collection method. Numbers in the diagram correspond to the description below. Further details of each inventory collection method are discussed on the following pages.

***Tip:** In the following discussion, the term "UNIX-like platforms" is used to group together AIX, HP-UX, all supported flavors of Linux (CentOS, Debian, Fedora, Oracle, Red Hat), OS X, and Solaris.*


Start
1
Licensed FlexNet Manager for Oracle?
No
You cannot gather detailed Oracle inventory
Yes
2
OK to install FlexNet inventory agent locally on Oracle servers?
Yes
No
3
OK to use lightweight FlexNet Inventory Scanner?
Yes
No
4
OK to use Zero footprint inventory gathering?
Yes
FlexNet inventory agent: Oracle discovery, general s/w and h/w inventory, and Oracle inventory
No
5
Network access from inventory beacon to Oracle server?
Yes
6
Additional data source for hardware details in licenses?
Yes
Use direct inventory gathering (with any discovery option) to inventory Oracle Database
No
No
Record Oracle details in spreadsheets and import (.xslx or .csv)

1. To perform license management and compliance for Oracle-specific licenses, you need a license for the FlexNet Manager for Oracle product. Without this product, you can only discover Oracle infrastructure and collect basic Oracle software inventory.

2. If you can install a FlexNet inventory agent on each of the target Oracle servers, this provides the most complete solution. You may use a discovery and inventory rule to 'adopt' Oracle servers (that is, automatically install the FlexNet inventory agent on them, and continue to manage the behavior through device policy); or you may deploy the FlexNet inventory agent with the tool of your choice. On a global schedule, each of the locally-installed FlexNet inventory agents collects the inventory for its device, and uploads the results to the appropriate inventory beacon. For more information, see How Agent-Based Collection of Oracle Inventory Works.

3. The FlexNet Inventory Scanner offers a light-weight alternative to the full FlexNet inventory agent, for a moderate trade-off in functionality (for example, if the first attempt at an inventory upload across the network fails for some transient reason, there is no catch-up). You also have a little more flexibility in its set-up, as you take responsibility for its scheduling as well as its deployment. For details, see How the FlexNet Inventory Scanner Collects Oracle Inventory.

4. When local installation is not an option, you may collect inventory through the Zero-footprint method. Here the FlexNet inventory core components saved on the inventory beacon are (for Windows) executed from this file share, or (for UNIX-like platforms) downloaded, temporarily installed, executed, and then removed from the target device, leaving no permanent installation footprint. The process is managed by a discovery and inventory rule configured on the central application server for FlexNet Manager Suite, and the same rule dictates the inventory collection schedule. For details, see How Zero-footprint Collection of Oracle Inventory Works. In terms of the results achieved, this is functionally identical to the locally-installed agent option.

   Tip: *One feature available with both these methods is that they also run scripts provide by the Oracle License Management Service (LMS). These scripts collect sufficient software and hardware data that you can later export an Oracle audit report for submission to auditors (navigate to the* ***Discovery & Inventory > Oracle Instances*** *page, and see details in the help for that page).*

5. If you do *not* have a direct network connection allowing an inventory beacon to communicate with the target Oracle server(s), the remaining option is to maintain Oracle Database inventory details in a spreadsheet format. You can then save the spreadsheet on an inventory beacon and have it automatically uploaded and included in Oracle license consumption calculations. However, maintaining data in this form over time is a high maintenance burden, and this approach is not recommended except as a last resort.

6. Since you do have network access from an inventory beacon to your Oracle server(s), you can use direct gathering of Oracle Database inventory by the inventory beacon for each Oracle database instance (called 'direct' because the inventory beacon connects directly to the Oracle database instance to gather information — although as always this connection is brokered by a listener). There are three different ways that the system can discover the Oracle database instances from which to gather the inventory, and all three discovery/direct inventory combinations are detailed under How Direct Collection of Oracle Inventory Works. However, direct inventory gathering *alone* does not provide sufficient information to calculate consumption for all Oracle licenses (such as Oracle Named User Plus and process-based licenses), because these require additional details about the hardware that the database instance is running on. Therefore to use direct inventory gathering successfully for Oracle license management, you must have an additional source of inventory data both for the Oracle server hardware, and for any additional Oracle software (other than Oracle Database itself) that you want to manage. If you do not have these auxiliary data sources, you could revert to manual management of your data in spreadsheets, and importing those. (However, since

spreadsheet maintenance is generally an unattractive option, you may wish to reconsider an alternative from earlier in the flowchart!)

Comparison of Inventory Collection Methods

The following table presents a summary comparison of different inventory collection methods available with FlexNet Manager Suite. In the table:

- "Y" means that the item applies to the method
- "O" means that the item is optional, or its use depends on the details of your implementation.

Feature	Agent-based	Scanner	Zero-footprint	Direct	Spreadsheet
Components Required					
FlexNet inventory agent	Y				
FlexNet Inventory Scanner		Y			
FlexNet Beacon installed on an inventory beacon	Y	Y	Y	Y	Y
Discovery and inventory rules	O		Y	Y	
Compatible OLEDB drivers from Oracle on inventory beacon				Y	
The `tnsnames.ora` file				O	
The OEM Adapter				O	
Privileges Required					
For adoption on Windows: local or domain account (registered in Password Store) with full access to Windows Service Control Manager on the Oracle server	Y				
For operation on Windows: • `LocalSystem` or administrator account • Registered in Password Store • Read-only access to Windows Service Control Manager on Oracle server • Member of the Windows local security group `ora_dba` (where `LocalSystem` appears as `NT AUTHORITY\SYSTEM`).	Y		Y		

Feature	Agent-based	Scanner	Zero-footprint	Direct	Spreadsheet
For non-privileged operation on Windows: • A non-privileged account to which you have given all access rights required for the discovery and inventory collection you require (this unsupported approach is not documented, as it is specific to your environment) • Member of the Windows local security group `ora_dba` (where `LocalSystem` appears as `NT AUTHORITY\SYSTEM`) • Has permissions to invoke the commands listed in the *Common: Child Processes on Windows Platforms* topic in the *Gathering FlexNet Inventory* PDF (available through the title page of online help).		Y			
For adoption on UNIX-like platforms: • Local account with `ssh` privileges that can elevate to `root`-level privileges • Registered in Password Store.	Y				
For operation on UNIX-like platforms: The tracker runs as `root`. (If the tracker is run as any other account, Oracle inventory is not collected.) This is true for all agent-based inventory gathering: • The Adopted case • The Agent third-party deployment case • The FlexNet Inventory Scanner case • The Zero-footprint case.	Y	Y	Y		
An account with read-only permissions on every Oracle Database for all the tables and views needed for collecting Oracle inventory.				Y	
Collected Information					
General hardware and software inventory	Y	Y	Y		O
Oracle Database inventory	Y	Y	Y	Y	O
Oracle application and engineering system inventory	Y	Y	Y		O
Oracle LMS data for audit	Y	Y	Y		
User Actions Required					

Feature	Agent-based	Scanner	Zero-footprint	Direct	Spreadsheet
Create a discovery and inventory rule with the **Allow these targets to be adopted** option selected in the target definition (required in the Adopted case, but not in the Agent third-party deployment case).	O				
Create a discovery and inventory rule, and in the action definition: • For **Action type**, choose `Discovery and inventory` • Select **Network scan** as the discovery method • In the **General hardware and software inventory** section, select **Gather hardware and software inventory from all target devices** If you wish to target exclusively Oracle servers, specify appropriate IP addresses, machine name patterns, or port details to focus the settings under **Define machines to target** in the **Targets** tab.			Y		
To use a network scan, create a discovery and inventory rule with the following options selected in the action definition: • For **Action type**, choose `Discovery and inventory` • Select **Network scan** as the discovery method • In the **Oracle database environments** section, select the **Discover Oracle database environments**, **Port scan** and/or **SNMP scan**, and **Gather Oracle database environment inventory** options.				O	
To use a `TNSNames.ora` file, create a discovery and inventory rule with the following options selected in the action definition: • For **Action type**, choose `Discovery and inventory` • Select **TNSNames file for Oracle databases** as the discovery method (you may optionally combine this, for example, with **Network scan**) • In the **Oracle database environments** section, select the **Discover Oracle database environments**, **Port scan** and/or **SNMP scan**, and **Gather Oracle database environment inventory** options.				O	

Feature	Agent-based	Scanner	Zero-footprint	Direct	Spreadsheet
To use manually-created data to replace discovery, create discovery device records with listener and services information for all Oracle servers; and then create a discovery and inventory rule with the following options selected in the action definition: • For **Action type**, choose `Inventory only` • In the **Oracle database environments** section, select the **Gather Oracle database environment inventory** option.				O	
Schedule file uploads from the FlexNet Beacon.					Y

Agent-Based Collection of Oracle Inventory

This section provides details about Oracle discovery and inventory using a local instance of FlexNet inventory agent. In this context, 'local' means that FlexNet inventory agent is installed and executing on the target Oracle server.

Except as noted in following topics, it does not matter how the FlexNet inventory agent was deployed. In the terms defined in the *Gathering FlexNet Inventory* PDF, the concept of 'local agent-based inventory collection' covers:

- The Adopted case
- The Agent third-party deployment case.

Prerequisites for local agent-based inventory collection

The following must be in place for collection of Oracle inventory by a local copy of the FlexNet inventory agent installed on the target Oracle server:

1. You have licensed the FlexNet Manager for Oracle product (for details, see Appendix E: Features Enabled in FlexNet Manager for Oracle).
2. You have deployed and configured one or more inventory beacon(s) in your network, such that at least one inventory beacon can access each of your target Oracle servers.
    - For detailed information about inventory beacons, their deployment, and configuration, see the topics under *What Is an Inventory Beacon?* in the online help. You initiate deployment of an inventory beacon by navigating to **Discovery & Inventory** > **Beacons**.
    - Your organizational site and subnet hierarchy is recorded through the **Discovery & Inventory** > **Subnets** page of the web interface (see *Subnets* in the online help).
    - Assign the defined subnets to the inventory beacon(s) through the **Discovery & Inventory** > **Beacons** page of the web interface (see *Assigning a Subnet to a Beacon* in the online help).

3. You have set up the accounts required for operation, and (in the Adopted case) possibly separate accounts for adoption of the target Oracle servers. Details of the accounts for different platforms are in Credentials for Local Agent-Based Inventory.
4. You have deployed the FlexNet inventory agent to the target devices:
   - In the Agent third-party deployment case, following the guidelines starting from the *Agent third-party deployment: Implementation* topic within the *Gathering FlexNet Inventory* PDF
   - In the Adopted case, following the guidelines in the *Adopted: Implementation* topic in the same PDF file.

Tip: *When you know the names or network locations of the Oracle servers you want to adopt, you can declare a single rule in the web interface for FlexNet Manager Suite to target and adopt these known machines. If you are unsure where all your Oracle databases may have been installed, you can use a more generalized discovery rule to find and identify those devices, and subsequently adopt them.*

Credentials for Local Agent-Based Inventory

The required accounts and their privilege levels vary across computer platforms, and they are also different for the initial deployment (in the Adopted case) and subsequent steady-state operations. (The accounts you may need for deployment in the Agent third-party deployment case are left to your own management, and not described here.)

For the **Windows** platform:

- **Adoption** requires an account that:
  - May be either a local account on the target Windows device, or a Windows domain account
  - Has full access to the Windows Service Control Manager on that target Windows device (specifically, the account must have the `SC_MANAGER_ALL_ACCESS` access right)
  - Is registered in the secure Password Store on the appropriate inventory beacon before running the discovery task that includes the adoption action.

  Once the FlexNet inventory agent is correctly installed (through the adoption process), this level of privilege is no longer required.
- **Operation** (after the FlexNet inventory agent is correctly installed) requires an account on the target device that:
  - Is the `LocalSystem` account on the target device (but for Oracle Database version 9i, see the following note)
  - Has read-only access to the Windows Service Control Manager (this allows discovery of Oracle services)
  - Is a member of the Windows local security group `ora_dba` (in which context, the `LocalSystem` account is displayed as `NT AUTHORITY\SYSTEM`)
  - Uses local OS authentication to take inventory; which means that the `SQLNet.AUTHENTICATION_SERVICES` property must be set to `(NTS)` in the `sqlnet.ora` file located in the `%ORACLE_HOME%\network\admin` directory.

> **Note:** *Operation with Oracle Database 9i is an exceptional case. To collect Oracle 9i inventory on Windows, you must run* `ndtrack` *as a non-*`LocalSystem` *user account. This is only possible if you trigger the tracker with a custom command line, using your preferred scheduling tool (such as Microsoft Task Scheduler). This makes the local agent cases (whether the Adopted case or the Agent third-party deployment case) rather unsuitable for taking inventory for version 9i. In both these cases, the tracker runs under policy as* `LocalSystem` *(in which case it reports a failure to collect inventory from an Oracle 9i database instance); and if you run it again with a custom command line as a different account, you get inventory results. The combination of positive results gained with negative failure notifications is bound to produce confusion! For these reasons, if you have instances of Oracle Database 9i, it is better to consider the lightweight FlexNet Inventory Scanner, for which you can more easily manage your own command lines (see FlexNet Inventory Scanner Collection of Oracle Inventory); or even the Core deployment approach (for which see the Gathering FlexNet Inventory PDF).*

For **UNIX**-like platforms:

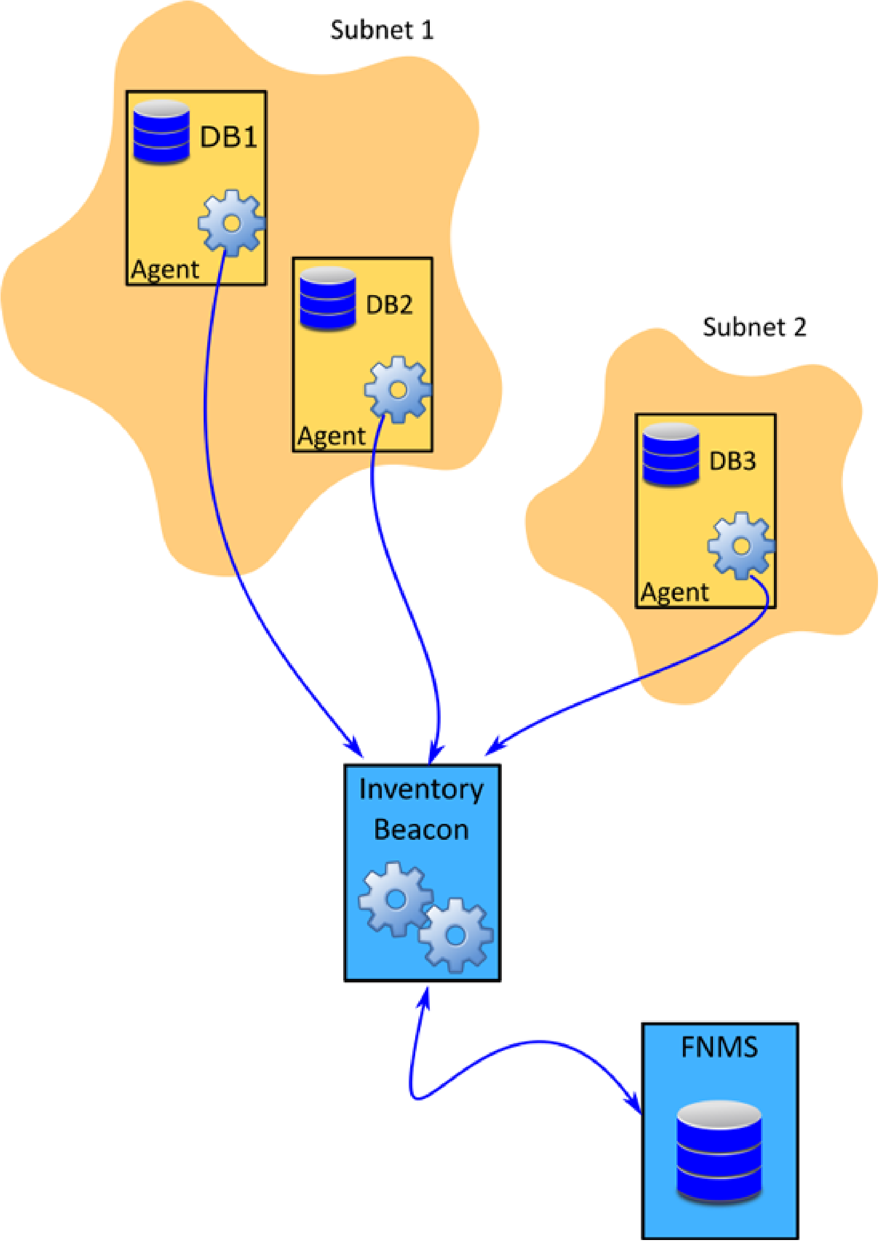
- **Adoption** requires an account that:
  - Is local on the target device
  - Has `ssh` privileges
  - Can elevate to `root`-level privileges to complete the installation
  - Is registered in the secure Password Store on the appropriate inventory beacon before the adoption process is run (and the additional details for elevation of account privileges with your preferred tool, such as `sudo` or `priv`, are also registered there).
- **Operation** (after the FlexNet inventory agent is correctly installed) requires an account on the target device that:
  - Must be `root` — otherwise local Oracle inventory collection is disabled
  - May impersonate other trusted accounts with lower privilege levels — as discussed in detail in the *Common: Child Processes on UNIX-Like Platforms* topic in the *Gathering FlexNet Inventory* PDF, along with coverage of the following preferences in the `config.ini` file that affect the choice of account to impersonate:
    - If `OracleInventoryAsSysdba=True` (or omitted), and `OracleInventoryUser` is configured, the nominated account is impersonated, with the database connection made as `sysdba`.
    - If `OracleInventoryAsSysdba=True` (or omitted), and `OracleInventoryUser` is *not* configured, the account running the database instance is impersonated, with the database connection made as `sysdba`.
    - If `OracleInventoryAsSysdba=False`, and `OracleInventoryUser` is configured, the nominated account is impersonated, with the database connection made as that same account (which obviously must be configured as an Oracle user with adequate read-only privileges as detailed in Appendix B-Oracle Tables and Views for Oracle Inventory Collection).
    - If `OracleInventoryAsSysdba=False`, and `OracleInventoryUser` is *not* configured, Oracle inventory collection does not proceed.

How Agent-Based Collection of Oracle Inventory Works

In local agent-based inventory collection, FlexNet Manager Suite collects Oracle inventory through the FlexNet inventory agent installed on each Oracle server within your network. This method is simplest in operation, as each FlexNet inventory agent performs discovery and inventory for its respective Oracle server, and the various processes are managed automatically.

The installation of the FlexNet inventory agent is detailed in the *Gathering FlexNet Inventory* PDF for either the Adopted case or the Agent third-party deployment case. This topic summarizes operation after deployment.

The following diagram shows an example scenario for a single inventory beacon.



The diagram shows three database servers, two in Subnet1 and one in Subnet2. An instance of FlexNet inventory agent has been installed on each of these database servers. The inventory beacon has been assigned to cover both of these subnets and can connect to every Oracle server. All the prerequisites outlined in Agent-Based Collection of Oracle Inventory are satisfied.

The process for local agent-based Oracle inventory collection runs like this:

1. By default, every 15 minutes each inventory beacon checks for any updates its own policy, from which it derives policy to share with the devices it is managing. (To adjust this download schedule, see *Inventory Settings Page* > *Beacon Settings Section* in the online help.) This policy may:
   - Update the schedule for the installed FlexNet inventory agents if this has been changed (see *Inventory Settings Page* > *Agent Inventory Schedule Section* in the online help)
   - Update the `InventorySettings.xml` file, if this has been changed by a recent download of the Application Recognition Library (this file includes specialized actions for gathering Oracle inventory).
2. When the global schedule for inventory collection by the installed FlexNet inventory agents triggers, each FlexNet inventory agent performs discovery on its local device (recorded in a `.disco` file). This process is run by the tracker component of the FlexNet inventory agent (`ndtrack` executable). For Oracle, the discovery process tries to identify one or more paths for `$ORACLE_HOME`, using all of these platform-dependent methods in order (and combining the resulting dataset):

UNIX-like platforms — Oracle discovery	Windows platforms — Oracle discovery
1. The tracker scans the file system for any `oracle` executables. • This scan honors the global settings for file system scans in the **File Inventory** section of the **Inventory Settings** page of the web interface, which may limit search paths or even disable file scanning entirely. • On success, this search returns the file path (`$ORACLE_HOME`) and the executable ID.	1. The tracker looks for a registry entry under `HKLM\SOFTWARE\Wow6432Node\Oracle\` (or, on 32-bit systems, `HKLM\SOFTWARE\Oracle\`). On success, this returns the `%ORACLE_HOME%` path.
2. The tracker looks for an `oratab` file (installed in either `/etc` or `/var/opt/oracle` during database installation). On success, this provides the `$ORACLE_HOME` path, the executable ID for the `oracle` executable, and the System ID (SID) for the related database.	2. The tracker interrogates the Windows Service Control Manager. On success, this provides the `%ORACLE_HOME%` path, the System ID (SID) for the database running in that process, and the name of the related Oracle listener.
3. The tracker examines process listings for matches to `ora_smon_*`. On success, this provides the `$ORACLE_HOME` path and/or the executable ID for the `oracle` executable, as well as the SID for the running database and the user account running it.	(No step 3 for Windows.)

UNIX-like platforms — Oracle discovery	Windows platforms — Oracle discovery
4. The tracker examines process listings for `tnslsnr`. On success, this provides the `$ORACLE_HOME` path, the executable ID for the `oracle` executable, the name of the related Oracle listener, and the user account running the listener.	(No step 4 for Windows.)

3. Next, the tracker gathers general hardware and software inventory (recorded in an `.ndi` file) from the local device. This is the standard inventory gathering that the tracker gathers on every device where it is running.
4. If the tracker discovered one or more Oracle database instance(s) on the device, and all the required settings and account privileges are in place, the tracker also gathers inventory from all accessible Oracle database instances. The methods on different types of platform are as follows.
   - For UNIX-like platforms, the tracker impersonates an appropriate account, determined by the configuration of the preferences shown below. Each column in this table shows a set of conditions in the first three rows, followed by the resulting behavior in the last two rows:

UNIX-like platforms — Conditions	Option 1	Option 2	Option 3	Option 4	Option 5
If the executable runs as	`root`	`root`	`root`	`root`	Any other account
and `OracleInventoryAsSysdba` =	`True`	`True`	`False`	`False`	n.a.
and `OracleInventoryUser` =	Valid user	Not set	Valid user	Not set	n.a.
Then: Impersonated account is	That user	Process owner	That user	Not supported	n.a.
Command line parameters for `sqlplus`	`"/ as sysdba"`	`"/ as sysdba"`	`"/ "`	*No inventory*	*No inventory*

   - For Windows platforms, the tracker normally runs as `LocalSystem`, but may be run by another account that has administrator privileges (that is, is a member of the `Administrators` security group). In either case, the same account that is running the `ndtrack` executable is used to invoke the command line for `sqlplus`, using the parameter `"/ as sysdba"`. This remains true even if the Oracle database instance is running as a service user, as is possible from Oracle Database 12c; so that binaries controlled by the service account are now executed as `LocalSystem` (or at least with administrator privileges). It is, of course, best practice to ensure that any service account running a database instance is well secured, so that the binaries it controls are protected.
5. Where Oracle inventory is collected, the tracker also executes scripts provided by Oracle License Management Services (LMS) to gather software and hardware information about the servers where Oracle Database is installed. (These scripts, as amended from time to time, are downloaded to the tracker from the

InventorySettings.xml file. They are used only for the preparation of an Oracle audit report, available to operators who have appropriate access rights in the **Discovery & Inventory > Oracle Instances** page, with more details available in the help for that page.)

6. The tracker records the software and hardware results of the Oracle inventory gathering in a separate .ndi file.

*💡 **Tip:** Notice that the installed FlexNet inventory agent responds to settings in the **Inventory Settings** page of the web interface, and does not follow the rules or schedules in the **Discovery and Inventory Rules** page, which are used by inventory beacons. This means that you do not need to set a particular rule to cause the installed FlexNet inventory agent to perform these discovery and inventory-gathering actions, as (subject to its local settings in the Windows registry or config.ini file on UNIX-like platforms) it always does these, including checking for and collecting Oracle inventory on its local device.*

7. Immediately on completion of inventory gathering, the tracker uploads the .disco file and one or two compressed .ndi files to the appropriate inventory beacon. If some temporary network problem causes this upload to fail, there is a catch-up task to try again overnight (using the ndupload component).
8. The inventory beacon uploads all collected discovery and inventory information to the central application server (or, if it is a member of a hierarchy of inventory beacons, uploads the data to its parent in the hierarchy, and the upload is repeated until the data reaches the application server). Data is stored initially in the inventory database.
9. In due course, the inventory import (to the compliance database) and license reconciliation process runs (typically overnight, although an operator in an Administrator role can also trigger a full import and reconciliation). Progress is visible on the **System Tasks** page.
10. The **Discovery & Inventory > Oracle Instances** page lists the database inventory for all servers discovered and inventoried until the time of the latest reconciliation calculation.

Troubleshooting Agent-Based Collection of Oracle Inventory

If you are using agent-based Oracle discovery and inventory collection, a successful installation of the FlexNet inventory agent is a prerequisite.

To troubleshoot local agent-based discovery and inventory:

1. Before concluding that there is a problem, ensure that you have allowed sufficient time for:

   - Discovery and inventory processes on the target device (check the global schedule for the FlexNet inventory agent)
   - File upload to the inventory beacon, and from there to the central application server (typically within several minutes of the data gathering being completed)
   - Inventory import from the inventory database to the main compliance database (typically scheduled overnight)
   - The license reconciliation calculations (typically scheduled overnight).

   If after this process has completed, the target Oracle server does not appear in **Discovery & Inventory > All Discovered Devices**, it is time to continue troubleshooting. (If the device does appear in this listing, but the Oracle instance is not visible in **Discovery & Inventory > Oracle Instances**, skip forward to step .)

2. Validate that the required accounts are set up correctly (see Credentials for Local Agent-Based Inventory) and that the required rule is correctly configured (see How Agent-Based Collection of Oracle Inventory Works).
3. Validate that the FlexNet inventory agent is installed on the target device. Navigate to the **Discovery & Inventory > All Discovered Devices** page, looking for a `Yes` displayed in the **Agent installed** column for the relevant device.
   - In the Adopted case, the value is updated as soon as the automated adoption process succeeds.
   - In the Agent third-party deployment case, the value is retrospectively updated after an inventory upload reveals the installer package for the FlexNet inventory agent (which may take a little longer).

   If adoption has failed on your target Oracle server (that is, the automatic installation process has failed), review the following log files on that device for evidence of the problem:

   - **On Windows:** `%temp%\adoption.log`
   - **On UNIX-like devices:** `/var/tmp/flexera/log/ndinstlr.log` and `ndinstlrsh.log`.

   If you are unable to resolve the adoption-specific errors, contact Flexera Software Support with the log files.
4. When you know that the FlexNet inventory agent was successfully installed, on the target Oracle server review the contents of the following folder:
   - **On Windows**: `%ProgramData%\ManageSoft Corp\ManageSoft\Common\Uploads\Discovery`
   - **On UNIX**: `/var/opt/managesoft/uploads/discovery/`.

   The presence of a discovery file (`.disco`) in this folder quickly validates that discovery is working, but that the upload is failing (since, after a successful upload, the file is removed from this folder). The *absence* of a file is therefore ambiguous: it may mean that the file creation is failing, or that upload has succeeded and that the problem is further upstream.
5. To assess whether upload is the problem, log into the relevant inventory beacon, open the `%ProgramData%\Flexera Software\Incoming\Discovery` folder there, and look for a discovery file containing the device name of the Oracle server. If it is present, it shows that both generation and upload from the Oracle server to the inventory beacon are working, but may indicate a problem loading the file upstream, as once again it should be removed from this staging folder once the upload has succeeded.
6. When there is no evidence of file uploads, you can test that discovery is working by using the following command on the target Oracle server. This performs discovery but prevents the upload of the `.disco` discovery file to the inventory beacon, so that it remains in the discovery folder on the Oracle server for your inspection.
   - **For Windows:** `ndtrack -t machine -o Upload=False`
   - **For UNIX-like devices:** `bin/sh ./ndtrack -t machine -o Upload=False`

   Thereafter, inspect the discovery folder again (as described earlier).

   a. When a discovery file is not created, check the log file for the `ndtrack` component:

  - **On Windows:** `%temp%\ManageSoft\tracker.log`
  - **On UNIX-like platforms:** `/var/opt/managesoft/log/tracker.log`

  Verify the following events:

  - The event `Uploading file <`*`filename`*`.disco>` indicates the generation of the discovery file has succeeded (it is normally attempted immediately after creation of the discovery file).
  - The event `File <`*`filename`*`.disco> removed from upload directory` indicates the successful upload of the discovery file.

b. If `tracker.log` provides no information about discovery completion, configure the target device for more detailed logging (tracing) by removing `#` from the following lines of the `etcp.trace` file in the FlexNet inventory agent installation folder on the Oracle server:

```
+Inventory/Oracle
+Inventory/Oracle/SDK
+Inventory/Oracle/Query
+Inventory/Oracle/Query/Substitution
+Inventory/Oracle/Query/Execution
+Inventory/Oracle/Listener
+Inventory/Oracle/Listener/Detail
```

Rerun the command manually (as described above) to generate the trace files, and examine them for clues.

When a discovery file was created, but on inspection in a text editor it contains no data related to Oracle services:

a. Verify the status of Oracle discovery in the following log file:

  - **On Windows**: `%temp%\ManageSoft\` for the account running `ndtrack.exe` (normally this is the `LocalSystem` account, so that the expanded environment variable contains `C:\Windows\Temp\managesoft.log`)
  - **On UNIX-like platforms**: `/var/opt/flexera/managesoft.log`

a. Try to remedy any problems that are logged. If the problem persists, please contact Flexera Software Support with details and the log files.

7. When the discovery file is being created successfully, *and* contains data about Oracle services, the original problem may have been with uploads.

a. Run the tracker again with command lines similar to the above but omitting the `-o` option, so that upload is now permitted.

b. Thereafter, check for issues related to the upload from the target Oracle server to the inventory beacon:

  - **On Windows**: `%temp%\ManageSoft\upload.log` (when the tracker is running as `LocalSystem`, normally `C:\Windows\Temp\ManageSoft\tracker.log`)
  - **On UNIX-like platforms**: `/var/opt/flexera/managesoft/log/tracker.log`.

> ***Tip:** Recalling that the original upload is attempted by the tracker immediately after inventory collection, the details appear in the `tracker.log`. If the full FlexNet inventory agent needs to attempt a later catch-up after a failed upload, this is logged in the `upload.log` file saved in the same folder.*

c. If the problem may lie between the inventory beacon and its parent (potentially, the central application server), switch to the inventory beacon and check `C:\Windows\Temp\ManageSoft\uploader.log` (when, as is normal, the FlexNet Beacon executable is running as `LocalSystem` on the inventory beacon).

Once again, if you cannot resolve the problem, please contact Flexera Software Support with details and log files.

8. Once the target Oracle server is visible in **Discovery & Inventory > All Discovered Devices**, check for a record of the Oracle instance(s) running on that server in **Discovery & Inventory > Oracle Instances**. If not:

a. Return to the log file for the `ndtrack` component on the target Oracle server:

- **On Windows:** `%temp%\ManageSoft\tracker.log`
- **On UNIX-like platforms:** `/var/opt/managesoft/log/tracker.log`

Verify the following events:

- `Starting oracle inventory` and `Finished generating inventory` indicate the start and end of the Oracle inventory collection process.
- `Uploading file <`*`filename`*` (Oracle).ndi.gz>` indicates the upload of the compressed Oracle inventory file.
- `File <`*`filename`*` (Oracle).ndi.gz> removed from upload directory` indicates the successful upload of the inventory file.

Troubleshooting uploads is the same as covered earlier.

b. If Oracle Database inventory gathering is failing, make sure that the account running the database instance is listed in the ORADBA group (the local `ora_dba` security group on Windows and the `dba` group on UNIX-like platforms). By default this group exists, and the account running the instance is listed in it; but it is possible that the group has been removed on [some of] your Oracle servers. Gathering Oracle inventory cannot proceed without this group existing, and being correctly populated with the relevant accounts.

If problems persist, please contact Flexera Software Support with full details and log files.

FlexNet Inventory Scanner Collection of Oracle Inventory

Rather than deploying the complete FlexNet inventory agent, in this approach you choose to deploy the lightweight FlexNet Inventory Scanner, a reduced code set that is detailed in the *Gathering FlexNet Inventory* PDF file (available through the title page of online help). Operational details and results are very similar to the agent-based cases described earlier, but the differences are included in the topics in this section.

Prerequisites for FlexNet Inventory Scanner inventory collection

The following must be in place for FlexNet Inventory Scanner collection of Oracle inventory by an inventory beacon:

1. You have licensed the FlexNet Manager for Oracle product (for details, see Appendix E: Features Enabled in FlexNet Manager for Oracle).
2. Each installed copy of the FlexNet Inventory Scanner must be able to access an inventory beacon to upload its `.disco` and `.net.gz` files. The path to this inventory beacon must be defined in its `UploadLocation` preference (normally in the command line that invokes the FlexNet Inventory Scanner). This may be one of your existing, fully-configured inventory beacons; or if it is one specifically for use by the FlexNet Inventory Scanner alone, it does not require assigned subnets (you are managing the FlexNet Inventory Scanner, rather than letting the inventory beacon manage it).
3. You have deployed the FlexNet Inventory Scanner, following the processes in these topics from the *Gathering FlexNet Inventory* PDF:
   - *FlexNet Inventory Scanner: Implementation on Windows*
   - *FlexNet Inventory Scanner: Implementation on UNIX-like Platforms*.

   Tip: *For gathering Oracle inventory with the FlexNet Inventory Scanner, it is critical that you have also deployed `InventorySettings.xml` into the same folder as the FlexNet Inventory Scanner, as described in the above topics.*
4. You have configured your preferred scheduling system to invoke the FlexNet Inventory Scanner on your desired schedule, with the command-line settings needed to trigger upload of the collected inventory and Oracle discovery files to an appropriate inventory beacon. (For details, see *Gathering FlexNet Inventory*.)

Credentials for FlexNet Inventory Scanner Inventory

When using FlexNet Inventory Scanner as your inventory-gathering tool, you configure your preferred scheduling tool (such as Microsoft Task Scheduler on Windows, or `cron` on UNIX-like platforms) to invoke FlexNet Inventory Scanner with the appropriate tracker command line parameters (documented in *ndtrack Command Line* in the *Gathering FlexNet Inventory* PDF). Since this invocation is local on the target inventory device, there is no requirement to register any credentials in the Password Store on any inventory beacon.

The credentials required on the target device vary across platforms.

On Microsoft Windows target devices

For the account to invoke FlexNet Inventory Scanner:

- The `LocalSystem` account is recommended.

- A non-`LocalSystem` account with administrator privileges is also acceptable. (This means that the account is a member of the Administrators security group in Active Directory.)

> **Note:** *On Microsoft Windows, the tracker does not prevent invocation by an account that has lesser privileges; but you would then need to ensure that such an account had all the required access rights for the kinds of inventory you expected to gather on a target device. Since this is highly dependent on your environment, this approach is unsupported.*

- The chosen account must have read-only access to the Windows Service Control Manager (this allows discovery of Oracle services)
- It must be a member of the Windows local security group `ora_dba` (in which context, the `LocalSystem` account is displayed as `NT AUTHORITY\SYSTEM`)
- This account uses local OS authentication to take inventory; which means that the `SQLNet.AUTHENTICATION_SERVICES` property must be set to `(NTS)` in the `sqlnet.ora` file located in the `%ORACLE_HOME%\network\admin` directory.

Operation with Oracle Database 9i is an exceptional case. To collect Oracle 9i inventory on Windows, you *must* run `ndtrack` as a *non*-`LocalSystem` user account. To do this, ensure that the account has administrator privileges on the target device (that is, is included in the Administrators security group) so that it can collect sufficient hardware inventory information; and then set up your Windows scheduled task to include the following:

- In the **General** tab of the **Task Scheduler**, set the user account name in the field for **When running the task, use the following user account**.
- In the **Actions** tab, set the action to `Start a program`, and the **Program/script:** value to

  ```
  ndtrack.exe -t machine
  ```

  The `-t machine` option is mandatory in this scenario (in contrast, it is the default when the tracker runs as `LocalSystem`).

On UNIX-like target devices

FlexNet Inventory Scanner must run as `root` to collect Oracle inventory. If it is run under any other account on UNIX-like systems, the gathering of Oracle inventory is blocked.

How the FlexNet Inventory Scanner Collects Oracle Inventory

In this approach, you have taken responsibility for the deployment and scheduling of the lightweight FlexNet Inventory Scanner (including installing the current version of the `InventorySettings.xml` file in the same folder as the scanner executable).

The following description assumes that all the prerequisites listed in FlexNet Inventory Scanner Collection of Oracle Inventory have been satisfied.

1. When your chosen scheduling tool triggers the FlexNet Inventory Scanner on the target inventory device, the tracker component performs discovery on its local device (recording results in a .disco file). For Oracle, the discovery process tries to identify one or more paths for $ORACLE_HOME, using all of these platform-dependent methods in order (and combining the resulting dataset):

UNIX-like platforms — Oracle discovery	Windows platforms — Oracle discovery
1. The tracker scans the file system for any oracle executables. • This scan honors the global settings for file system scans in the **File Inventory** section of the **Inventory Settings** page of the web interface, which may limit search paths or even disable file scanning entirely. • On success, this search returns the file path ($ORACLE_HOME) and the executable ID.	1. The tracker looks for a registry entry under HKLM\SOFTWARE\Wow6432Node\Oracle\ (or, on 32-bit systems, HKLM\SOFTWARE\Oracle\). On success, this returns the %ORACLE_HOME% path.
2. The tracker looks for an oratab file (installed in either /etc or /var/opt/oracle during database installation). On success, this provides the $ORACLE_HOME path, the executable ID for the oracle executable, and the System ID (SID) for the related database.	2. The tracker interrogates the Windows Service Control Manager. On success, this provides the %ORACLE_HOME% path, the System ID (SID) for the database running in that process, and the name of the related Oracle listener.
3. The tracker examines process listings for matches to ora_smon_*. On success, this provides the $ORACLE_HOME path and/or the executable ID for the oracle executable, as well as the SID for the running database and the user account running it.	(No step 3 for Windows.)
4. The tracker examines process listings for tnslsnr. On success, this provides the $ORACLE_HOME path, the executable ID for the oracle executable, the name of the related Oracle listener, and the user account running the listener.	(No step 4 for Windows.)

2. Next, the tracker gathers general hardware and software inventory (recorded in an .ndi file) from the local device. This is the standard inventory gathering that the tracker gathers on every device where it is running.

3. If the tracker discovered one or more Oracle database instance(s) on the device, and all the required settings and account privileges are in place, the tracker also gathers inventory from all accessible Oracle database instances. The methods on different types of platform are as follows.

- For UNIX-like platforms, the tracker impersonates an appropriate account, determined by the configuration of the preferences shown below. Each column in this table shows a set of conditions in the first three rows, followed by the resulting behavior in the last two rows:

UNIX-like platforms — Conditions	Option 1	Option 2	Option 3	Option 4	Option 5
If the executable runs as	`root`	`root`	`root`	`root`	Any other account
and `OracleInventoryAsSysdba` =	`True`	`True`	`False`	`False`	n.a.
and `OracleInventoryUser` =	Valid user	Not set	Valid user	Not set	n.a.
Then: Impersonated account is	That user	Process owner	That user	Not supported	n.a.
Command line parameters for `sqlplus`	`"/ as sysdba"`	`"/ as sysdba"`	`"/ "`	*No inventory*	*No inventory*

- For Windows platforms, the tracker normally runs as `LocalSystem`, but may be run by another account that has administrator privileges (that is, is a member of the `Administrators` security group). In either case, the same account that is running the `ndtrack` executable is used to invoke the command line for `sqlplus`, using the parameter `"/ as sysdba"`. This remains true even if the Oracle database instance is running as a service user, as is possible from Oracle Database 12c; so that binaries controlled by the service account are now executed as `LocalSystem` (or at least with administrator privileges). It is, of course, best practice to ensure that any service account running a database instance is well secured, so that the binaries it controls are protected.

4. Where Oracle inventory is collected, the tracker also executes scripts provided by Oracle License Management Services (LMS) to gather software and hardware information about the servers where Oracle Database is installed.

   These scripts are extracted from the `InventorySettings.xml` file that you installed in the same directory as the FlexNet Inventory Scanner. The data gathered by these scripts helps to populate the Oracle audit report available through FlexNet Manager Suite (navigate to the **Discovery & Inventory** > **Oracle Instances** page, and see details in the help for that page).

5. The tracker records the software and hardware results of the Oracle inventory gathering in a separate `.ndi` file.

6. By default, the FlexNet Inventory Scanner saves collected inventory in `%temp%\FlexeraSoftware\$(*UserName*) on $(*MachineId*).ndi`, where `%temp%` is the temporary directory for the account that is running the FlexNet Inventory Scanner, with the file name showing the account and machine ID related to the inventory run. The files remain here (for example, for your inspection in an XML editor) until over-written in the next inventory collection. Alternatively, if the command line used to invoke the FlexNet Inventory Scanner included the options `-o Upload=True -o`

`UploadLocation=http://`*`YourBeaconServerURL`*`/ManageSoftRL`, then immediately on completion of inventory gathering, the tracker uploads the `.disco` file and one or two compressed `.ndi` files to the appropriate inventory beacon.

> 💡 ***Tip:** If this upload should fail (for example, because of an incorrect upload parameter in the command line, or a temporary network problem), the FlexNet Inventory Scanner does not have the capacity to run a catch-up at a later time. (For this catch-up facility, install the full FlexNet inventory agent.)*

7. The inventory beacon uploads all collected discovery and inventory information to the central application server (or, if it is a member of a hierarchy of inventory beacons, uploads the data to its parent in the hierarchy, and the upload is repeated until the data reaches the application server). Data is stored initially in the inventory database.
8. In due course, the inventory import (to the compliance database) and license reconciliation process runs (typically overnight, although an operator in an Administrator role can also trigger a full import and reconciliation). Progress is visible on the **System Tasks** page.
9. The **Discovery & Inventory** > **Oracle Instances** page lists the database inventory for all servers discovered and inventoried until the time of the latest reconciliation calculation.

Troubleshooting Oracle Inventory Using the FlexNet Inventory Scanner

If you are using the FlexNet Inventory Scanner for Oracle discovery and inventory collection, a successful installation and invocation of the FlexNet Inventory Scanner is a prerequisite. As these processes are entirely in your control, the following guide assumes that you have validated them first.

To troubleshoot Oracle discovery and inventory gathering by the FlexNet Inventory Scanner:

1. Before concluding that there is a problem, ensure that you have allowed sufficient time for:

   - Discovery and inventory processes on the target device (check the schedule you have configured for the FlexNet Inventory Scanner, and allowing just a few minutes to gather inventory, even for a large server)
   - File upload to the inventory beacon, and from there to the central application server (typically within several minutes of the data gathering being completed)
   - Inventory import from the inventory database to the main compliance database (typically scheduled overnight)
   - The license reconciliation calculations (typically scheduled overnight).

   If after this process has completed, the target Oracle server does not appear in **Discovery & Inventory > All Discovered Devices**, it is time to continue troubleshooting. (If the device does appear in this listing, but the Oracle instance is not visible in **Discovery & Inventory** > **Oracle Instances**, skip forward to step 4.)
2. On the target Oracle server, examine the tracker log file in the appropriate folder from this list:

- **On Windows:** `%temp%\ManageSoft\tracker.log` (where `%temp%` is the temporary folder for the account running the tracker), or your chosen location if you redirected the logging at the command line.
- **On UNIX-like platforms:**
    - When the executable has run as the `root` account, in `/var/tmp/flexera/log`
    - When the executable has been run by any other user account (represented as *`UserName`*), in `/var/tmp/flexera.`*`UserName`*`/log`.
    - Your chosen location if you redirected the logging at the command line or in the `ndtrack.ini` file of preferences on UNIX-like platforms.

Verify the following events:

- The event `Uploading file <`*`filename`*`.disco>` indicates the generation of the discovery file has succeeded (it is normally attempted immediately after creation of the discovery file).
- The event `File <`*`filename`*`.disco> removed from upload directory` indicates the successful upload of the discovery file.

3. If there is no evidence of a successful upload:

a. Check the discovery upload folder on the target Oracle server, since files should be left behind when upload fails:

- **On Windows:** `%temp%\FlexeraSoftware\`, where `%temp%` is the temporary directory for the account that is running the FlexNet Inventory Scanner
- **On UNIX-like platforms:**
    - When the executable has run as the `root` account, in `/var/tmp/flexera/uploads/Discovery`
    - When the executable has been run by any other user account (represented as *`UserName`*), in `/var/tmp/flexera.`*`UserName`*`/uploads/Discovery`.

b. If the relevant discovery upload folder still contains the `.disco` file, discovery is working but uploads are failing:

- Double-check that the tracker command line options passed to the FlexNet Inventory Scanner correctly identified an accessible upload location on the correct inventory beacon.
- Ping or otherwise check network access from the target Oracle server to the inventory beacon.
- Ensure that the `ManageSoftRL` file share remains configured on the relevant inventory beacon (it is configured as part of the installation of the inventory beacon) and accessible.
- Can you be sure there wasn't an intermittent network problem at last inventory time?

c. If the relevant discovery upload folder on the target Oracle server is empty, upload to the inventory beacon may have worked as the first stage, and you can check for a later problem in the upload chain:

Switch to the relevant inventory beacon, and:

- Check `%CommonAppData%\Flexera Software\Incoming\Inventories`. This is the staging folder for data uploaded from target devices but not yet uploaded to the parent of this inventory beacon. If a file is still here, the upload from this inventory beacon to its parent (another inventory beacon) has failed.
- Check logs for any issues in `%CommonAppData%\Flexera Software\Compliance\Logging\BeaconEngine`.

4. If discovery is working but Oracle inventory is not, the target Oracle server is visible in **Discovery & Inventory > All Discovered Devices**, but there is no record of the Oracle instance(s) running on that server in **Discovery & Inventory > Oracle Instances**. To troubleshoot, return to the log file for the `ndtrack` component on the target Oracle server:

   Verify the following events:

   - `Starting oracle inventory` and `Finished generating inventory` indicate the start and end of the Oracle inventory collection process.
   - `Uploading file <`*`filename`*` (Oracle).ndi.gz>` indicates the upload of the compressed Oracle inventory file.
   - `File <`*`filename`*` (Oracle).ndi.gz> removed from upload directory` indicates the successful upload of the inventory file.

   Troubleshooting uploads is the same as covered earlier.

5. If Oracle Database inventory gathering is failing, make sure that the account running the database instance is listed in the ORADBA group (the local `ora_dba` security group on Windows and the `dba` group on UNIX-like platforms). By default this group exists, and the account running the instance is listed in it; but it is possible that the group has been removed on [some of] your Oracle servers. Gathering Oracle inventory cannot proceed without this group existing, and being correctly populated with the relevant accounts.

If the problem persists, please contact Flexera Software Support with the full details and the appropriate log files.

Zero-footprint Collection of Oracle Inventory

"Zero-footprint" inventory collection is a term defined in the *Gathering FlexNet Inventory* PDF file (available through the title page of online help). It refers to an approach where an inventory beacon initiates the inventory gathering process (using different platform-specific methods), and then removing code artifacts afterward so that there is no permanent installation footprint on the target device.

Prerequisites for Zero-footprint inventory collection

The following must be in place for Zero-footprint collection of Oracle inventory by an inventory beacon:

1. You have licensed the FlexNet Manager for Oracle product (for details, see Appendix E: Features Enabled in FlexNet Manager for Oracle).

2. You have deployed and configured one or more inventory beacon(s) in your network, such that at least one inventory beacon can access each of your target Oracle servers.
    - For detailed information about inventory beacons, their deployment, and configuration, see the topics under *What Is an Inventory Beacon?* in the online help. You initiate deployment of an inventory beacon by navigating to **Discovery & Inventory** > **Beacons**.
    - Your organizational site and subnet hierarchy is recorded through the **Discovery & Inventory** > **Subnets** page of the web interface (see *Subnets* in the online help).
    - Assign the defined subnets to the inventory beacon(s) through the **Discovery & Inventory** > **Beacons** page of the web interface (see *Assigning a Subnet to a Beacon* in the online help).
3. You have set up the accounts required for operation, both configuring them on the target Oracle servers and recording them in the secure Password Store on the appropriate inventory beacons. Details of the accounts for different platforms are in Credentials for Zero-footprint Inventory.

Credentials for Zero-footprint Inventory

For Zero-footprint inventory, the required accounts and their privilege levels vary across computer platforms. For each target server, two accounts may be required:

- The first initializing account allows the inventory beacon to link to the target device, either download the appropriate files (for UNIX) or run a service (for Windows), and invoke the FlexNet inventory agent
- The second operational account is the account under which the FlexNet inventory agent is run.

On Microsoft Windows target devices

- The initializing account:
    - May be either a Windows domain account, or a local account on the target device
    - Requires full access to the Windows Service Control Manager on the target device (specifically, it must have the `SC_MANAGER_ALL_ACCESS` access right)
    - Must be appropriately registered in the secure Password Store on the inventory beacon that is responsible for collecting inventory from this target device (for details, see *FlexNet Manager Suite Help* > *Inventory Beacons* > *Password Management Page* and its child topics)
    - May conveniently be the `LocalSystem` account, since this is required for the following operational stage.
- For the operational account, FlexNet inventory core components (and in particular the `ndtrack` component) run as the `LocalSystem` account.

On UNIX-like target devices

- The initializing account:
    - Is a local account on the target inventory device
    - Has `ssh` privileges on that device

  - Must be appropriately registered in the secure Password Store on the inventory beacon that is responsible for collecting inventory from this target device (for details, see *FlexNet Manager Suite Help* > *Inventory Beacons* > *Password Management Page* and its child topics)

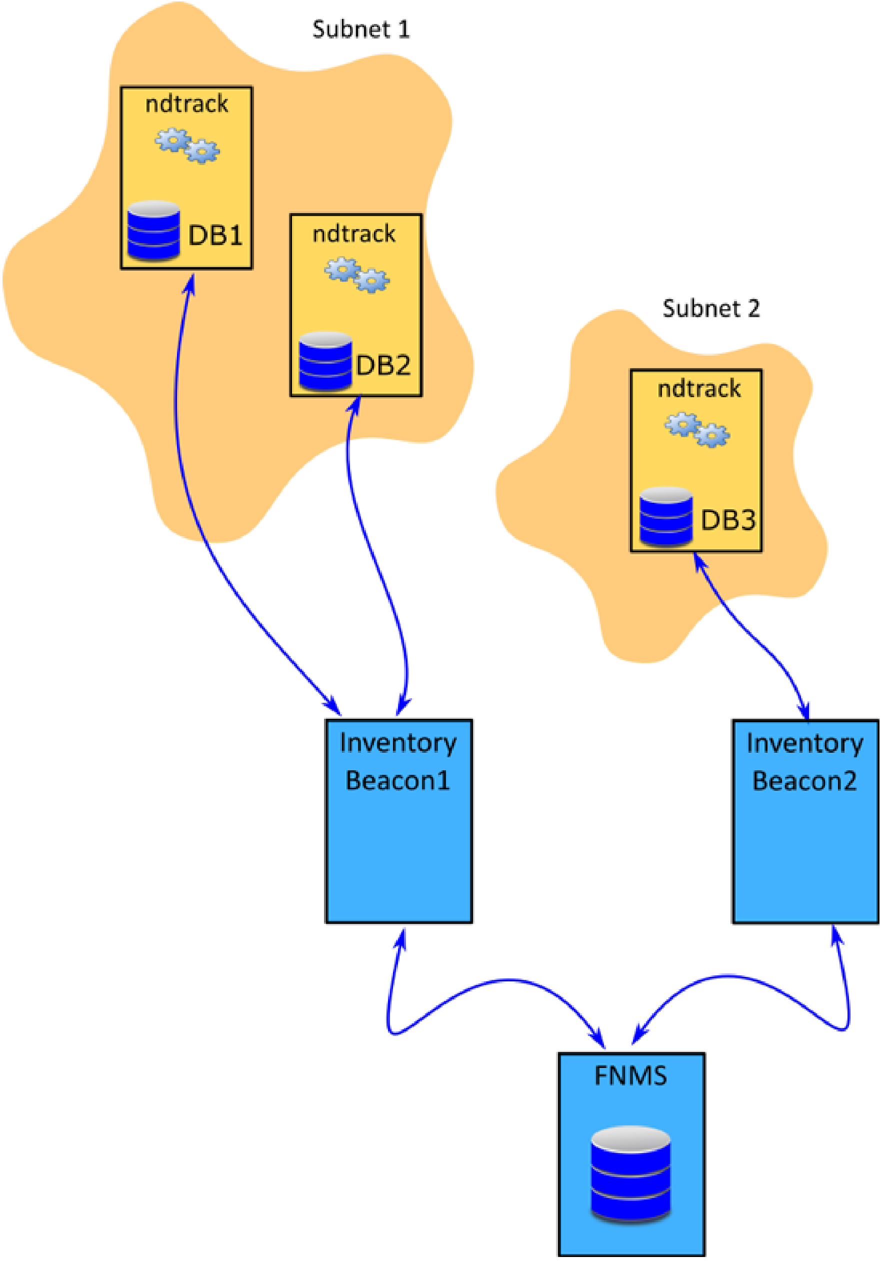
- For the operational account, FlexNet inventory core components (and in particular the `ndtrack` component) run as `root`.

How Zero-footprint Collection of Oracle Inventory Works

In Zero-footprint inventory collection, the process is initiated by the inventory beacon. However, once the FlexNet inventory agent commences operation, it is running entirely in the context of the target device (the Oracle server). This means that it is functionally equivalent to the local agent-based collection of Oracle inventory, with the only differences being in the methods of initiation.

Tip: *In particular, the settings for Oracle inventory that are set in the* ***Actions*** *tab of the* ***Discovery and Inventory Rules*** *page (under* ***Oracle database environments****, where there are check boxes for* ***Discover Oracle database environments*** *and* ***Gather Oracle database environment inventory****) do not control the behavior of FlexNet inventory agent in this Zero-footprint case, any more than in the local agent-based collection. The Zero-footprint case is controlled only by the setting in the* ***General hardware and software inventory*** *section, and inventory collection is triggered when a rule includes the setting* ***Gather hardware and software inventory from all target devices****.*

The following diagram shows an example scenario for two inventory beacons.



The above diagram shows three database servers, two in Subnet1 and one in Subnet2. The Subnet1 is assigned to Inventory Beacon1 and Subnet2 is assigned to Inventory Beacon2. Each inventory beacon can connect to the Oracle server(s) in its assigned subnet. All the prerequisites outlined in Zero-footprint Collection of Oracle Inventory are satisfied.

The process for Zero-footprint collection of Oracle inventory runs like this:

1. To control the behavior of the inventory beacon(s), an operator sets an appropriate rule in the web interface at **Discovery & Inventory > Discovery and Inventory rules**:
    - **Target**: One or more target(s) to identify all Oracle servers in your network.
    - **Action**: These settings:
        - For **Action type**, choose `Discovery and inventory`.

    - Under **Discovery of devices**, select **Network scan** (and ensure the appropriate ports for your target devices are listed)
    - In the **General hardware and software inventory** section, select **Gather hardware and software inventory from all target devices**.
  - **Schedule**: Set your preferred schedule for execution of the completed rule.

2. By default, every 15 minutes each inventory beacon checks for any updates to its policy, which also transfers any changed discovery and inventory rules. (To adjust this download schedule, see *Inventory Settings Page* > *Beacon Settings Section* in the online help.) Each inventory beacon exercises only those rules that apply to its assigned subnet(s). The only action setting relevant to the Zero-footprint case is **Gather hardware and software inventory from all target devices**.
3. When the related schedule triggers an applicable rule, the inventory beacon initiates the process in ways appropriate to the target platform. Full details are available in the *Gathering FlexNet Inventory* PDF; but in summary:
   - **For Windows:** The FlexNet Beacon engine logs into the target server, and creates a Windows service that executes `ndtrack.exe` from the `mgsRET$` file share on the inventory beacon. Note that `InventorySettings.xml` is available to the FlexNet inventory agent so that advanced Oracle inventory capabilities are available; but there is no way to pass device-specific preferences to `ndtrack.exe`.
   - **For UNIX:** The FlexNet Beacon engine logs into the target server, elevates its privileges to root level, creates a secure link back to the inventory beacon, and copies `ndtrack.sh` to the target server and executes it. This script identifies the platform, unzips the appropriate `ndtrack` executable, and runs it. Note that the `ndtrack.ini` (which contains any agent preference settings you may have configured there) and `InventorySettings.xml` are delivered to the target device as well, allowing the functionality described below. However, since these are stored on the inventory beacon, the same values are delivered to each target device managed by an individual inventory beacon.

   ***Tip:** The remaining steps in the process are almost identical to those for local agent-based inventory collection (with the exception of upload retries). The descriptions are repeated here for your convenience.*
4. The tracker (`ndtrack` executable) runs discovery on the target device, writing results to a `.disco` file. For Oracle, the discovery process tries to identify one or more paths for `$ORACLE_HOME`, using all of these platform-dependent methods in order (and combining the resulting dataset):

UNIX-like platforms — Oracle discovery	Windows platforms — Oracle discovery
1. The tracker scans the file system for any `oracle` executables. • This scan honors the global settings for file system scans in the **File Inventory** section of the **Inventory Settings** page of the web interface, which may limit search paths or even disable file scanning entirely. • On success, this search returns the file path (`$ORACLE_HOME`) and the executable ID.	1. The tracker looks for a registry entry under `HKLM\SOFTWARE\Wow6432Node\Oracle\` (or, on 32-bit systems, `HKLM\SOFTWARE\Oracle\`). On success, this returns the `%ORACLE_HOME%` path.
2. The tracker looks for an `oratab` file (installed in either `/etc` or `/var/opt/oracle` during database installation). On success, this provides the `$ORACLE_HOME` path, the executable ID for the `oracle` executable, and the System ID (SID) for the related database.	2. The tracker interrogates the Windows Service Control Manager. On success, this provides the `%ORACLE_HOME%` path, the System ID (SID) for the database running in that process, and the name of the related Oracle listener.
3. The tracker examines process listings for matches to `ora_smon_*`. On success, this provides the `$ORACLE_HOME` path and/or the executable ID for the `oracle` executable, as well as the SID for the running database and the user account running it.	(No step 3 for Windows.)
4. The tracker examines process listings for `tnslsnr`. On success, this provides the `$ORACLE_HOME` path, the executable ID for the `oracle` executable, the name of the related Oracle listener, and the user account running the listener.	(No step 4 for Windows.)

5. Next, the tracker gathers general hardware and software inventory (recorded in an `.ndi` file) from the local device. This is the standard inventory gathering that the tracker gathers on every device where it is running.

6. If the tracker discovered one or more Oracle database instance(s) on the device, and all the required settings and account privileges are in place, the tracker also gathers inventory from all accessible Oracle database instances. The methods on different types of platform are as follows.

   - For UNIX-like platforms, the tracker impersonates an appropriate account, determined by the configuration of the preferences shown below. Each column in this table shows a set of conditions in the first three rows, followed by the resulting behavior in the last two rows:

UNIX-like platforms — Conditions	Option 1	Option 2	Option 3	Option 4	Option 5
If the executable runs as	`root`	`root`	`root`	`root`	Any other account

UNIX-like platforms — Conditions	Option 1	Option 2	Option 3	Option 4	Option 5
and `OracleInventoryAsSysdba` =	`True`	`True`	`False`	`False`	n.a.
and `OracleInventoryUser` =	Valid user	Not set	Valid user	Not set	n.a.
Then: Impersonated account is	That user	Process owner	That user	Not supported	n.a.
Command line parameters for `sqlplus`	`"/ as sysdba"`	`"/ as sysdba"`	`"/ "`	*No inventory*	*No inventory*

- For Windows platforms, the tracker normally runs as `LocalSystem`, but may be run by another account that has administrator privileges (that is, is a member of the `Administrators` security group). In either case, the same account that is running the `ndtrack` executable is used to invoke the command line for `sqlplus`, using the parameter `"/ as sysdba"`. This remains true even if the Oracle database instance is running as a service user, as is possible from Oracle Database 12c; so that binaries controlled by the service account are now executed as `LocalSystem` (or at least with administrator privileges). It is, of course, best practice to ensure that any service account running a database instance is well secured, so that the binaries it controls are protected.

7. Where Oracle inventory is collected, the tracker also executes scripts provided by Oracle License Management Services (LMS) to gather software and hardware information about the servers where Oracle Database is installed. (These scripts, as amended from time to time, are downloaded to the tracker from the `InventorySettings.xml` file. They are used only for the preparation of an Oracle audit report, available to operators who have appropriate access rights in the **Discovery & Inventory** > **Oracle Instances** page, with more details available in the help for that page.)

8. The tracker records the software and hardware results of the Oracle inventory gathering in a separate `.ndi` file.

9. Immediately on completion of inventory gathering, the tracker uploads the `.disco` file and one or two compressed `.ndi` files to the appropriate inventory beacon.

   ***Tip:** If this upload fails (say, because of a temporary network issue), there is no catch-up retry in the Zero-footprint case.*

10. The inventory beacon uploads all collected discovery and inventory information to the central application server (or, if it is a member of a hierarchy of inventory beacons, uploads the data to its parent in the hierarchy, and the upload is repeated until the data reaches the application server). Data is stored initially in the inventory database.

11. In due course, the inventory import (to the compliance database) and license reconciliation process runs (typically overnight, although an operator in an Administrator role can also trigger a full import and reconciliation). Progress is visible on the **System Tasks** page.

12. The **Discovery & Inventory** > **Oracle Instances** page lists the database inventory for all servers discovered and inventoried until the time of the latest reconciliation calculation.

Troubleshooting Zero-footprint Collection of Oracle Inventory

This case is very similar to the local agent-based collection of Oracle inventory, so if the following notes don't provide the answers you need, you can also check Troubleshooting Agent-Based Collection of Oracle Inventory.

Most of the troubleshooting information for this method is displayed on the **Rules** page in the web interface of FlexNet Manager Suite.

To troubleshoot Zero-footprint collection of Oracle inventory:

1. In the web interface for FlexNet Manager Suite, navigate to **Discovery & Inventory** > **Oracle Instances** to identify the database instances that have been discovered successfully. You may wish to focus on instances you expected to find that are not present on this page. (It is helpful to know the device name of an Oracle server you wish to examine, as you can use the name in searches in various lists.)
2. Another quick check is to look at **Discovery & Inventory** > **All Discovered Devices** and validate that the Oracle server is listed there. If the device itself cannot be discovered, no services on it can be discovered either. Also check for Oracle discovered devices listing problems:
   a. Click the filter icon above the right end of the list, and in the quick filter row, select **Oracle** = `Yes`.
   b. Next to the filter icon, click the notification icon to reduce the list to only those Oracle servers reporting problems.
   c. In the list, click the **Name** of a discovered device to open its properties, and select the **Status** tab.
   d. Expand the **Oracle Database inventory** section, which displays any error message returned by the Oracle listener on this discovered device. Seek the help of your Oracle database administrator to resolve any issues.

   Here are some common errors with suggested things to check:

Error Message	Notes
ORA-12170: TNS: Connect timeout occurred	• Ensure that no firewall is blocking connection to the database. • Ensure that the database is online and running on correct IP.
ORA-12541: TNS: no listener	• The database is shutdown. Ask your database administrator to start the database. • Ensure that no firewall is blocking connection to the database. • Ensure that the listener is not password protected. If it is, add the listener password to the Password Store on the appropriate inventory beacon.

Error Message	Notes
ORA-00942: table or view does not exist	Ensure that the table listed in the error message exists. Ask your database administrator to create the table if it does not exist.
ORA-12514: TNS: listener does not currently know of service requested in connect descriptor	TNS names file is not correct. This is common when a database is set to listen for only “SID” or only “Service_Name”.
ORA-01017: invalid username/password; logon denied	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).
ORA-01034: ORACLE not available ORA-27101: shared memory realm does not exist Linux-x86_64 Error: 2: No such file or directory	These errors typically mean that a discovered Oracle database instance was not running at inventory time. Ask your Oracle Database administrator whether the instance can be made active for the next inventory gathering process.
ORA-01033: ORACLE initialization or shutdown in progress	Oracle is stuck in a reboot process. Ask your database administrator to shutdown and restart the database.
ORA-12518: TNS: listener could not hand off client connection	Indicates a network problem. Ensure that the appropriate inventory beacon can access the Oracle server.
ORA-00604: error occurred at recursive SQL level 1	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).
ORA-00257: archiver error. Connect internal only, until freed	Indicates an archive error. Ask your Oracle Database administrator to check the `archiver.log` file for the error.

3. Navigate to **Discovery & Inventory** > **Discovery and Inventory Rules** > **Rules** tab, and:

   a. Find the appropriate rule, and check its **Rule status** value shows `Enabled`. (A disabled rule never executes.)

   b. Click the title of the relevant rule and note the **Action** name and **Targets** name for this rule for use shortly. Also validate that the **Schedule** details are as expected.

   c. Look in **Current run** or **Last completed run** to see the number of database instances discovered, inventoried, skipped, and failed. Some notes to assist your analysis of these figures:

Column	Notes
Service discovered	The number of Oracle database instances discovered in the last execution of the rule. This number should match (or possibly exceed) your expectations for Oracle servers within the targeted subnets. However, database discovery *cannot* succeed when: • The target device is powered off at the time of rule execution (to recover, re-run the rule when the server is operational). • The listener on the device is not operating when the rule executes (to recover, re-run the rule when the listener is running). • The password for the listener is not available in the Password Store on the inventory beacon attempting discovery. • The listener returns an error, or does not identify any services (database instances).
Inventory completed	The count of those instances from which database inventory has been collected. In an ideal world, this count of successful inventories may match the discovery result in the previous column. Differences should be tracked in the next two columns.
Inventory skipped	The count of database instances where collection of database inventory was not attempted. If a server is within scope for the inventory beacon, but no listener is identified on that server, it is counted as skipped.
Inventory failed	The count of database instances where inventory collection was attempted but failed. This may be because: • The credentials for the database instance were not configured in the Password Store on the inventory beacon attempting to collect database inventory. • The instance was not running at inventory time. • The instance was running, but was not active (that is, was in the idle state) at inventory time.

d. Look to the bottom of the same expanded panel, and click **Show/hide task status and history**. By default this lists the last five executions of the rule. You can expand one (such as the most recent) to see all the inventory beacons that received the discovery and inventory rule (it still shows as `Scheduled` on inventory beacons that do not manage the appropriate subnets). You should find the intended inventory beacon in this list, where you can check the value in the **Status** column.

e. Use the **+** icon to expand more details for the chosen inventory beacon, and you see entries such as `Performing discovery` and `Gathering Oracle database inventory`. In the right-hand column are links for **Download log**. Download these, unzip the archive, and examine in a text file editor for clues to the problem.

4. In the area summarizing the run results, the **Devices failed to be inventoried** field indicates the number of devices for which general hardware and software inventory collection has failed. You can click the link to view the details in the **Rule Execution Details** page. For more information, see the **Rule Execution Details** page in the online help.
5. Using the noted **Action** name for this rule, switch to the **Actions** tab, locate the relevant action, and click the editing (pencil) icon on the right-hand side to show the details. In the **Discovery of devices** section, where **Network scan** is selected, verify the correct ports are included for all Oracle servers where database instances are running (especially focusing on instances that have not yet been discovered). If you are not sure about the correct port settings for each Oracle server, ask your system administrator. Recall that a probe on the ports listed here must get a response from the server itself before further discovery or inventory work is attempted.
6. In the **General hardware and software inventory** section, ensure that the **Gather hardware and software inventory from all target devices** option is selected.
7. If it appears that connection has been made and inventory collected, check for problems with file upload from the inventory beacon to the central application server. On the inventory beacon, examine `C:\Windows\Temp\ManageSoft\uploader.log` for any issues with uploads.
8. Still on the inventory beacon, check for inventory-specific errors in `%ProgramData%\Flexera Software\Compliance\Logging\InventoryRule\DeviceInventory.log` and `OracleDBInventory.log` files.
9. To enable richer logging on the inventory beacon, enable tracing by removing the hash character (#) from the following lines of the `etdp.trace` file present in the `%Program Files (x86)%\Flexera Software\Inventory Beacon\` folder:

   ```
   +Inventory/Oracle
   +Inventory/Oracle/SDK
   +Inventory/Oracle/Query
   +Inventory/Oracle/Query/Substitution
   +Inventory/Oracle/Query/Execution
   +Inventory/Oracle/Listener
   +Inventory/Oracle/Listener/Detail
   ```

   ***Important:** After making changes to the `etdp.trace` file, you must use the Windows Service Controller on the inventory beacon to stop and restart the `beaconengine` service.*

10. Rerun the rule to collect Oracle discovery and inventory information, so that additional logging is created. See whether these richer logs assist in identifying the problem. Wait until after the next inventory import, and then look for both the discovered device (**All Discovered Devices**) and its Oracle instance (**Oracle Instances**). (Rather than waiting, an operator in an Administrator role can navigate to **License Compliance > Reconcile**, ensure that the **Update inventory for reconciliation** option is selected, and click **Reconcile**.)
11. If the problem persists, contact Flexera Software support with detailed information and log files.

Direct Collection of Oracle Inventory

The phrase 'direct collection of inventory' refers to techniques where an inventory beacon connects directly to a data source (possibly through an API) to collect information. In the case of Oracle, the method requires that FlexNet Beacon (the code engine on an inventory beacon) connects to the Oracle Database (using an OLEDB client library) through the Oracle Net Listener, and collects the available information as database inventory.

Important: *The direct collection inventory method only gathers information about database instances. It does not, for example, collect any hardware inventory data nor software inventory about any other products. This means that the direct collection inventory method alone is insufficient to correctly determine license consumption for Oracle products:*

- *For licensing of database instances and options, hardware information (such as the count of cores) is missing*
- *For other products such as Oracle middleware, there is no software inventory available from the Oracle Database.*

This means that, if you choose to use direct collection of Oracle inventory (and want to manage Oracle licenses), you must augment the approach with other ways of gathering hardware and general software inventory. You could achieve this, for example, through third-party products, from which you import inventory into FlexNet Manager Suite to allow for data integration and license consumption calculations. Alternatively, reconsider local Agent-Based Collection of Oracle Inventory.

The method for direct collection of Oracle inventory does not inherently include any process for *discovery* of Oracle installations. Details of an Oracle database instance must be already available to allow the direct connection to proceed. Therefore, before using direct collection of Oracle inventory, you must decide on, and implement, a discovery process.

Three distinct methods of providing discovery details are available:

- **Network discovery:** You can set rules so that the FlexNet Beacon engine probes the network to discover appropriate servers. It tests those servers for the presence of one or more Oracle listeners, from which it collects access details for the database instances known to each listener. The inventory beacon then accesses the discovered servers immediately for inventory gathering; and it also uploads the discovery results along with the inventory results. This approach produces discovered device records in FlexNet Manager Suite.

  Note: *This discovery approach is supported only for earlier versions of Oracle Database:*

  - *For version 9i and below, it is recommended that you have set a listener password. If you have done so, you need to provide this password as part of the credentials needed for this approach to work.*
  - *For versions 10g and 11g, it was best practice not to set a listener password, since the default behavior was changed to disallow remote connections and rely on operating system authentication for local access. If you wish to use direct collection of inventory with these versions, you must supply a listener password to turn on support for remote connections.*
  - *Remote connection through the listener is not possible from Oracle 12c onwards, when the listener password was discontinued. Therefore,* ***for Oracle Database 12c and beyond, you cannot use direct collection of Oracle Database inventory.***

- **Using `tnsnames.ora`:** This is a standard Oracle file that identifies database instances and connection details. You may take a copy from your Oracle server and save it on the inventory beacon, or you may use the OEM adapter to create one. When you first trigger direct inventory collection using this method of discovery, there are no matching discovered devices visible in the web interface of FlexNet Manager Suite; but as the first inventory upload occurs, discovery information is also uploaded, and matching discovered device and inventory device records are created in the same import process.

- **Manually-created records:** You can manually enter the listener and services information for each Oracle server through the web interface of FlexNet Manager Suite.

More information about each discovery method is available in the appropriate topic:

- Using Network Discovery with Direct Inventory
- Using tnsnames Discovery with Direct Inventory
- Using Manual Discovery with Direct Inventory.

When discovered device records are available from a previously-completed discovery process, you may also choose to conduct direct inventory collection using those existing records. In this case, the existing discovery information is downloaded from the central application server to the inventory beacon, and used for direct inventory gathering. In operation, this is identical to the case with manually-created records, so see Using Manual Discovery with Direct Inventory.

Prerequisites for direct collection of Oracle inventory

The following must be in place for collection of Oracle inventory by direct connection from an inventory beacon to the Oracle Database:

1. You have licensed the FlexNet Manager for Oracle product (for details, see Appendix E: Features Enabled in FlexNet Manager for Oracle).
2. You have deployed and configured one or more inventory beacon(s) in your network, such that at least one inventory beacon can access each of your target Oracle servers.
   - For detailed information about inventory beacons, their deployment, and configuration, see the topics under *What Is an Inventory Beacon?* in the online help. You initiate deployment of an inventory beacon by navigating to **Discovery & Inventory > Beacons**.
   - Your organizational site and subnet hierarchy is recorded through the **Discovery & Inventory > Subnets** page of the web interface (see *Subnets* in the online help).
   - Assign the defined subnets to the inventory beacon(s) through the **Discovery & Inventory > Beacons** page of the web interface (see *Assigning a Subnet to a Beacon* in the online help).
3. You have set up the accounts required for operation and recorded these in the Password Store on the appropriate inventory beacon (for more information, see Credentials for Direct Collection of Oracle Inventory).
4. You have downloaded and installed on each inventory beacon the appropriate version of the 32-bit Oracle Provider for OLEDB used by the FlexNet Beacon engine to connect the Oracle Database. This driver is included the Oracle Data Access Components (ODAC), and must be the version that is compatible with the target Oracle Database accessed by that inventory beacon.
   - To determine the appropriate driver for your target version of Oracle Database, use your Oracle support account to access the OLEDB driver compatibility matrix from `http://metalink.oracle.com/metalink/plsql/ml2_documents.showDocument?p_database_id=NOT&p_id=207303.1`. Another

version of the compatibility matrix (maintained by a third-party consulting organization) is available at `http://www.dba-oracle.com/t_oracle_client_versions_higher_lower_database_release.htm`. The ODAC versions are available for download from Oracle.

- Each inventory beacon may have exactly one version of the OLEDB drivers installed. As a result, if you have two (or more) different Oracle Database servers that require different versions of the OLEDB drivers, each *must* be managed by a separate inventory beacon. Since inventory beacons are assigned distinct subnets to manage, this means that if the incompatible Oracle Database products are installed within the same subnet, you must split the subnet to separate those Oracle servers, and then assign each new subnet to a distinct inventory beacon, each of which has the appropriate OLEDB driver matching the target Oracle Database version.

Credentials for Direct Collection of Oracle Inventory

The accounts and privileges required for direct collection of inventory data from an Oracle database instance are relatively straight-forward. In addition to inventory collection, the entire process must allow for the initial *discovery* of devices and their database instances to query, and some discovery methods add their own requirements for credentials.

Using network discovery

This method of discovery requires two sets of credentials for discovery.

The first is an account that can be used to log into the target device and probe specified ports to test for the presence of an Oracle Net Listener. This account must be registered in the Password Store on the inventory beacon responsible for discovery (and subsequent inventory gathering).

Once a device has been discovered, and the Oracle Net Listener is known to exist on that device, the listener must accept a remote connection and status request. This request identifies the database instances (services) that the listener knows about. (For this reason, the listener password is required only for the case of network discovery, since in the other cases the database instances are already identified without this request.) This password must be registered in the secure Password Store on the inventory beacon that is to complete the discovery and collect the database inventory (only the password is required, and no account name is needed with this listener password.)

Tip: *If there are multiple listeners on the Oracle server and these have multiple passwords, each password for listeners you will access must be recorded in the Password Store. These are not differentiated by any listener identification: the FlexNet Beacon engine simply steps through each listener password in turn until one works.*

Note: *This method of directly accessing the listener to discover the available Oracle database instances has been barred from Oracle Database version 12c onwards. To use direct inventory gathering with later versions of the database, you must use one of the other discovery methods; and in those alternative methods, the listener password is not required.*

Using tnsnames.ora

There are no special credentials required, other than the normal ones to get the `tnsnames.ora` in place on the inventory beacon (for details see Using tnsnames Discovery with Direct Inventory):

- If you are manually transferring a `tnsnames.ora` file from your Oracle server, you need to log in to the inventory beacon with sufficient privileges to access the file path (typically, with administrator privileges)
- If you are using the OEM adapter, this writes the `tnsnames.ora` file into the correct location, and the credentials needed for the adapter are covered in the *Adapter Reference* PDF (available through the title page of online help).

Using manually-created discovery device records

No additional credentials are required — an operator in a Role with sufficient privileges to create the records does the data input, and these discovered device records are then utilized automatically when required.

Credentials for inventory gathering

Regardless of the discovery method you use, for direct inventory collection you need one account per Oracle database instance that:

- Is a member of the OS-specific ORADBA group (the local `ora_dba` security group on Windows platforms and the `dba` group on UNIX-like platforms)
- Has at least read-only permissions for all the tables and views needed for collecting Oracle inventory (listed in Appendix B- Oracle Tables and Views for Oracle Inventory Collection)
- Has the user name and password registered in the secure Password Store on the inventory beacon that is to collect inventory from each database instance.

One potentially helpful practice is to use the same set of credentials on all target Oracle servers as a special "audit account". This makes it easier to register a single set of credentials in the Password Stores on all applicable inventory beacons, and to script creation of the account consistently across all your Oracle servers. If you choose to use a common audit account across servers, Flexera Software provides a script to create and configure this database user. To get this script, log into the Flexera Software Knowledge Base (https://flexeracommunity.force.com/customer/CCKnowledgeBase, or access through the Support pages of the company website), and search for article Q200934.

***Note:** The sole purpose of creating this audit user is to collect Oracle inventory. However, FlexNet Manager Suite counts it as a named user while calculating license compliance for Oracle licenses. You can adjust the license consumption for this user to avoid consuming license entitlements. Navigate to the **Oracle Instance Properties** > **Oracle users** page for each affected database instance and set the consumption for this user to zero. For more information, see the associated online help.*

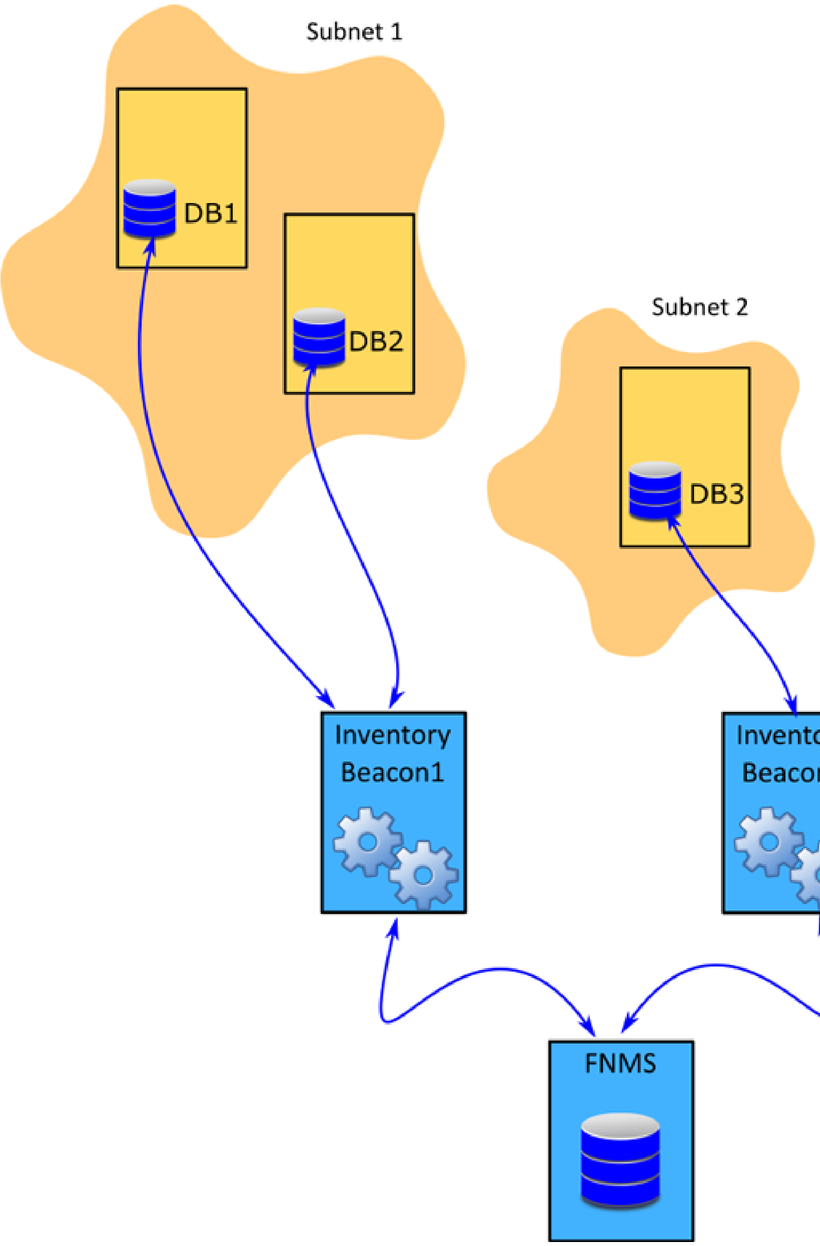
How Direct Collection of Oracle Inventory Works

In the direct inventory collection method, the FlexNet Beacon engine on an inventory beacon connects directly to an Oracle server that lies within its assigned subnet(s), and collects only Oracle Database inventory. While the direct connection step in itself is relatively straight-forward, it must be preceded by your choice of discovery method used to identify the target Oracle server. For completeness, each of these discovery methods is covered in the following topics, and you may focus only on your chosen discovery method together with the subsequent direct inventory collection. The three discovery methods are:

- Network scanning (see Using Network Discovery with Direct Inventory)
- Processing `tnsnames.ora` files, whether these be copied from your Oracle server(s), created with the OEM adapter, or even edited manually (see Using tnsnames Discovery with Direct Inventory)
- Manually creating discovered device records including the necessary connection information (see Using Manual Discovery with Direct Inventory).

Using Network Discovery with Direct Inventory

In this approach, each inventory beacon takes responsibility for both discovery of the Oracle servers and taking inventory of the database instances on them. The following diagram shows an example scenario:



The above diagram shows three database servers, two on Subnet1 and one on Subnet2. The Subnet1 is assigned to Inventory Beacon1 and Subnet2 is assigned to Inventory Beacon2. Note that in this diagram, DB1 and DB2 are running versions of Oracle Database compatible with the same OLEDB driver, as discussed in Direct Collection of Oracle Inventory; separately, DB3 may also be compatible, or may require a different version, since it is already managed by a separate inventory beacon.

The following description assumes that all the prerequisites listed in Direct Collection of Oracle Inventory have been satisfied, including the installation of an appropriate version of the 32-bit OLEDB driver (one version per inventory beacon) for each target Oracle Database.

1. It is likely that the Oracle Net Listener(s) on each target Oracle server has/have been configured with a password for administrative use, as when collecting status and the list of known services (as discussed in Direct Collection of Oracle Inventory, which also lists the versions of Oracle Database for which this

approach is supported). If so, ensure that the password is recorded in the secure Password Store on each appropriate inventory beacon. No user name is required when you record the listener password.

2. On each target Oracle server, set up the special "audit account" for collecting database inventory (see Credentials for Direct Collection of Oracle Inventory).
3. Record the credentials for the special audit account in the secure Password Store on each applicable inventory beacon.
4. Create a rule that combines network discovery with direct inventory. Navigate to **Discovery & Inventory > Discovery and Inventory rules** and use these settings:
   - **Target**: Create a target to identify all Oracle servers (up to and including Oracle Database 11g) in your network. You can use subnet name, IP address, or pattern matching on the device name to identify devices in the target definition.

     > ***Remember:*** *From Oracle Database 12c onwards, password access direct to the listener to query it for the available instances has been blocked, so that this method of discovery is available only for earlier versions of Oracle Database.*

   - **Action**: Create an action that includes these settings:
     - For **Action type**, choose `Discovery and inventory`.
     - In the **Discovery of devices** section, select **Network scan**, and ensure that the appropriate ports are listed. These are the ports tested for the existence of the server itself (typically, for example, 22 for a UNIX server and 139 for a Windows server). Customize this list if your environment requires it. The hardware (server) must respond before further discover of Oracle details is attempted.
     - Expand the **Oracle database environments** section, and select **Discover Oracle database environments**. In the additional controls for **Discovery methods**, select **Port scan**, and if necessary update the list of ports to include all listener ports used in your environment. When each inventory beacon executes this action, it tests each port in turn on each target server, seeking a response from Oracle Net Listener. (Less commonly, if you have SNMP configured on your Oracle servers, you may select the **SNMP** option as well, or instead.)
     - In the same section, select **Gather Oracle database environment inventory**. This is the switch to turn on direct inventory gathering for Oracle database instances.
   - **Schedule**: Specify the running schedule for this rule.

   This completes the initial configuration for network discovery with direct inventory gathering for Oracle. The remainder of these steps cover normal operation.
5. By default, every 15 minutes each inventory beacon checks for any updates to its policy, which also transfers any changed discovery and inventory rules. (To adjust this download schedule, see *Inventory Settings Page* > *Beacon Settings Section* in the online help.) Each inventory beacon exercises only those rules that apply to its assigned subnet(s).
6. When the related schedule triggers an applicable rule:
   a. The inventory beacon reports to the central application server that the task is commencing. You can navigate to **Discovery & Inventory > Discovery and Inventory Rules** and click the rule name to view its status. Wait (while the remainder of the process takes place) until the **Status** field shows

Completed. This process may take some time to complete and you may have to revisit or refresh the page from time to time.

   b. The inventory beacon scans each of its assigned subnets, recording every device that responds to probing on the specified device ports. (Each of these discovered devices will be reported to the central application server in the uploaded `.disco` file, regardless of what else is found on each device.)

   c. The inventory beacon next probes each discovered device for a response on each of the specified listener ports (or, less commonly, collects SNMP data from each discovered device and checks for the presence of Oracle database instances).

   d. From devices where a listener responds, the inventory beacon extracts the list of known Oracle services (database instances).

   All this information is included in the uploaded `.disco` file. For direct inventory gathering (where the discovery files may be larger than with the locally-installed FlexNet inventory agent), `.disco` files are compressed for upload.

7. The FlexNet Beacon engine (on each inventory beacon) uses the discovered services information to connect to each database instance, and collect Oracle Database inventory data. The results are saved into an `.ndi` inventory file (specific to Oracle inventory only) for each server.

   ***Tip:** Because listeners may know about database instances on several distinct servers, one inventory beacon may return database inventory from multiple servers, and (depending on the configuration of your network and listeners) not necessarily restricted to the subnet(s) assigned to that inventory beacon. The FlexNet Beacon engine uses information retrieved from each database instance to identify the servers, and ensure that it returns one `.ndi` inventory file per server.*

8. Immediately after inventory gathering, the inventory beacon compresses the `.ndi` file(s) and `.disco` files, and uploads them to the central application server (or, if it is a member of a hierarchy of inventory beacons, uploads the data to its parent in the hierarchy, and the upload is repeated until the data reaches the application server). It is initially stored in the inventory database.

9. In due course, the inventory import (to the compliance database) and license reconciliation process runs (typically overnight, although an operator in an Administrator role can also trigger a full import and reconciliation). Progress is visible on the **System Tasks** page.

10. The **Discovery & Inventory** > **Oracle Instances** page lists the database inventory for all servers discovered and inventoried until the time of the latest reconciliation calculation.

Troubleshooting Direct Inventory Using Network Scan

In direct gathering of Oracle inventory, the FlexNet Beacon engine connects directly to Oracle databases using database port information. If you select network scan as the method of discovery, the FlexNet Beacon engine first tries to discover the required port information by finding and querying the appropriate Oracle listener services.

To troubleshoot Oracle inventory gathering with discovery by network scanning:

1. In the web interface for FlexNet Manager Suite, navigate to **Discovery & Inventory** > **Oracle Instances** to identify the database instances that have been discovered successfully. You may wish to focus on

instances you expected to find that are not present on this page. (It is helpful to know the device name of an Oracle server you wish to examine, as you can use the name in searches in various lists.)

2. Another quick check is to look at **Discovery & Inventory > All Discovered Devices** and validate that the Oracle server is listed there. If the device itself cannot be discovered, no services on it can be discovered either. Also check for Oracle discovered devices listing problems:

    a. Click the filter icon above the right end of the list, and in the quick filter row, select **Oracle** = `Yes`.

    b. Next to the filter icon, click the notification icon to reduce the list to only those Oracle servers reporting problems.

    c. In the list, click the **Name** of a discovered device to open its properties, and select the **Status** tab.

    d. Expand the **Oracle Database inventory** section, which displays any error message returned by the Oracle listener on this discovered device. Seek the help of your Oracle database administrator to resolve any issues.

    Here are some common errors with suggested things to check:

Error Message	Notes
ORA-12170: TNS: Connect timeout occurred	• Ensure that no firewall is blocking connection to the database. • Ensure that the database is online and running on correct IP.
ORA-12541: TNS: no listener	• The database is shutdown. Ask your database administrator to start the database. • Ensure that no firewall is blocking connection to the database. • Ensure that the listener is not password protected. If it is, add the listener password to the Password Store on the appropriate inventory beacon.
ORA-00942: table or view does not exist	Ensure that the table listed in the error message exists. Ask your database administrator to create the table if it does not exist.
ORA-12514: TNS: listener does not currently know of service requested in connect descriptor	TNS names file is not correct. This is common when a database is set to listen for only “SID” or only “Service_Name”.
ORA-01017: invalid username/password; logon denied	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).

Error Message	Notes
ORA-01034: ORACLE not available ORA-27101: shared memory realm does not exist Linux-x86_64 Error: 2: No such file or directory	These errors typically mean that a discovered Oracle database instance was not running at inventory time. Ask your Oracle Database administrator whether the instance can be made active for the next inventory gathering process.
ORA-01033: ORACLE initialization or shutdown in progress	Oracle is stuck in a reboot process. Ask your database administrator to shutdown and restart the database.
ORA-12518: TNS: listener could not hand off client connection	Indicates a network problem. Ensure that the appropriate inventory beacon can access the Oracle server.
ORA-00604: error occurred at recursive SQL level 1	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).
ORA-00257: archiver error. Connect internal only, until freed	Indicates an archive error. Ask your Oracle Database administrator to check the `archiver.log` file for the error.

3. Navigate to **Discovery & Inventory** > **Discovery and Inventory Rules** > **Rules** tab, and:

   a. Find the appropriate rule, and check its **Rule status** value shows `Enabled`. (A disabled rule never executes.)

   b. Click the title of the relevant rule and note the **Action** name and **Targets** name for this rule for use shortly. Also validate that the **Schedule** details are as expected.

   c. Look in **Current run** or **Last completed run** to see the number of database instances discovered, inventoried, skipped, and failed. Some notes to assist your analysis of these figures:

Column	Notes
Service discovered	The number of Oracle database instances discovered in the last execution of the rule. This number should match (or possibly exceed) your expectations for Oracle servers within the targeted subnets. However, database discovery *cannot* succeed when: • The target device is powered off at the time of rule execution (to recover, re-run the rule when the server is operational). • The listener on the device is not operating when the rule executes (to recover, re-run the rule when the listener is running). • The password for the listener is not available in the Password Store on the inventory beacon attempting discovery. • The listener returns an error, or does not identify any services (database instances).
Inventory completed	The count of those instances from which database inventory has been collected. In an ideal world, this count of successful inventories may match the discovery result in the previous column. Differences should be tracked in the next two columns.
Inventory skipped	The count of database instances where collection of database inventory was not attempted. If a server is within scope for the inventory beacon, but no listener is identified on that server, it is counted as skipped.
Inventory failed	The count of database instances where inventory collection was attempted but failed. This may be because: • The credentials for the database instance were not configured in the Password Store on the inventory beacon attempting to collect database inventory. • The instance was not running at inventory time. • The instance was running, but was not active (that is, was in the idle state) at inventory time.

d. Look to the bottom of the same expanded panel, and click **Show/hide task status and history**. By default this lists the last five executions of the rule. You can expand one (such as the most recent) to see all the inventory beacons that received the discovery and inventory rule (it still shows as `Scheduled` on inventory beacons that do not manage the appropriate subnets). You should find the intended inventory beacon in this list, where you can check the value in the **Status** column.

e. Use the **+** icon to expand more details for the chosen inventory beacon, and you see entries such as `Performing discovery` and `Gathering Oracle database inventory`. In the right-hand column are links for **Download log**. Download these, unzip the archive, and examine in a text file editor for clues to the problem.

4. Using the noted **Action** name for this rule, switch to the **Actions** tab, locate the relevant action, and click the editing (pencil) icon on the right-hand side to show the details. In the **Discovery of devices** section, where **Network scan** is selected, verify the correct ports are included for all Oracle servers where database instances are running (especially focusing on instances that have not yet been discovered). If you are not sure about the correct port settings for each Oracle server, ask your system administrator. Recall that a probe on the ports listed here must get a response from the server itself before further discovery or inventory work is attempted.

5. Verify the listener ports settings specified in the **Oracle database environments** section of the action definition. If you are not sure about the correct port settings, ask your database administrator. For more information, see Using Network Discovery with Direct Inventory.

6. Switch to the **Targets** tab, locate the target whose name you noted earlier, and click the editing (pencil) icon on the right-hand end to examine the specified target. Validate that the setting for **Define machines to target** includes the Oracle server you are searching for. If you are suspicious that your target is not working correctly, you can also expand each of your other targets looking for an `Exclude` condition in **Define machines to target**. Any overlapping exclude condition in any target, even though that target is not linked in this particular rule, always overrules any `Include` condition. Be sure that your target Oracle server is not accidentally excluded.

7. Check that the appropriate inventory beacon can access the Oracle server:

   a. If necessary, identify the subnet that contains the undiscovered Oracle server, and find this subnet in **Discovery & Inventory > Subnets** to identify the inventory beacon managing the subnet. (If the subnet has not yet been assigned to an inventory beacon, fix that first by clicking the edit icon, and in the **Beacon name** column, selecting an inventory beacon from the drop-down list.)

   b. Validate that the correct 32-bit OLEDB drivers are installed on the appropriate inventory beacon (as described in Direct Collection of Oracle Inventory).

   c. On the appropriate inventory beacon, run the FlexNet Beacon software as administrator, and examine the local Password Store.

   d. If (as is likely) the Oracle listener for the undiscovered database instance on the Oracle server is protected by an administrative password, ensure that the password (only, no account name required) is saved in the Password Store.

   e. Ensure that the special account to access the database instance has been recorded in the secure Password Store. For details, see Credentials for Direct Collection of Oracle Inventory, and for required database permissions see Appendix B- Oracle Tables and Views for Oracle Inventory Collection. Ensure that the credentials set up for the database instance are identically matched in the Password Store.

8. If it appears that connection has been made and inventory collected, check for problems with file upload from the inventory beacon to the central application server. On the inventory beacon, examine `C:\Windows\Temp\ManageSoft\uploader.log` for any issues with uploads.

9. For inventory-specific errors, check the `%ProgramData%\Flexera Software\Compliance\Logging\InventoryRule\DeviceInventory.log` and `OracleDBInventory.log` files on the inventory beacon.

10. To enable richer logging on the inventory beacon, enable tracing by removing the hash character (#) from the following lines of the `etdp.trace` file present in the `%Program Files (x86)%\Flexera Software\Inventory Beacon\` folder:

```
+Inventory/Oracle
+Inventory/Oracle/SDK
+Inventory/Oracle/Query
+Inventory/Oracle/Query/Substitution
+Inventory/Oracle/Query/Execution
+Inventory/Oracle/Listener
+Inventory/Oracle/Listener/Detail
```

***Important:** After making changes to the `etdp.trace` file, you must use the Windows Service Controller on the inventory beacon to stop and restart the `beaconengine` service.*

11. Rerun the rule to collect Oracle discovery and inventory information, so that additional logging is created. See whether these richer logs assist in identifying the problem. Wait until after the next inventory import, and then look for both the discovered device (**All Discovered Devices**) and its Oracle instance (**Oracle Instances**). (Rather than waiting, an operator in an Administrator role can navigate to **License Compliance** > **Reconcile**, ensure that the **Update inventory for reconciliation** option is selected, and click **Reconcile**.)

12. If the problem persists, contact Flexera Software support with detailed information and log files.

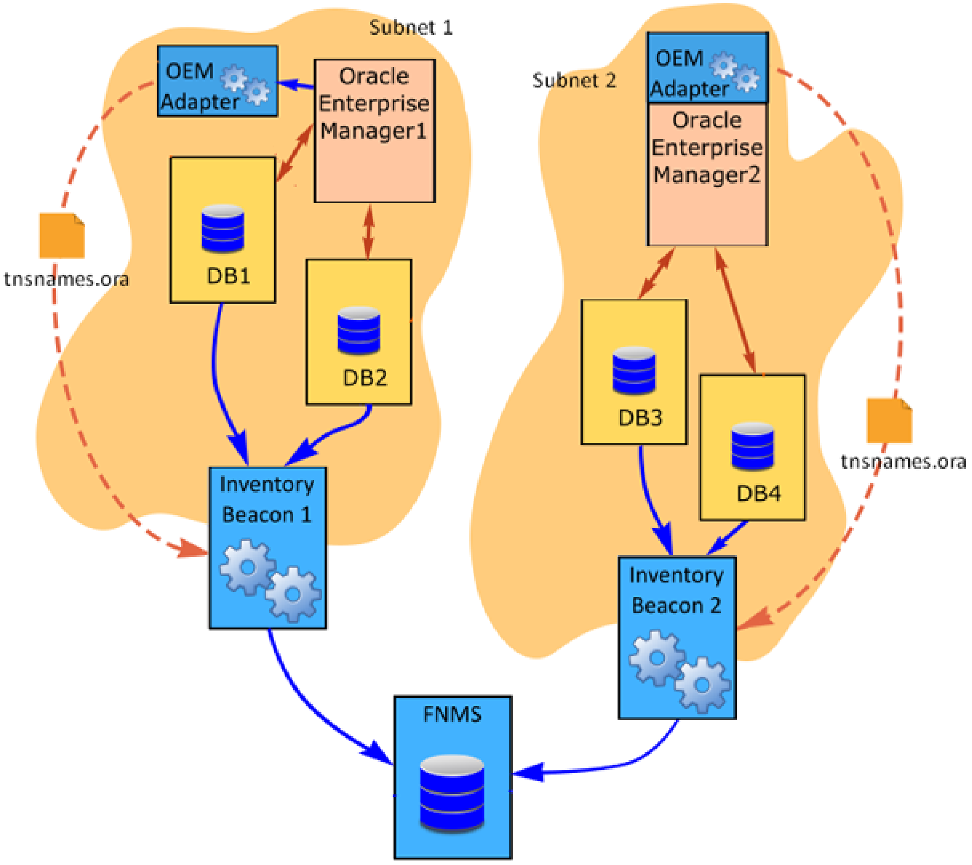
Using tnsnames Discovery with Direct Inventory

In this approach, the direct inventory part of the process is unchanged, but there is a different method to discover the Oracle database instances from which to gather inventory. This approach uses the content of a `tnsnames.ora` file to identify the target instances.

This Oracle-standard file can be created in any of three ways:

- You can copy it from your Oracle server and save it to the folder (identified below) on the inventory beacon where it will automatically be actioned.
- You can use the OEM adapter to create an `tnsnames.ora` file in the standard format, and save it to the correct folder on the appropriate inventory beacon that will perform the direct inventory collection. The OEM adapter is documented in the *Adapter Reference* PDF (available through the title page of online help).
- You could create one manually (although this would represent a considerable maintenance burden, and is not a recommended path).

The following diagram shows an example scenario of the most interesting case, using the OEM adapter. If you are intervening manually, be sure to place your copy of the `tnsnames.ora` file in the correct folder as described below.



The above diagram shows Subnet 1 and Subnet 2. Subnet 1 is assigned to Inventory Beacon 1 and Subnet 2 is assigned to Inventory Beacon 2. Each subnet contains:

- Two Oracle Database servers
- Oracle Enterprise Manager
- The OEM adapter (from Flexera Software), which may be co-located with Oracle Enterprise Manager or installed in another convenient location with fast network access to its related installation of Oracle Enterprise Manager (there is a 1:1 relationship, with one adapter required for each instance of Oracle Enterprise Manager)

Note that in this diagram, DB1 and DB2 are running versions of Oracle Database compatible with the same OLEDB driver, as discussed in Direct Collection of Oracle Inventory; similarly, DB3 and DB4 are running versions using the same OLEDB driver, although this may be a different driver than used in Subnet 1, since this subnet is already managed by a separate inventory beacon.

The following description assumes that all the prerequisites listed in Direct Collection of Oracle Inventory have been satisfied, including the installation of an appropriate version of the 32-bit OLEDB driver (one version per inventory beacon) for each target Oracle Database.

1. On each target Oracle server, set up the special "audit account" for collecting database inventory (see Credentials for Direct Collection of Oracle Inventory).
2. Record the credentials for the special audit account in the secure Password Store on each applicable inventory beacon.

3. Create a rule that combines the use of `tnsnames.ora` for discovery with direct inventory. Navigate to **Discovery & Inventory > Discovery and Inventory rules** and use these settings:

   - **Target**: Create a target to identify all Oracle servers in your network. You can use subnet name, IP address, or pattern matching on the device name to identify devices in the target definition.

     Tip: *The limitation on password-authenticated access direct to the Oracle listener, disallowed from Oracle Database 12c, is not relevant when you are using discovery through* `tnsnames.ora`*.*

   - **Action**: Create an action that includes these settings:
     - For **Action type**, choose `Discovery and inventory`.
     - In the **Discovery of devices** section, select **TNSNames file for Oracle databases** (only).
     - Expand the **Oracle database environments** section, and ensure that **Discover Oracle database environments** is clear (not selected).
     - In the same section, select **Gather Oracle database environment inventory**. This is the switch to turn on direct inventory gathering for Oracle database instances.
   - **Schedule**: Specify the running schedule for this rule.

   This completes the initial configuration for using `tnsnames.ora` for discovery with direct inventory gathering for Oracle. The remainder of these steps cover normal operation.

4. Each instance of the OEM adapter connects to its Oracle Enterprise Manager, and collects the connection information for all Oracle Database servers managed by that instance of Oracle Enterprise Manager.

5. The OEM adapter formats the information into a `tnsnames.ora` file.

6. The OEM adapter connects to the inventory beacon it has registered, and saves the `tnsnames.ora` file in the special path *%CommonAppData%*`\Flexera Software\Repository\TNSNames` (on stand-alone inventory beacons; but if the inventory beacon is co-located on your batch server, the path becomes *%CommonAppData%*`\Flexera Software\Warehouse\Repository\TNSNames\`).

   Tip: *If you are copying a* `tnsnames.ora` *file from your Oracle server, be sure to save it to this same path on your inventory beacon:* `%CommonAppData%\Flexera Software\Repository\TNSNames`*. Every* `.ora` *file in this folder is automatically used for targeting for direct inventory collection from the Oracle database instances that it identifies. This means that you can even mix files generated by the OEM adapter (always named* `tnsnames.ora`*) with files copied from another Oracle server, or one you have created manually. In these latter cases, be sure to rename the files you place manually (for example,* `manualtnsnames.ora` *or* `tnsnamesServer33.ora`*), because the next run of the OEM adapter overwrites the* `tnsnames.ora` *file in the TNSNames repository.*

7. By default, every 15 minutes each inventory beacon checks for any updates to its policy, which also transfers any changed discovery and inventory rules. (To adjust this download schedule, see *Inventory Settings Page* > *Beacon Settings Section* in the online help.) Each inventory beacon exercises only those rules that apply to its assigned subnet(s).

8. When the related schedule triggers an applicable rule:

a. The inventory beacon reports to the central application server that the task is commencing. You can navigate to **Discovery & Inventory > Discovery and Inventory Rules** and click the rule name to view its status. Wait (while the remainder of the process takes place) until the **Status** field shows `Completed`. This process may take some time to complete and you may have to revisit or refresh the page from time to time.

b. The inventory beacon opens each `.ora` file it finds in `%CommonAppData%\Flexera Software\Repository\TNSNames`, and converts each database instance there to a discovered device record. Each identified database instance is then tested against the current scope of the inventory beacon, where 'scope' means the intersection of its assigned subnet and the target declared as part of the rule it is currently running. Database instances that are both within the assigned subnet and within the current target are added to an `xxxx(InScope).disco` file. Database instances that fail either of these tests are added to an `xxxx(OutScope).disco` file.

All this information is included in the two `.disco` files when they are uploaded to the central application server. For direct inventory gathering (where the discovery files may be larger than with the locally-installed FlexNet inventory agent), `.disco` files are compressed for upload.

9. The FlexNet Beacon engine (on each inventory beacon) uses the discovered services information to connect to each database instance, and collect Oracle Database inventory data. The results are saved into an `.ndi` inventory file (specific to Oracle inventory only) for each server.

10. Immediately after inventory gathering, the inventory beacon compresses the `.ndi` file(s) and `.disco` files, and uploads them to the central application server (or, if it is a member of a hierarchy of inventory beacons, uploads the data to its parent in the hierarchy, and the upload is repeated until the data reaches the application server). It is initially stored in the inventory database.

11. In due course, the inventory import (to the compliance database) and license reconciliation process runs (typically overnight, although an operator in an Administrator role can also trigger a full import and reconciliation). Progress is visible on the **System Tasks** page.

12. The **Discovery & Inventory > Oracle Instances** page lists the database inventory for all servers discovered and inventoried until the time of the latest reconciliation calculation.

Troubleshooting Direct Inventory Using tnsnames.ora

In direct gathering of Oracle inventory, the FlexNet Beacon engine connects directly to Oracle databases using database port information. If you select the `tnsnames.ora` file as the method of discovery, the FlexNet Beacon engine uses the port information contained in that file.

To troubleshoot Oracle discovery and inventory using `tnsnames.ora`:

1. In the web interface for FlexNet Manager Suite, navigate to **Discovery & Inventory > Oracle Instances** to identify the database instances that have been discovered successfully. You may wish to focus on instances you expected to find that are not present on this page. (It is helpful to know the device name of an Oracle server you wish to examine, as you can use the name in searches in various lists.)

2. Check **Discovery & Inventory > All Discovered Devices** and validate that the Oracle server is listed there. If the `tnsnames.ora` file is resolved correctly and the data from it is uploaded, a discovered device record is created (after inventory import). (If the device is present, can you check whether the Oracle service was running at the time of last inventory gathering? The service must be running for Oracle

discovery and inventory to succeed.) You can also use this listing to check for Oracle servers that are discovered, but reporting problems:

a. Click the filter icon above the right end of the list, and in the quick filter row, select **Oracle** = `Yes`.

b. Next to the filter icon, click the notification icon to reduce the list to only those Oracle servers reporting problems.

c. In the list, click the **Name** of a discovered device to open its properties, and select the **Status** tab.

d. Expand the **Oracle Database inventory** section, which displays any error message returned by the Oracle listener on this discovered device. Seek the help of your Oracle database administrator to resolve any issues.

   Here are some common errors with suggested things to check:

Error Message	Notes
ORA-12170: TNS: Connect timeout occurred	• Ensure that no firewall is blocking connection to the database. • Ensure that the database is online and running on correct IP.
ORA-12541: TNS: no listener	• The database is shutdown. Ask your database administrator to start the database. • Ensure that no firewall is blocking connection to the database. • Ensure that the listener is not password protected. If it is, add the listener password to the Password Store on the appropriate inventory beacon.
ORA-00942: table or view does not exist	Ensure that the table listed in the error message exists. Ask your database administrator to create the table if it does not exist.
ORA-12514: TNS: listener does not currently know of service requested in connect descriptor	TNS names file is not correct. This is common when a database is set to listen for only “SID” or only “Service_Name”.
ORA-01017: invalid username/password; logon denied	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).
ORA-01034: ORACLE not available ORA-27101: shared memory realm does not exist Linux-x86_64 Error: 2: No such file or directory	These errors typically mean that a discovered Oracle database instance was not running at inventory time. Ask your Oracle Database administrator whether the instance can be made active for the next inventory gathering process.

Error Message	Notes
ORA-01033: ORACLE initialization or shutdown in progress	Oracle is stuck in a reboot process. Ask your database administrator to shutdown and restart the database.
ORA-12518: TNS: listener could not hand off client connection	Indicates a network problem. Ensure that the appropriate inventory beacon can access the Oracle server.
ORA-00604: error occurred at recursive SQL level 1	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).
ORA-00257: archiver error. Connect internal only, until freed	Indicates an archive error. Ask your Oracle Database administrator to check the `archiver.log` file for the error.

3. Navigate to **Discovery & Inventory** > **Discovery and Inventory Rules** > **Rules** tab, and:

    a. Find the appropriate rule, and check its **Rule status** value shows `Enabled`. (A disabled rule never executes.)

    b. Click the title of the relevant rule and note the **Action** name and **Targets** name for this rule for use shortly. Also validate that the **Schedule** details are as expected.

    c. Look in **Current run** or **Last completed run** to see the number of database instances discovered, inventoried, skipped, and failed. Some notes to assist your analysis of these figures:

Column	Notes
Service discovered	The number of Oracle database instances discovered in the last execution of the rule (that is, the total number identified in all the `.ora` files saved on every inventory beacon executing the rule). This number should match (or possibly exceed) your expectations for Oracle servers within the targeted subnets, as identified in the `.ora` files. However, database discovery *cannot* succeed when: • The target device is powered off at the time of rule execution (to recover, re-run the rule when the server is operational). • The listener on the device is not operating when the rule executes (to recover, re-run the rule when the listener is running). • The listener returns an error, or does not identify any services (database instances). In addition, the `tnsnames.ora` file saved on a particular inventory beacon may identify database instances that are out of scope for that inventory beacon (either outside its assigned subnets, or outside the target[s] for the current rule). Any out-of-scope database instances are included in this count of **Service discovered**; but the out-of-scope instances are skipped for inventory gathering by this inventory beacon.
Inventory completed	The count of those instances from which database inventory has been collected. In an ideal world, this count of successful inventories may match the discovery result in the previous column. Differences should be tracked in the next two columns.

Column	Notes
Inventory skipped	The count of database instances where collection of database inventory was not attempted. Inventory gathering cannot succeed in the following cases, which are logged in `%CommonAppData%\Flexera Software\Compliance\Logging\InventoryRule\`*`RuleID`*`\OracleDBInventory.log` on the inventory beacon: • A database instance listed in the `.ora` files on an inventory beacon falls outside the scope of the inventory beacon (where the 'scope' is the intersection of the subnets assigned to the inventory beacon and the target for the rule that the inventory beacon is executing). In this case the `OracleDBInventory.log` file includes an entry like `Skipped device '`*`deviceName`*`' because it was not within the authorised ranges for this beacon and rule`. In the case where the database instance is in the correct subnet assigned to the inventory beacon, but not listed in the targets incorporated in the currently-executing rule, the log entry is like `Skipped device '`*`deviceIP`*`' because it has no targets that are active (part of the current rule)`. • A database instance identified in an `.ora` file is not active at inventory time. In this case the `OracleDBInventory.log` file includes an entry like `No inventory gathered for device '`*`deviceIP`*`' because discovery did not find the service on the device`.
Inventory failed	The count of database instances where inventory collection was attempted but failed. This may be because: • The credentials for the database instance were not configured in the Password Store on the inventory beacon attempting to collect database inventory. • The instance was not running at inventory time. • The instance was running, but was not active (that is, was in the idle state) at inventory time.

d. Look to the bottom of the same expanded panel, and click **Show/hide task status and history**. By default this lists the last five executions of the rule. You can expand one (such as the most recent) to see all the inventory beacons that received the discovery and inventory rule (it still shows as `Scheduled` on inventory beacons that do not manage the appropriate subnets). You should find the intended inventory beacon in this list, where you can check the value in the **Status** column.

e. Use the **+** icon to expand more details for the chosen inventory beacon, and you see entries such as `Performing discovery` and `Gathering Oracle database inventory`. In the right-hand column are links for **Download log**. Download these, unzip the archive, and examine in a text file editor for clues to the problem.

4. Using the noted **Action** name for this rule, switch to the **Actions** tab, locate the relevant action, and click the editing (pencil) icon on the right-hand side to show the details. In the **Discovery of devices** section, ensure that **TNSNames file for Oracle databases** is selected.

5. Check the set-up of the inventory beacon responsible for directly gathering the Oracle inventory:

   a. If necessary, identify the subnet that contains the undiscovered Oracle server, and find this subnet in **Discovery & Inventory > Subnets** to identify the inventory beacon managing the subnet. (If the subnet has not yet been assigned to an inventory beacon, fix that first by clicking the edit icon, and in the **Beacon name** column, selecting an inventory beacon from the drop-down list.)

   b. Validate that the correct 32-bit OLEDB drivers are installed on the appropriate inventory beacon (as described in Direct Collection of Oracle Inventory).

   c. On the appropriate inventory beacon, run the FlexNet Beacon software as administrator, and examine the local Password Store.

   d. Ensure that the special account to access the database instance has been recorded in the secure Password Store. For details, see Credentials for Direct Collection of Oracle Inventory, and for required database permissions see Appendix B- Oracle Tables and Views for Oracle Inventory Collection. Ensure that the credentials set up for the database instance are identically matched in the Password Store.

   e. Verify the existence of one or more `.ora` file(s) in the TNSNames repository folder (`%ProgramData%\Flexera Software\Repository\TNSNames`) on the inventory beacon. If none is present, trace back the methods that should be updating the file(s) here (as discussed in Using tnsnames Discovery with Direct Inventory).

6. If it appears that connection has been made and inventory collected, check for problems with file upload from the inventory beacon to the central application server. On the inventory beacon, examine `C:\Windows\Temp\ManageSoft\uploader.log` for any issues with uploads.

7. For inventory-specific errors, check the `%ProgramData%\Flexera Software\Compliance\Logging\InventoryRule\DeviceInventory.log` and `OracleDBInventory.log` files on the inventory beacon.

8. To enable richer logging on the inventory beacon, enable tracing by removing the hash character (#) from the following lines of the `etdp.trace` file present in the `%Program Files (x86)%\Flexera Software\Inventory Beacon\` folder:

```
+Inventory/Oracle
+Inventory/Oracle/SDK
+Inventory/Oracle/Query
+Inventory/Oracle/Query/Substitution
+Inventory/Oracle/Query/Execution
+Inventory/Oracle/Listener
+Inventory/Oracle/Listener/Detail
```

***Important:** After making changes to the `etdp.trace` file, you must use the Windows Service Controller on the inventory beacon to stop and restart the `beaconengine` service.*

9. Rerun the rule to collect Oracle discovery and inventory information, so that additional logging is created. See whether these richer logs assist in identifying the problem. Wait until after the next inventory import, and then look for both the discovered device (**All Discovered Devices**) and its Oracle instance (**Oracle Instances**). (Rather than waiting, an operator in an Administrator role can navigate to **License Compliance > Reconcile**, ensure that the **Update inventory for reconciliation** option is selected, and click **Reconcile**.)

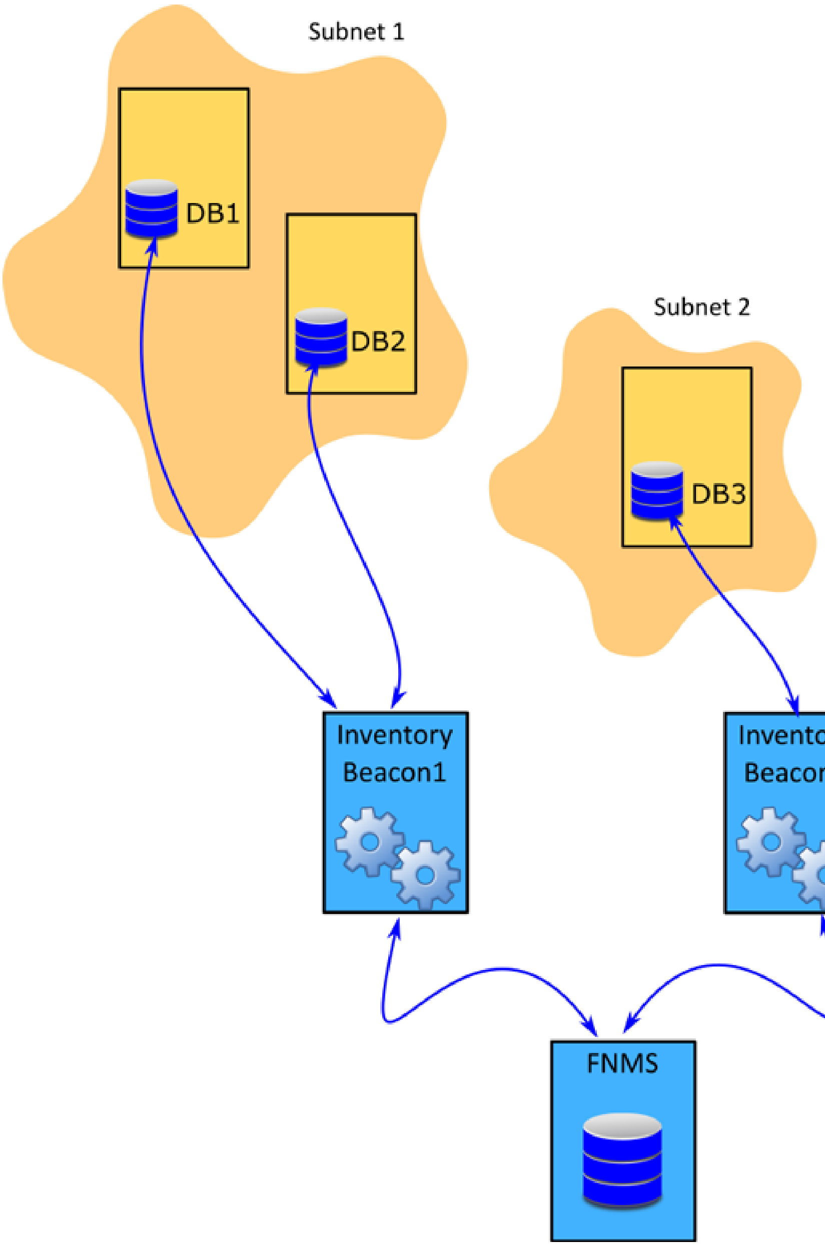
10. If the problem persists, contact Flexera Software support with detailed information and log files.

Using Manual Discovery with Direct Inventory

In this approach, the direct inventory part of the process is unchanged, but the discovery device records are created manually ahead of the inventory-gathering process. You may resort to manual creation of discovered device records for testing purposes, or because a target device is temporarily unavailable.

Tip: *You may also use this method when you want to re-use discovered device records created in earlier passes of inventory gathering, so that you by-pass discovery for this occasion.*

The concepts in this scenario are straight-forward, and the direct inventory gathering itself is identical; but for consistency here is the scenario diagram, followed by the complete description.



The above diagram shows three database servers, two on Subnet1 and one on Subnet2. The Subnet1 is assigned to Inventory Beacon1 and Subnet2 is assigned to Inventory Beacon2. Note that in this diagram, DB1 and DB2 are running versions of Oracle Database compatible with the same OLEDB driver, as discussed in Direct Collection of Oracle Inventory; separately, DB3 may also be compatible, or may require a different version, since it is already managed by a separate inventory beacon.

The following description assumes that all the prerequisites listed in Direct Collection of Oracle Inventory have been satisfied, including the installation of an appropriate version of the 32-bit OLEDB driver (one version per inventory beacon) for each target Oracle Database.

1. On each target Oracle server, set up the special "audit account" for collecting database inventory (see Credentials for Direct Collection of Oracle Inventory).
2. Record the credentials for the special audit account in the secure Password Store on each applicable inventory beacon.

3. If a necessary discovered device record (one for each target Oracle server) does not yet exist, create it:

    a. For example, navigate to **Discovery & Inventory > Create a Discovery Device** (or use one of the other paths to open a new property sheet for a discovered device).

    b. Complete the identification data on the **General** tab of the discovered device properties.

    The details you supply are used later to attempt connection to this device, so (as always) accuracy is paramount.

    c. Switch to the **Databases** tab, select **This device is running Oracle software**, and create details for the listener(s) on this device, and as children of each listener, the service(s) it manages. (For more information, see *Creating Listeners and Services* in the online help.) When data entry is complete, remember to click **Create** to save the discovered device record.

    > ***Tip:*** *Because you are identifying the services by name, you do not need to provide an administrative password for the listeners; and therefore, unlike the network scan method of discovery, this approach works with all versions of Oracle.*

    Repeat this until all the required discovered device records are available.

4. Create a rule that combines the use existing discovered device records with direct inventory. Navigate to **Discovery & Inventory > Discovery and Inventory rules** and use these settings:

    - **Target**: Create a target to identify all Oracle servers in your network. You can use subnet name, IP address, or pattern matching on the device name to identify devices in the target definition. In this case, be sure that all your manually-created (or previously existing) discovered devices are covered by the target.
    - **Action**: Create an action that includes these settings:
        - For **Action type**, choose `Discovery and inventory`.
        - In the **Discovery of devices** section, select **Use previously discovered devices**. (Although it is possible to mix discovery methods in the one action and rule, for simplicity the remainder of this description assumes that this is the only discovery selection you make).

        > ***Tip:*** *A shortcut instead of these two settings is to choose* `Inventory only` *for* ***Action type****.*

        - Expand the **Oracle database environments** section, and ensure that **Discover Oracle database environments** is clear (not selected).
        - In the same section, select **Gather Oracle database environment inventory**. This is the switch to turn on direct inventory gathering for Oracle database instances.
    - **Schedule**: Specify the running schedule for this rule.

    This completes the initial configuration for using existing discovery records with direct inventory gathering for Oracle. The remainder of these steps cover normal operation.

5. Every 30 minutes, each inventory beacon asks the central application server whether there is any change in the discovered device records it holds. Where the records have been updated, the entire set is downloaded in a series of compressed `.disco.gz` files, so that each inventory beacon knows about all

discovered devices, and can operate on those that match both its assigned subnets and the targets in any rule being executed.

6. By default, every 15 minutes each inventory beacon checks for any updates to its policy, which also transfers any changed discovery and inventory rules. (To adjust this download schedule, see *Inventory Settings Page* > *Beacon Settings Section* in the online help.) Each inventory beacon exercises only those rules that apply to its assigned subnet(s).

7. When the related schedule triggers an applicable rule:

    a. The inventory beacon reports to the central application server that the task is commencing. You can navigate to **Discovery & Inventory > Discovery and Inventory Rules** and click the rule name to view its status. Wait (while the remainder of the process takes place) until the **Status** field shows `Completed`. This process may take some time to complete and you may have to revisit or refresh the page from time to time.

    b. Because this rule specifies re-use of existing discovery records (only), the inventory beacon selects from the existing, downloaded records of discovered devices only those that match both its assigned subnet(s) and the rule targets.

    (In due course, the discovered device records are updated with new status results, and are therefore uploaded again as usual when the processes are complete.)

8. For each discovered device record within the scope of the inventory beacon, the FlexNet Beacon engine uses each listener port and service name to connect to each database instance, and collect Oracle Database inventory data. The results are saved into an `.ndi` inventory file (specific to Oracle inventory only) for each server.

9. Immediately after inventory gathering, the inventory beacon compresses the `.ndi` file(s) and `.disco` files, and uploads them to the central application server (or, if it is a member of a hierarchy of inventory beacons, uploads the data to its parent in the hierarchy, and the upload is repeated until the data reaches the application server). It is initially stored in the inventory database.

10. In due course, the inventory import (to the compliance database) and license reconciliation process runs (typically overnight, although an operator in an Administrator role can also trigger a full import and reconciliation). Progress is visible on the **System Tasks** page.

11. The **Discovery & Inventory > Oracle Instances** page lists the database inventory for all servers discovered and inventoried until the time of the latest reconciliation calculation.

Troubleshooting Direct Inventory Using Manual Discovery Records

In direct gathering of Oracle inventory, the FlexNet Beacon engine connects directly to Oracle databases using database port information. If you use previously-existing records of discovered devices (potentially including records created manually), the FlexNet Beacon engine uses the port information contained in your existing records. Obviously, it is critical that these records contain correct data for each discovered device, so start by validating those properties against any discovered device that is not reporting correctly.

To troubleshoot Oracle discovery and inventory using existing/manually-created discovery device records:

1. In the web interface for FlexNet Manager Suite, navigate to **Discovery & Inventory > Oracle Instances** to identify the database instances that have been discovered successfully. You may wish to focus on

instances you expected to find that are not present on this page. (It is helpful to know the device name of an Oracle server you wish to examine, as you can use the name in searches in various lists.)

2. Check **Discovery & Inventory > All Discovered Devices** and validate that the Oracle server is listed there. (If the device is present, can you check whether the Oracle service was running at the time of last inventory gathering? The service must be running for Oracle discovery and inventory to succeed.) You can also use this listing to check for Oracle servers that are discovered, but reporting problems:

    a. Click the filter icon above the right end of the list, and in the quick filter row, select **Oracle** = `Yes`.

    b. Next to the filter icon, click the notification icon to reduce the list to only those Oracle servers reporting problems.

    c. In the list, click the **Name** of a discovered device to open its properties, and select the **Status** tab.

    d. Expand the **Oracle Database inventory** section, which displays any error message returned by the Oracle listener on this discovered device. Seek the help of your Oracle database administrator to resolve any issues.

    Here are some common errors with suggested things to check:

Error Message	Notes
ORA-12170: TNS: Connect timeout occurred	• Ensure that no firewall is blocking connection to the database. • Ensure that the database is online and running on correct IP.
ORA-12541: TNS: no listener	• The database is shutdown. Ask your database administrator to start the database. • Ensure that no firewall is blocking connection to the database. • Ensure that the listener is not password protected. If it is, add the listener password to the Password Store on the appropriate inventory beacon.
ORA-00942: table or view does not exist	Ensure that the table listed in the error message exists. Ask your database administrator to create the table if it does not exist.
ORA-12514: TNS: listener does not currently know of service requested in connect descriptor	TNS names file is not correct. This is common when a database is set to listen for only “SID” or only “Service_Name”.
ORA-01017: invalid username/password; logon denied	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).

Error Message	Notes
ORA-01034: ORACLE not available ORA-27101: shared memory realm does not exist Linux-x86_64 Error: 2: No such file or directory	These errors typically mean that a discovered Oracle database instance was not running at inventory time. Ask your Oracle Database administrator whether the instance can be made active for the next inventory gathering process.
ORA-01033: ORACLE initialization or shutdown in progress	Oracle is stuck in a reboot process. Ask your database administrator to shutdown and restart the database.
ORA-12518: TNS: listener could not hand off client connection	Indicates a network problem. Ensure that the appropriate inventory beacon can access the Oracle server.
ORA-00604: error occurred at recursive SQL level 1	Indicates incorrect permissions. Ask your Oracle Database administrator to rerun the Flexera 'audit user' script (for details, see Credentials for Direct Collection of Oracle Inventory).
ORA-00257: archiver error. Connect internal only, until freed	Indicates an archive error. Ask your Oracle Database administrator to check the `archiver.log` file for the error.

3. Navigate to **Discovery & Inventory** > **Discovery and Inventory Rules** > **Rules** tab, and:

   a. Find the appropriate rule, and check its **Rule status** value shows `Enabled`. (A disabled rule never executes.)

   b. Click the title of the relevant rule and note the **Action** name and **Targets** name for this rule for use shortly. Also validate that the **Schedule** details are as expected.

   c. Look in **Current run** or **Last completed run** to see the number of database instances discovered, inventoried, skipped, and failed. Some notes to assist your analysis of these figures:

Column	Notes
Service discovered	Because you are using only existing discovered device records, no new discovery is attempted in the current rule, so that this figure is 0.
Inventory completed	The count of those instances from which database inventory has been collected.

Column	Notes
Inventory skipped	The count of database instances where collection of database inventory was not attempted. Inventory gathering cannot succeed in the following cases, which are logged in `%CommonAppData%\Flexera Software\Compliance\Logging\InventoryRule\`*`RuleID`*`\OracleDBInventory.log` on the inventory beacon: • An existing discovered device record falls outside the scope of the inventory beacon (where the 'scope' is the intersection of the subnets assigned to the inventory beacon and the target for the rule that the inventory beacon is executing). In this case the `OracleDBInventory.log` file includes an entry like `Skipped device '`*`deviceName`*`' because it was not within the authorised ranges for this beacon and rule`. In the case where the database instance is in the correct subnet assigned to the inventory beacon, but not listed in the targets incorporated in the currently-executing rule, the log entry is like `Skipped device '`*`deviceIP`*`' because it has no targets that are active (part of the current rule)`. • A database instance identified in a discovered device record is not active at inventory time. In this case the `OracleDBInventory.log` file includes an entry like `No inventory gathered for device '`*`deviceIP`*`' because discovery did not find the service on the device`.
Inventory failed	The count of database instances where inventory collection was attempted but failed. This may be because: • The credentials for the database instance were not configured in the Password Store on the inventory beacon attempting to collect database inventory. • The instance was not running at inventory time. • The instance was running, but was not active (that is, was in the idle state) at inventory time.

d. Look to the bottom of the same expanded panel, and click **Show/hide task status and history**. By default this lists the last five executions of the rule. You can expand one (such as the most recent) to see all the inventory beacons that received the discovery and inventory rule (it still shows as `Scheduled` on inventory beacons that do not manage the appropriate subnets). You should find the intended inventory beacon in this list, where you can check the value in the **Status** column.

   e. Use the **+** icon to expand more details for the chosen inventory beacon, and you see entries such as `Performing discovery` and `Gathering Oracle database inventory`. In the right-hand column are links for **Download log**. Download these, unzip the archive, and examine in a text file editor for clues to the problem.

4. Using the noted **Action** name for this rule, switch to the **Actions** tab, locate the relevant action, and click the editing (pencil) icon on the right-hand side to show the details. In the **Discovery of devices** section, ensure that **Use previously discovered devices** is selected.

5. Check the set-up of the inventory beacon responsible for directly gathering the Oracle inventory:

   a. If necessary, identify the subnet that contains the undiscovered Oracle server, and find this subnet in **Discovery & Inventory > Subnets** to identify the inventory beacon managing the subnet. (If the subnet has not yet been assigned to an inventory beacon, fix that first by clicking the edit icon, and in the **Beacon name** column, selecting an inventory beacon from the drop-down list.)

   b. Validate that the correct 32-bit OLEDB drivers are installed on the appropriate inventory beacon (as described in Direct Collection of Oracle Inventory).

   c. On the appropriate inventory beacon, run the FlexNet Beacon software as administrator, and examine the local Password Store.

   d. Ensure that the special account to access the database instance has been recorded in the secure Password Store. For details, see Credentials for Direct Collection of Oracle Inventory, and for required database permissions see Appendix B- Oracle Tables and Views for Oracle Inventory Collection. Ensure that the credentials set up for the database instance are identically matched in the Password Store.

6. If it appears that connection has been made and inventory collected, check for problems with file upload from the inventory beacon to the central application server. On the inventory beacon, examine `C:\Windows\Temp\ManageSoft\uploader.log` for any issues with uploads.

7. For inventory-specific errors, check the `%ProgramData%\Flexera Software\Compliance\Logging\InventoryRule\DeviceInventory.log` and `OracleDBInventory.log` files on the inventory beacon.

8. To enable richer logging on the inventory beacon, enable tracing by removing the hash character (#) from the following lines of the `etdp.trace` file present in the `%Program Files (x86)%\Flexera Software\Inventory Beacon\` folder:

```
+Inventory/Oracle
+Inventory/Oracle/SDK
+Inventory/Oracle/Query
+Inventory/Oracle/Query/Substitution
+Inventory/Oracle/Query/Execution
+Inventory/Oracle/Listener
+Inventory/Oracle/Listener/Detail
```

Important: *After making changes to the* `etdp.trace` *file, you must use the Windows Service Controller on the inventory beacon to stop and restart the* `beaconengine` *service.*

9. Rerun the rule to collect Oracle discovery and inventory information, so that additional logging is created. See whether these richer logs assist in identifying the problem. Wait until after the next inventory import, and then look for both the discovered device (**All Discovered Devices**) and its Oracle instance (**Oracle Instances**). (Rather than waiting, an operator in an Administrator role can navigate to **License Compliance > Reconcile**, ensure that the **Update inventory for reconciliation** option is selected, and click **Reconcile**.)

10. If the problem persists, contact Flexera Software support with detailed information and log files.

Appendix A: Components for Oracle Inventory Collection

Each of the different inventory collection methods described in this chapter may involve different software components within FlexNet Manager Suite. The number and types of software components involved in Oracle inventory collection depends on the selected inventory collection method. This section provides a brief overview of each of the software components involved in inventory collection.

FlexNet inventory agent

A software agent that may be installed on different kinds of computers to collect software and hardware inventory information for the device on which it is installed. Its core components are also installed on each inventory beacon, allowing Zero-footprint collection of inventory. The essential component, called the tracker, is a 32-bit executable that transforms the inventory information into an XML formatted (`.ndi`) file and uploads it to an inventory beacon. All locally-installed FlexNet inventory agents collect inventory according to the global agent inventory collection schedule defined in the web interface for FlexNet Manager Suite (navigate to **Discovery & Inventory > Settings**).

Where the FlexNet inventory agent has been locally installed on the target device, it collects discovery information, hardware and general software inventory along with specifically Oracle inventory, and uploads collected data to an inventory beacon. However, it is significant to note that the FlexNet inventory agent is autonomous, and may make its own choice of inventory beacon to which it uploads, which may not be the same one assigned to manage the subnet containing the inventory device (for example, if another inventory beacon responds faster, or based on other logic).

FlexNet Inventory Scanner

The FlexNet Inventory Scanner provides an alternative to the full FlexNet inventory agent that is somewhat lighter to deploy and manage. It includes only the FlexNet inventory core components, so that it lacks functionality such as usage tracking, or upload retries after transient network failures. However, it packages these components as self-extracting executables, known as:

- On Microsoft Windows, `FlexeraInventoryScanner.exe`
- On UNIX-like platforms, `ndtrack.sh`.

As part of the functionality available in this case, the operational executables are removed after each execution, although the FlexNet Inventory Scanner package itself is not automatically removed.

In this configuration, and given appropriate command lines, the FlexNet inventory core components are capable of collecting hardware and software inventory from a target device, and uploading it to a location specified in the command line. For more details about the FlexNet Inventory Scanner, see the *Gathering FlexNet Inventory* PDF file, available through the title page of online help.

FlexNet Beacon

You can install FlexNet Beacon on supported versions of Microsoft Windows Server to make it operate as an inventory beacon, where it acts as a collection point for inventory and business information within the enterprise (the supported versions of Windows Server are listed in the Release Notes for each version of FlexNet Manager Suite). One or more network subnets are assigned to an inventory beacon, and the inventory beacon applies rules (potentially including device adoption) within the assigned subnets. The rules may include collect data remotely through Zero-footprint inventory gathering. When the inventory beacon collects Zero-footprint inventory, it follows the schedule set in the applicable rule (in contrast to the locally-installed FlexNet inventory agent, which, as described above, does not).

Any inventory beacon also accepts uploads from any installed instance of FlexNet inventory agent or FlexNet Inventory Scanner that contacts it. Uploads are not filtered by the assigned subnets.

Each inventory beacon then uploads collected data to its parent in a hierarchy. The parent may be another inventory beacon acting as a concentrator, or it may be the central application server, where all uploads eventually arrive. Here it is processed to update the database records representing the assets, both software and hardware, located within the enterprise's computing environment. For more information about inventory beacons, see *What is an Inventory Beacon?* in the online help.

Oracle Enterprise Manager Adapter

The Oracle Enterprise Manager (OEM) adapter is a software component that provides an alternative or additional method of discovering Oracle databases in your computing estate. FlexNet Manager Suite requires discovery information before collecting inventory. Discovery (for Oracle databases) includes the collection of connection details to allow inventory gathering. The OEM adapter gathers the database connection details for all the databases managed by an instance of Oracle Enterprise Manager and formats them into a standard `tnsnames.ora` file. Each installation of OEM adapter can connect to only one instance of Oracle Enterprise Manager, saving the resulting `tnsnames.ora` file to a fixed location on the inventory beacon (`%Program Data%\Flexera Software\Repository\TNSNames`). Therefore, you need an inventory beacon and one installation of the OEM adapter for each instance of Oracle Enterprise Manager.

The `tnsnames.ora` file generated by the OEM adapter is used by the FlexNet Beacon engine as one possible discovery method for use with direct inventory gathering method to collect Oracle Database inventory. If you decide to use direct inventory gathering but not to deploy the OEM adapter, you can also copy the standard `tnsnames.ora` manually from the Oracle server to the TNSNames repository on the appropriate inventory beacon.

tnsnames.ora

The `tnsnames.ora` file is an Oracle-standard configuration file that contains connection descriptors for the services running on an Oracle Database. The connection descriptors contain the host name, protocol, service name, and port for each of the services running on an Oracle Database. The `tnsnames.ora` file may be created in at least two ways:

- By default, each time the services configuration is updated, Oracle automatically saves updated connection information in a `tnsnames.ora` file stored on the Oracle server. If this file is copied to the appropriate inventory beacon and saved in `%Program Data%\Flexera Software\Repository\TNSNames`, the inventory beacon can use this standard Oracle file as its discovery process before taking direct inventory of the Oracle database instances identified in the file.

- A separate `tnsnames.ora` file may be generated by the OEM adapter, as described above, for use in direct inventory gathering.

Use of one or more `tnsnames.ora` files must be configured in a discovery and inventory rule in the web interface of FlexNet Manager Suite (for details, see Using tnsnames Discovery with Direct Inventory).

Discovery and Inventory Rules

You can use a discovery and inventory rule to configure discovery and inventory processes that you choose to run from an inventory beacon. You also need a rule if you choose to install FlexNet inventory agent automatically on each of the discovered Oracle servers (called "adoption" of the device). A rule is a combination of one or more targets, an action, and a schedule. The action properties determine the actions to perform and the targets' properties determine the devices on which to perform the action. The target adoption settings can be used to adopt the identified devices (that is, to install FlexNet inventory agent locally on the devices). When a discovery and inventory rule executes, it identifies devices based on the target definition(s) and performs the action specified in the rule on those devices. For more information about discovery and inventory rules, see *Discovery and Inventory Rules* in the online help.

Appendix B- Oracle Tables and Views for Oracle Inventory Collection

You need to create a database user account to collect Oracle inventory using the direct inventory collection method (regardless of your choice of discovery methods to enable the direction collection). You should add the credentials of this user into the secure Password Store of all applicable inventory beacons. The database user must have read-only access to the following tables and views on each Oracle server present within the assigned subnet of an inventory beacon:

- `ALL_SDO_GEOM_METADATA SELECT`
- `DBA_ADVISOR_TASKS SELECT`
- `DBA_AUDIT_TRAIL SELECT`
- `DBA_AWS SELECT`
- `DBA_CPU_USAGE_STATISTICS SELECT`
- `DBA_CUBES SELECT`
- `DBA_DV_REALM SELECT`
- `DBA_ENCRYPTED_COLUMNS SELECT`
- `DBA_FEATURE_USAGE_STATISTICS SELECT`
- `DBA_FLASHBACK_ARCHIVE_TABLES SELECT`

- DBA_FLASHBACK_ARCHIVE_TS SELECT
- DBA_FLASHBACK_ARCHIVE SELECT
- DBA_INDEXES SELECT
- DBA_LOB_PARTITIONS SELECT
- DBA_LOB_SUBPARTITIONS SELECT
- DBA_LOBS SELECT
- DBA_MINING_MODELS SELECT
- DBA_OBJECT_TABLES SELECT
- DBA_OBJECTS SELECT
- DBA_RECYCLEBIN SELECT
- DBA_REGISTRY SELECT
- DBA_SEGMENTS SELECT
- DBA_SQL_PROFILES SELECT
- DBA_SQLSET_REFERENCES SELECT
- DBA_SQLSET SELECT
- DBA_TAB_PARTITIONS SELECT
- DBA_TAB_SUBPARTITIONS SELECT
- DBA_TABLESPACES SELECT
- DBA_TABLES SELECT
- DBA_USERS SELECT
- DUAL SELECT
- GV_$INSTANCE SELECT
- GV_$PARAMETER SELECT
- MGMT$TARGET_PROPERTIES
- MODEL$ SELECT
- REGISTRY$HISTORY SELECT
- ROLE_SYS_PRIVS SELECT
- SDO_GEOM_METADATA_TABLE SELECT

- `USER_ROLE_PRIVS SELECT`
- `USER_SYS_PRIVS SELECT`
- `UTL_INADDR EXECUTE`
- `V_$ARCHIVE_DEST_STATUS SELECT`
- `V_$BLOCK_CHANGE_TRACKING SELECT`
- `V_$CONTAINERS SELECT`
- `V_$DATABASE SELECT`
- `V_$INSTANCE SELECT`
- `V_$LICENSE SELECT`
- `V_$OPTION SELECT`
- `V_$PARAMETER SELECT`
- `V_$SESSION SELECT`
- `V_$VERSION SELECT`

Appendix C - Deploying Inventory Tools to a Shared Location

In agent-based inventory collection, all copies of the FlexNet inventory agent locally installed on target inventory devices run according to a single global inventory collection schedule. This single schedule may not provide sufficient flexibility for your environment.

It is possible to deploy the key executables to a shared location where they can be accessed by target inventory devices, and then to configure different devices to trigger inventory collection on different schedules. These key executables are collectively called the FlexNet inventory core components.

If you decide to do this, it is best practice to ensure that only one Oracle server accesses the shared deployment of the FlexNet inventory core components at a time. As a result, the total number of shared deployments that may be required depends on the network structure and access constraints. For example, if an Oracle server is not allowed to access the shared deployment of the FlexNet inventory core components present in a different subnet, you may have to deploy another shared deployment in the subnet of the target Oracle server.

For more information about use of the FlexNet inventory core components, see the *Core deployment: Details* chapter of the *Gathering FlexNet Inventory* PDF (available through the title page of online help). In particular, for deployment instructions, see the *Core deployment: Implementation* topic in that chapter.

Appendix D - Oracle Standard Users Exempted From Consuming Licenses

When calculating consumption of license entitlements for Oracle database instances, FlexNet Manager Suite automatically exempts the following standard named Oracle user accounts so that they do not consume entitlements:

- ABM
- AD
- AD_MONITOR
- AHL
- AHM
- AK
- ALR
- AME
- AMF
- AMS
- AMV
- AMW
- AN
- ANONYMOUS
- AP
- APPLSYS
- APPLSYSPUB
- APPS
- APPS_MRC
- AR
- AS
- ASF
- ASG
- ASL
- ASN
- ASO
- ASP
- AST
- GCS
- GHR
- GL
- GMA
- GMD
- GME
- GMF
- GMI
- GML
- GMO
- GMP
- GMS
- GMW
- GNI
- GR
- HCA
- HCC
- HCN
- HCP
- HCT
- HR
- HRI
- HXC
- HXT
- IA
- IAM
- IBA
- IBC
- ORASSO_DS
- ORASSO_PA
- ORASSO_PS
- ORASSO_PUBLIC
- ORDPLUGINS
- ORDSYS
- OSE$HTTP$ADMIN
- OSM
- OTA
- OUC
- OUTLN
- OWA_MGR
- OWAPUB
- OZF
- OZP
- OZS
- PA
- PAY
- PBR
- PER
- PERFSTAT
- PFT
- PJI
- PJM
- PM
- PMI
- PN
- PO

- AU
- AURORA$JIS$UTILITY$
- AURORA$ORB$UNAUTHENTICATED
- AX
- AZ
- BEN
- BIC
- BIE
- BIL
- BIM
- BIN
- BIS
- BIV
- BIX
- BIY
- BLC
- BLEWIS
- BNE
- BOM
- BSC
- CCT
- CDOUGLAS
- CDR
- CE
- CHV
- CLA
- CLE
- CLJ
- IBE
- IBP
- IBT
- IBU
- IBW
- IBY
- ICX
- IEB
- IEC
- IEM
- IEO
- IEP
- IES
- IET
- IEU
- IEV
- IEX
- IGC
- IGF
- IGI
- IGS
- IGW
- IMC
- IMT
- INTERNET_APPSERVER_REGISTRY
- INV
- IP
- IPA
- POA
- POM
- PON
- PORTAL
- PORTAL_APP
- PORTAL_DEMO
- PORTAL_PUBLIC
- PORTAL30
- PORTAL30_DEMO
- PORTAL30_PUBLIC
- PORTAL30_SSO
- PORTAL30_SSO_PS
- PORTAL30_SSO_PUBLIC
- POS
- PQH
- PQP
- PRP
- PSA
- PSB
- PSP
- PSR
- PTE
- PTG
- PTX
- PV
- QA
- QOT
- QP

- CLKRT
- CLL
- CLN
- CN
- CPGC
- CRP
- CS
- CSC
- CSD
- CSE
- CSF
- CSI
- CSL
- CSM
- CSN
- CSP
- CSR
- CSS
- CST
- CTB
- CTSYS
- CUA
- CUC
- CUE
- CUF
- CUG
- CUI
- CUN
- IPD
- IPM
- IRC
- ISC
- ISX
- IT_PERF
- ITA
- ITG
- IZU
- JA
- JE
- JG
- JL
- JMF
- JTF
- JTI
- JTM
- JTR
- JTS
- JUNK_PS
- KWALKER
- LNS
- MDSYS
- ME
- MFG
- MIA
- MIV
- MQA
- QRM
- QS
- QS_ADM
- QS_CB
- QS_CBADM
- QS_CS
- QS_ES
- QS_OS
- QS_WS
- RCM
- REPADMIN
- RG
- RHX
- RLA
- RLM
- RMG
- RRC
- RRS
- SCOTT
- SH
- SHT
- SPIERSON
- SQLAP
- SQLGL
- SSOSDK
- SSP
- SYS
- SYSADMIN

- CUP
- CUR
- CUS
- CZ
- DBSNMP
- DCM
- DDD
- DEM01
- DISCOVERER5
- DNA
- DOM
- DSGATEWAY
- DSSYS
- DT
- DUMMY_GMO
- EAA
- EAM
- EC
- ECX
- EDR
- EGO
- EMS
- ENG
- ENI
- EVM
- FA
- FEM
- FF
- MRP
- MSC
- MSD
- MSO
- MSR
- MST
- MWA
- OAM
- OCA
- ODM
- ODM_MTR
- ODQ
- ODS
- ODSCOMMON
- OE
- OFA
- OKB
- OKC
- OKC_REP_TXT_INDEX_OPTIMIZE
- OKC_REP_TXT_INDEX_SYNC
- OKE
- OKI
- OKL
- OKO
- OKP
- OKR
- OKS
- OKT
- SYSTEM
- TEST
- TRACESVR
- UDDISYS
- VEA
- VEH
- WFADMIN
- WH
- WIP
- WIRELESS
- WK_PROXY
- WK_Test
- WKSYS
- WMA
- WMS
- WMSYS
- WPS
- WSH
- WSM
- XDB
- XDO
- XDP
- XLA
- XLE
- XNA
- XNB
- XNC
- XNI

- `FII`
- `FLM`
- `FND`
- `FPA`
- `FPT`
- `FRM`
- `FTE`
- `FTP`
- `FUN`
- `FV`
- `OKX`
- `OLAPDBA`
- `OLAPSVR`
- `OLAPSYS`
- `ONT`
- `OPI`
- `ORAOCA_PUBLIC`
- `ORASSO`
- `XNM`
- `XNP`
- `XNS`
- `XNT`
- `XTR`
- `ZFA`
- `ZPB`
- `ZSA`
- `ZX`

Appendix E: Features Enabled in FlexNet Manager for Oracle

The basic license for FlexNet Manager Suite includes some functionality related to Oracle. With only the basic license, you can:

- Discover Oracle databases (but not collect inventory from them)
- Collect installer evidence data (basic software inventory of other products).

However, to enable collection of detailed Oracle inventory, you must have licensed the FlexNet Manager for Oracle product for FlexNet Manager Suite. This additional license adds many more features:

- License management and compliance for Oracle Processor, Oracle Named User Plus, Oracle Application User, and other Oracle-specific licenses
- Detailed Oracle inventory of database options and Oracle E-Business Suite
- Inventory of specialized systems like Exadata, SuperCluster, and so on
- Inventory and license reconciliation for the Oracle license types stated above.

To check whether you have licensed FlexNet Manager for Oracle:

1. Navigate to the system menu (⚙▼ in the top right corner) and select **FlexNet Manager Suite License**.
2. Scroll down to the section on **Licensed products**, and identify the card for FlexNet Manager for Oracle.
3. If the card is missing or grayed out, detailed Oracle inventory cannot be processed, and you should discuss your requirements with your Flexera Software consultant.

6

Server Scheduling

FlexNet Manager Suite relies on a significant numbers of schedules. For example, there are schedules on the inventory beacons that determine when inventory data is collected from third-party inventory systems, from Active Directory, and so on. There is a schedule, set centrally, that determines when installed FlexNet inventory agents collect data from their hosts, and upload resulting discovery and inventory files to an inventory beacon. Both of these kinds of schedule operate remotely, away from the central application server.

However, there are also a significant number of scheduled tasks that run on the central application server. These schedules that operate on the application server are covered in this chapter.

Traditionally, scheduled tasks have been managed by the Microsoft Task Scheduler on the server. To maintain accessibility, these forms of task scheduling are still available, and are summarized in this chapter. Many of these Microsoft scheduled tasks simply queue messages for the internal FlexNet batch scheduler that runs on the application server. (In larger implementations where there are multiple servers, the batch scheduler runs on the server known as the batch server.)

The FlexNet batch scheduler incorporates knowledge of the interdependencies between the processes used in FlexNet Manager Suite. It is therefore able to make optimal scheduling decisions that avoid system conflicts and go some way towards load balancing on the batch server. The batch scheduler and batch processor are also covered in this chapter.

Server-Side Scheduled Tasks

In general, the scheduled tasks that are (by default) set up in Microsoft Task Scheduler on your central application server fall into three groups:

- Calls to `mgsimport.exe` that collect various kinds of data from staging locations on the inventory server and import into the *inventory* database. Examples include Active Directory, FlexNet inventory, installation logs, usage records, and VDI information. In a multi-server implementation, these scheduled tasks execute on the inventory server. Data handled this way requires an additional import from the inventory database to the compliance database (executed by the batch processor, as described shortly).
- Calls to the same `mgsimport.exe` that collect different kinds of data from staging locations on the inventory server and import directly into the compliance database. Examples include inventory beacon state and activity status, and discovery information. In a multi-server implementation, these scheduled tasks execute on the

inventory server. Clearly, since these kinds of data have been loaded directly into the compliance database, there is no further import required.

- Calls to the internal batch scheduler to queue various tasks, taking into account all the system interdependencies and constraints. Examples include download of the product libraries, imports from the inventory database to the compliance database, and others shown below. In a multi-server implementation, these scheduled tasks execute on the batch server. For more information on the resulting batch scheduler tasks, see Batch Scheduler Command Line.

The default configuration of the Microsoft scheduled tasks is shown in the table below.

Scheduled task	Default schedule	Command	Note
Data warehouse export	6am Sunday	`BatchProcessTask.exe run DataWarehouseUpdate`	Export data as a snapshot to the data warehouse database (on a multi-tenant system, this is for all tenants).
Delete activity log history	4am daily	`BatchProcessTask.exe run ActivityLogHistoryDelete`	Truncate the execution history of scheduled batch processes.
Export to ServiceNow	3am Sunday	`BatchProcessTask.exe run ServiceNowExport`	When FlexNet Manager Suite integrates with ServiceNow, ServiceNow is regarded as authoritative for asset and contract records. This process synchronizes this information. For details, see the chapter *ServiceNow Integration with FlexNet Manager Suite* in *FlexNet Manager Suite Adapters Reference*, available through the title page of online help.
FlexNet inventory data maintenance	Midnight daily	`BatchProcessTask.exe run IMDataMaintenance`	Performs cleanup on the inventory database (containing FlexNet inventory) in FlexNet Manager Suite. This also adds discovery information for systems found in inventory but not previously discovered.
FlexNet Manager Suite database support task	Midnight daily	`BatchProcessTask.exe run FNMPDataMaintenance`	Performs cleanup on the compliance database in FlexNet Manager Suite.

Scheduled task	Default schedule	Command	Note
FNMEA Enterprise Groups export	1am daily	`BatchProcessTask.exe run FNMEAEnterpriseGroupExport`	Reserved for future development.
Import Active Directory	Every 10 minutes	`mgsimport.exe -o CREATE_NO_WINDOW=True -- -t activedirectory`	Imports into the inventory database any Active Directory data that has been uploaded from the inventory beacons to the `Incoming` folder. The availability of these files depends on Active Directory imports being scheduled on at least one inventory beacon. When this import is completed, a message is queued for the batch scheduler to execute `BatchProcessTask.exe run ActiveDirectoryImport -- "-s` *`connectionName`* `-e ActiveDirectory"`, where *`connectionName`* is replaced with the connection to the inventory database. In a multi-tenant system, the batch processing is specific to each tenant.
Import application usage logs	Every 10 minutes	`mgsimport.exe -o CREATE_NO_WINDOW=True -- -t usagedata`	When usage tracking is configured for FlexNet inventory agent, this command imports uploaded usage records from the `Incoming` folder to the inventory database. This data is collected in the next inventory import (worst case is typically the daily catchup task).
Import discovery information	Every 10 minutes	`mgsimport.exe -o CREATE_NO_WINDOW=True -- -t discovery`	Imports uploaded discovery records from the `Incoming` folder directly to the compliance database.

Scheduled task	Default schedule	Command	Note

Import installation logs	Every 10 minutes	`mgsimport.exe`
		`-o CREATE_NO_WINDOW=True`
		`-- -t logs`
			Loads into the inventory database the installation records of packages required by the FlexNet inventory agent, covering schedule changes, updated rules and so on. This data is resolved into the compliance database along with the next inventory import, where currently it is use as installation evidence for the FlexNet inventory agent on the managed device.

Import inventories	Every 10 minutes	`mgsimport.exe`
		`-o CREATE_NO_WINDOW=True`
		`-- -t inventories`
			Imports all the inventory data collected by the FlexNet inventory agent and uploaded through inventory beacons, loading it from the `Incoming` folder to the inventory database. This data is collected in the next inventory import (worst case is typically the daily catchup task).

Import Inventory Beacon activity status	Every 10 minutes	`mgsimport.exe`
		`-o CREATE_NO_WINDOW=True`
		`-- -t activitystatus`
			Loads the activity (or process) reporting of all available inventory beacons directly to the compliance database. Examples include rule execution and gathering inventory from third-party connections (such as Microsoft SCCM). This data feeds the listing available in the system menu (⚙▼ in the top right corner) > **Data Inputs**.

Scheduled task	Default schedule	Command	Note
Import Inventory Beacon status	Every 10 minutes	`mgsimport.exe -o CREATE_NO_WINDOW=True -- -t beaconstatus`	Loads the state (or condition) reporting of all available inventory beacons directly to the compliance database. Examples include whether the FlexNet Beacon software has any known issues, the state of its services, its settings for uploading to its parent (either the central application server or another inventory beacon in the hierarchy), and the like. This data feeds the listing available in **Discovery & Inventory > Beacons** (in the **Network** group).
Import remote task status information	Every 10 minutes	`mgsimport.exe -o CREATE_NO_WINDOW=True -- -t ActionStatus`	Deprecated: no remaining function. You may disable this task.
Import SAP inventories	10pm daily	`BatchProcessTask.exe run SAPInventoryImport`	Imports inventory from FlexNet Manager for SAP Applications that has been uploaded into the `Incoming` folder, writing the results into the compliance database.
Import SAP package license	6am Sunday	`BatchProcessTask.exe run SAPPackageLicenseImport`	Imports the licenses calculated by SAP, writing results into the compliance database.
Import SAP user and activity information	Midnight Sunday	`BatchProcessTask.exe run SAPUserAndActivityImport`	Perform a SAP user and activity information import from the SAP system defined in the web interface.
Import security event information	Every 10 minutes	`mgsimport.exe -o CREATE_NO_WINDOW=True -- -t securityevent`	Deprecated: no remaining function. You may disable this task.

Scheduled task	Default schedule	Command	Note

Import system status information	Every 10 minutes	`mgsimport.exe`
		`-o CREATE_NO_WINDOW=True`
		`-- -t systemstatus`
			Deprecated: no remaining function. You may disable this task.

Import VDI access data	Every 10 minutes	`mgsimport.exe`
		`-o CREATE_NO_WINDOW=True`
		`-- -t vdiAccess`
			Imports data on which users can access virtual desktops from the `Incoming` folder to the inventory database. This data is collected in the next inventory import (worst case is typically the daily catchup task).

Inventory import and license reconcile	2am daily	`BatchProcessTask.exe`
		`run InventoryImport`
			Perform a full inventory import from all connections, followed by a license recalculation (reconciliation). In a multi-tenant implementation, this is for all tenants. For more information, see the corresponding entry in Batch Scheduler Command Line.

Recognition data import	1am daily	`BatchProcessTask.exe`
		`run ARLDownload`
			Schedules the download of the Application Recognition Library to the `%TEMP%` folder of the service account running the download. Only one instance of the ARL download task can run at a time. The batch scheduler automatically adds follow-on tasks for the import and clean up of the downloaded data.

Scheduled task	Default schedule	Command	Note
Regenerate Business Import config	5:30am daily	`BatchProcessTask.exe run BusinessAdapterConfig`	Updates the data model (`FNMPDataModel.ini`), the DDI files, and the CSV templates used by the Business Importer (and therefore the Business Adapter Studio), and initiates downloads to the inventory beacons. This update is particularly valuable for keeping the Business Importer up to date with changes to custom properties.
Send contract notifications	Midnight daily	`NotificationScheduler.exe`	
Update FlexNet Manager Suite software usage history	4am daily	`BatchProcessTask.exe run FNMPSoftwareUsageHistoryUpdate`	Take a snapshot of all current licenses for use in reporting (to improve reporting performance).

Introducing the Batch Scheduler

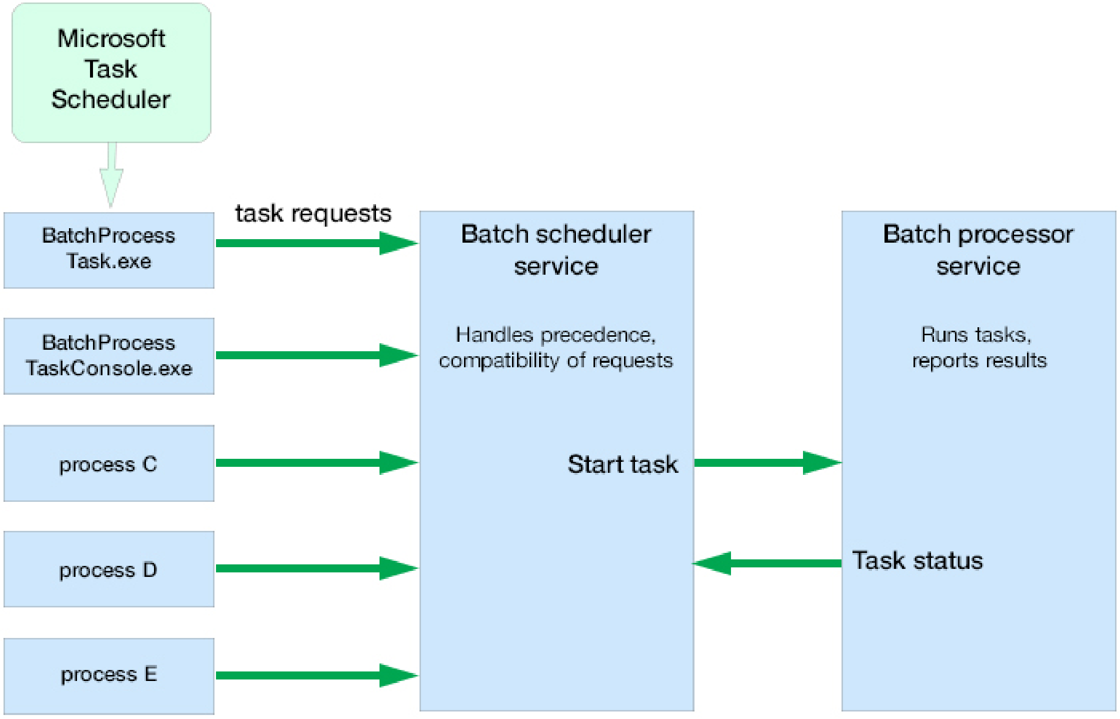
The batch scheduler for FlexNet Manager Suite runs on the batch server. It is responsible for receiving messages that request specific tasks, and placing these in an execution queue in such a way as to eliminate incompatibilities and (to some degree) optimize performance.

The batch scheduler executable is `BatchProcessScheduler.exe`, which runs as a service on the batch server. The interface to this service is a separate utility, available in two different forms that provide identical functionality other than interactivity:

- `BatchProcessTaskConsole.exe` provides a command-line interface which also displays the output of results
- `BatchProcessTask.exe` is used for execution directly from a scheduling tool (such as Microsoft Task Scheduler), and as such accepts the same command-line inputs as `BatchProcessTaskConsole.exe`, but suppresses output to the console.

The majority of this documentation concerns the operation of either of the `BatchProcessTask[Console].exe` utilities, since these provide the command line interface for the batch scheduler.

How Batch Scheduling and Processing Works



Batch scheduling and processing, summarized in the diagram above, runs as follows:

1. The batch scheduler service receives a message requesting a particular task. Messages may come from (among other sources):

    - `BatchProcessTask.exe` or `BatchProcessTaskConsole.exe` (including command-line input)
    - The web interface for FlexNet Manager Suite (for example, when an operator has uploaded spreadsheet or other data)
    - The `ManageSoftRL` endpoint (the web service that receives uploads FlexNet inventory from inventory beacons)
    - The `inventory-beacons` endpoint (used by inventory beacons to collect policy and updated rules, as well as to upload third-party inventory)
    - The Activation Wizard (where you enter details of your license to use FlexNet Manager Suite).

2. The message is validated with the following tests:

    - The message type is one of the supported batch processor tasks. If not, the failure is logged. (All supported tasks are listed in Batch Scheduler Command Line.)
    - The scoping is correctly supplied, as listed in Batch Scheduler Command Line (for example, if a group identifier is required, one is supplied and a tenant ID is not supplied; or for tasks requiring a tenant ID, that the ID is correctly supplied, and no group is present). If the scoping is not correctly specified, the

message is failed, and the failure is logged. For a standard (single tenant) on-premises implementation, no tenant ID is required for any task.

- The message is not a duplicate of one already in the task queue. A message is a duplicate if it has the same task type, group name, tenant UID, and parameter set (both names and values). Duplicates are discarded, and logged with the fact that they are duplicates.

3. Validated messages are saved to the database. This allows for recovery after a disastrous failure, such as the server suddenly going down.
4. Saved, valid messages are added to the in-memory pending messages queue.
5. The scheduler service regularly assesses the set of currently pending messages (from the oldest to the most recent) against any other tasks that are currently executing. The constraints include:

   - Limits where no more than one of a particular task may be running at a time
   - Mutual exclusions, where task B may not start while task A is running.

   For the list of constraints, see Batch Processing Constraints.
6. When the scheduler decides a task is safe to execute, it sends a message to the batch processor.
7. The batch processor collects the task from the head of the queue, and executes it, returning a message to update the task status as required.

   The possible status values that may be updated by either the batch scheduler or the batch processor (and are visible in the log files) are:

Status	Updated by	Description
`Duplicate`	Batch scheduler	New incoming task is a duplicate of an existing task that has a `Submitted` status. Duplicate entries have the same • Task type • Group name • Tenant UID • Parameter set.
`Submitted`	Batch scheduler	Task submitted and is waiting (possibly on other tasks) for dispatch to the processor service.
`Queued`	Batch scheduler	Task dispatched to the tasks queue by the scheduler service, but not yet picked up by the processor service.
`Processing`	Batch processor	Task accepted by the batch processor service, and processing is in progress.
`Success`	Batch processor	Processor service reported the successful completion of the task (this may be reporting the return code from a child process).

Status	Updated by	Description
`Error`	Batch processor	Error while processing task.

8. While processing, the batch processor continues to send 'heartbeat' messages to the batch scheduler (the heartbeat continues whether the batch processor is busy or idle).

> ***Tip:*** *If the heartbeat messages fail for a specified period (default: 5 hours), all tasks recorded as* `Processing` *are marked as failed, and given the status* `Error`*. This may happen, for example, if the batch processor service was killed and failed to reappear.*

9. When the processing of the task completes, the status is updated to either `Success` or `Error`. Results are logged in `%ProgramData%\Flexera Software\Compliance\Logging\BatchProcessScheduler\BatchProcessScheduler.log` on the batch server (or the server hosting this functionality), with the log entry including text like the following:

   ```
   received status update for task 'Success' from processor serverName
   ```

   The same log message includes a task identifier in the following format:

   ```
   Task[159add91-a5e4-4755-9ff4-d514baae2e11]:
   ```

   To identify the type of task, you can:

   - Search for the first occurrence of this ID in the batch scheduler log, such as:

     ```
     Message DataWarehouseUpdateRights[159add91-a5e4-4755-9ff4-d514baae2e11]
     sent for processing
     ```

   - Search for the first occurrence of this ID in the `BatchProcessor.log` (in the same folder), which also lists the full command that the batch processor executed:

     ```
     DataWarehouseUpdateRights[159add91-a5e4-4755-9ff4-d514baae2e11]
     Starting process with command line '"C:\Program Files (x86)\Flexera
     Software\FlexNet Manager Platform\DotNet\bin\ComplianceReader.exe"
     -us false -importtype Exporters -e BusinessIntelligenceRights'
     ```

A by-product of this process is that it is not possible to schedule a particular task at a *precise* time. Scheduled times really mean "not earlier than" and "as close as possible to", and the actual execution start time depends on there being no constraints from other tasks to delay execution.
Using the batch scheduler to organize tasks ensures that:

- Processes for importing the product libraries (such as the Application Recognition Library), which exert locks on various database tables, do not cause failures in inventory and other kinds of imports which may access the same tables
- Imports automatically avoid each other, instead of failing if they are accidentally run at the same time
- Business and third-party inventory imports uploaded by an inventory beacon are automatically processed as they arrive at the central application server. In multi-tenant environments, the batch scheduler can maximize the parallelism between imports for different tenants.

- Tasks originating from different sources (listed at the start of this topic) can be executed on demand when possible, without causing random failures through accidentally requesting incompatible processes at overlapping times.

Rapid Processing of Third-Party Inventory

The batch scheduler provides some useful specializations for handling third-party inventory imports from disconnected inventory beacons (those that are not co-located on your central application server, or batch server in a multi-server implementation). The purpose of these specializations is to make third-party inventory results available in the web interface as promptly as possible.

Third-party inventory processing overview:

1. An inventory beacon collects inventory from a third-party tool (such as Microsoft SCCM or IBM's ILMT).
2. The inventory data package is saved with an XML manifest that identifies the connection used for the inventory import (both by the name you defined for the connection, and by a GUID tying the connection to the particular inventory beacon).
3. The inventory package is immediately uploaded to a web service on the central application server (or the batch server in a large implementation with separate servers).
4. The web service queues an `InventoryImportReaders` message to the batch scheduler. (Details of task messages are included in Batch Scheduler Command Line.)
5. The reader task is scheduled as soon as constraints and current tasks allow, resulting in the third-party inventory reaching the internal staging tables.
6. After the success of that task, by default the batch scheduler queues an `InventoryImportWriters` message so that the data is also transferred into the operational tables in the compliance database.

   This chaining of the writer task is controlled by another specialized option on the command line of the batch scheduler:

   ```
   -p "ChainWritersMessage=true"
   ```

   The value of this Boolean is derived from a per-tenant setting in the database, called `PackageUploadTriggersWriters` (stored in the `ComplianceTenantSetting` table). Its effect is to cause the batch scheduler to queue tasks for the compliance writers immediately on the success of the import readers task. These not only transfer the inventory to the operational tables in the compliance database, but also complete a new calculation of license consumption (reconciliation) based on this latest data. Therefore the inventory, and its impact on licensing, are available as quickly as possible in the web interface of FlexNet Manager Suite.

   Tip: *The same setting may be used in a single-tenant on-premises implementation.*

While you can chain the writers for all inventory sources, it doesn't have the same impact when used in the case of inventory collected by FlexNet inventory agent. This is because the individual `.ndi` files have over time been uploaded into the internal inventory database, and there is no equivalent "instant trigger" to cause this data source to be 'immediately' written into the compliance database (really, 'immediately' has no useful meaning when `.ndi` files continue to be uploaded to the inventory database at relatively random times).

In contrast, for third-party inventory, the specialized process described above means that third-party inventory is available in the web interface of FlexNet Manager Suite as promptly as possible after it is collected by an inventory beacon.

Configuration for Batch Processing

Single or multiple servers (and network share)

The batch scheduler service and the batch processor service are implemented on a single server, known as the batch server. (When the implementation is quite small, the batch server may also be combined with the inventory server, and potentially also the web application server; but for the moment, our focus is on batch processing.)

Communications between the batch server and the batch scheduler are local to the batch server, and the staging folder for data incoming from inventory beacons is on the same server. The default location is `%ProgramData%\Flexera Software\Beacon\IntermediateData`. This default is formed by appending `IntermediateData` to the value of the base directory saved in `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\ManageSoft Corp\ManageSoft\Beacon\CurrentVersion\BaseDirectory`. This base location is also used by other processes, and should be changed only with care.

***Tip:** A second folder, a network share, is used for handing off files uploaded through the web interface (such as inventory spreadsheet imports) for processing by the batch server. For this share, the default path is `%ProgramData%\FlexNet Manager Platform\DataImport`, and the path is saved in the registry at `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\ManageSoft Corp\ManageSoft\Compliance\CurrentVersion\DataImportDirectory`. There is also a parallel folder for data export. For implementations that separate the web application server from the batch server, these shares must also be configured and accessible from both servers. For more information, see Configure Network Shares for Multi-Server.*

Installation and upgrade

The messaging that drives the batch scheduling and batch processing is implemented using Microsoft Message Queuing (MSMQ). In a multi-server implementation, MSMQ must be enabled on all servers. The MSMQ priority queues exist only on the batch server. For that reason, where other servers are separate, they must know the fully-qualified domain name of the batch server so that they can access the queues. (Where there is only a single, combined application server, `localhost` may be used in place of the fully-qualified domain name of the server.)

These details of configuration are normally set up by PowerShell scripts during installation or upgrade of FlexNet Manager Suite. If at any stage there are new features installed, the PowerShell scripts should be re-run to update the configuration.

***Tip:** The name of the batch server is saved in the `ComplianceSetting` table of the compliance database, as `BatchSchedulerHostName`.*

Authentication and authorization

The batch scheduler and processor services must be executed using a valid account in Active Directory. During installation, through the PowerShell scripts, this same account is made a member of the Operator role (given full operator access to the system data). In a multi-server implementation, it is normal for the same service account runs on all the central servers, simplifying your administration of the message queues in MSMQ.

Authentication between the web application server and the batch server, or between any inventory beacon and the batch server, is handled using Windows authentication managed by MSMQ.

On the batch server (or, in a single server implementation, the application server), the account that runs the batch processor service was set up during implementation (the suggested value was `svc-flexnet`). This account must have inheritable permission to read the `%ProgramData%\FlexNet Manager Platform\DataImport` folder and all its sub-folders. (This is the default path: you can confirm the setting for your server by checking the registry at `HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\ManageSoft Corp\ManageSoft\Compliance\CurrentVersion\DataImportDirectory`.) Typically these permissions are controlled through Active Directory group memberships, and you can check the permissions like this:

1. In Windows Explorer, right-click on the `DataImport` folder, and select **Properties** from the context menu.
2. In the **DataImport Properties** dialog, select the **Security** tab, and then click **Advanced**.
3. In the **Advanced Security Settings for DataImport** dialog, select the **Effective Permissions** tab.
4. Next to the **Group or user name** field, click **Select...**.
5. In the **Select User, Computer, Service Account, or Group** dialog, click **Object Types...**, ensure that **Service Account** is selected, and click **OK**.
6. In the **Enter the object name to select** field, enter the name of the account running the batch processor service (the name proposed during implementation was `svc-flexnet`). You can click **Check Names** to ensure that the account name is valid and recognized. Then click **OK** to return to the previous dialog, and display the permissions for this service account on the folder. (Since the service account is the same user context as runs the compliance readers or the Business Importer, the necessary rights are more extensive that required just for messaging.) As a minimum, the following permissions are required:
   - `List folder / read data`
   - `Create files / write data`
   - `Create folders / append data`
   - `Delete subfolders and files`
   - `Delete`.
7. These rights must be inheritable by any child objects (such as subfolders) that are created. In general, check the **Permissions** tab of the **Advanced Security Settings for** *`Folder name`* dialog. If it shows a checked (ticked) box for **Include inheritable permissions from this object's parent**, it typically also means that the inheritance property is also inherited. Otherwise, inheritance must be configured within Active Directory.

***Tip:** Microsoft IIS is configured by default not to use account impersonation. If IIS is reconfigured to use impersonation, MSMQ and folder permissions will need to be adjusted such that all system users have appropriate rights to the folders and the MSMQ incoming queue.*

Limiting Parallel Execution Across Tenants

This process applies only to multi-tenant implementations (such as for managed service providers).

In a multi-tenant environment, it is possible for many tasks to be requested at once, potentially creating load issues on the batch processor. Some limits are in place naturally: for example, execution of the `ComplianceReader` is generally restricted to one-per-tenant. However, in a system with many tenants, the worst case is to have each tenant running one instance, and all running at once; and there are other tasks like SAP imports that also create load on the system.

There is a database feature that allows limits to be applied to sets of batch processing task types. For example, by default a limit named `ComplianceReader` is given a value of `5`. This limit is associated by ID with the following batch processing tasks:

- `ActiveDirectoryImport`
- `DataWarehouseUpdate`
- `EntitlementRecommendations`
- `InventoryImport`
- `InventoryImportNoStats`
- `InventoryImportReaders`
- `InventoryImportWriters`
- `LicenseReconcile`.

This means that across all tenants, there is a maximum of five of any of these tasks executing at once.

***Tip:** A task type may only be associated with at most one limit.*

To create a limit:

1. In Microsoft SQL Server Management Studio, in the compliance database, insert a new row into the into `BatchProcessTypeLimit` table, with a unique `Name` and the upper limit set as the `Max Tasks` value, noting the `BatchProcessTypeLimitID` created for this record.

   For details, see *FNMSSchemaReferencePDF*, available through the title page of online help.

2. Update the `BatchProcessType` table, selecting the row with the appropriate `TypeName` for the task in question, and inserting the `BatchProcessTypeLimitID` value into the column of the same name for that row.

3. Repeat the last step for any other task types that should participate in the same limit.

***Important:** The `IBMPVULicenseUpdate` task must not participate in a limit that involves other batch process tasks. Furthermore, if `IBMPVULicenseUpdate` is limited (on its own), the limit must be set to a high value. Tight restrictions on `IBMPVULicenseUpdate` may mean that FlexNet Manager Suite cannot meet the frequency of PVU checks required for IBM audit data and compliance.*

Batch Scheduler Command Line

Command-line reference for the server-side batch scheduler.

The command line syntax and results are identical for the two forms of the command-line utility for the batch scheduler service (`BatchProcessTaskConsole.exe` for interactive use, and `BatchProcessTask.exe` for programmatic use). These utilities exist solely for interpreting input and sending messages to the batch scheduler service.

***Note:** The command-line syntax documented below works in the Windows command window. These commands are not suitable for use in the PowerShell interface.*

When you input a command (either through the console, or programmatically through a scheduled task)::

- `BatchProcessTask[Console].exe` validates the command line (this requires that the task name is valid, and parameters are specified appropriately for the scope of the task). Valid command lines are sent as a message to the batch scheduler service.
- The batch scheduler service checks against the list of pending tasks for duplicate messages (duplicates have the same task, group name, tenant UID, and parameter set). When a duplicate is detected, the original queued task is preserved, and the new command is not queued, but is saved in the database with the state `Duplicate`.
- The batch scheduler service persists the command to the database (protecting against unexpected shut-down, so that the system resumes cleanly after a restart).
- The batch scheduler service adds the command to the pending queue. It reviews this queue (from oldest to latest) regularly, and passes any task that is free of restrictions in a message to the batch processor service.

For more details, see How Batch Scheduling and Processing Works.

Synopsis

Syntax:
`BatchProcessTask[Console].exe run` *taskName* [*options*] [**`--`** *taskArguments*]

***Tip:** The default path to the executable is `C:\Program Files (x86)\Flexera Software\FlexNet Manager Platform\DotNet\bin`.*

The leading set of options have limited applicability, and are uncommon for on-premises implementations:

Syntax:

`-g` *groupName* (applicable only to very large, multi-compliance-database implementations)

`-p`

`-t` *tenantUID* (applicable only to multi-tenant implementations, for managed service providers)

`-g`	*`groupName`*	Not relevant to, and must not be used with, on-premises installations. For multi-database implementations, this means to run the task for all tenants in the specified group. **Note:** *With this option, a tenant UID must not be specified in the command line.* Groups apply only to very large implementations where the compliance data is split over multiple databases. The group identifies which database contains data records for the set of tenants. For on-premises implementations, this option must be omitted.
`-p`		Pass properties to the batch processor that customize its behavior for certain tasks. These properties are not passed through as arguments to any executable that the batch processor may call in a sub-process. (For that purpose, use the – *`taskArguments`* format.) Instead, these properties modify the behavior of the batch processor itself. Properties must be specified in *`name=value`* pairs, and multiple pairs may be separated by commas.
`-t`	*`TenantUniqueID`*	In a multi-tenant environment, runs the task only for the tenant specified by the unique identifier. (This alphanumeric code is viewable in the Flexera Software license details, and in the `Tenant` table in the database.) **Note:** *If a task is scoped to a tenant, and the `-t` option is omitted on the command line, `BatchProcessTaskConsole.exe` queues a separate message for every tenant in the database. These messages are then prioritized and processed as usual by the batch scheduler service.* For single-tenant on-premises implementations, this option should be omitted, and has no effect.

Tasks and Task Arguments

The following table lists the available task names, together with the *scope* of each task. The scope (System, Group, or Tenant):

- Specifies who is affected by an instance of the task (for example, `ActiveDirectoryImport`, which has a scope of Tenant, imports the AD information for a single tenant). System tasks are global, and must not have either a group name or a tenant ID specified. For an on-premises implementation, Group scope is equivalent to System scope.
- Maps to the options described above, so that, for example, in a multi-tenant implementation for a managed service provider, `ActiveDirectoryImport` requires that the `-t` *`TenantUID`* option is specified to the batch

scheduler service (if omitted at the command line, `BatchProcessTaskConsole.exe` queues a separate message for every tenant in the database.

- Describes the level of isolation for each task. For example, the `ActiveDirectoryImport` task cannot be run in parallel (that is, only one instance may run at a time) within its scope of a single tenant. However, in a multi-tenant environment, separate tenants may be running this task at the same time, as long as for each tenant exactly one instance of the task is running. (For more details about restrictions and constraints about what cannot be run in parallel, see Batch Processing Constraints)

The task arguments are not required for standard operation. The batch processor service adds a standard set of arguments for each task (in the table, shown with the "Underlying executable" entry). If you are customizing behavior, you may add additional task arguments, which are appended to the standard set (you cannot override the standard arguments). If you are adding task arguments, each set must be preceded by *two* dashes ('minus minus'), which indicates that the argument(s) are to be passed through directly to the executable invoked when processing the task. The set of arguments must then be enclosed in double quotation marks if they contain any white space.

Task	Scope	Notes
`ActiveDirectoryImport`	Tenant	Import sites, subnets, computers, groups, and users from Active Directory. There should be no need to trigger this task manually, nor to schedule it separately, as the appropriate message is queued by `mgsimport.exe` after importing an uploaded file to the inventory database. ***Tip:*** *When Active Directory data is uploaded from an inventory beacon, a Microsoft scheduled task triggers its import into the inventory database (this task by default runs every 10 minutes). At the successful completion of this import, a message is queued for the batch scheduler to schedule* `ActiveDirectoryImport` *for the connection to the inventory database. The bottom line is that Active Directory data is available in the web interface of FlexNet Manager Suite as quickly as possible after it is scheduled for collection on any inventory beacon.* Underlying executable: `ComplianceReader.exe -s` *`connectionName`* `-e ActiveDirectory`
`ActivityLogHistoryDelete`	Tenant	Clean up any records in the system activity log that are older than (by default) 90 days. Underlying executable: SQL stored procedure.

Task	Scope	Notes
`ARLCleanup`	System	This task cleans up downloaded library files (both `.cab` files and extracted files) after the contents have been imported into FlexNet Manager Suite. ***Tip:*** *It is not necessary to schedule or execute this task. In normal operations, the batch scheduler automatically schedules a cleanup after all required imports are completed.* Underlying executable: `MgsImportRecognition.exe -c`

Task	Scope	Notes
`ARLDownload`	System	Downloads the latest version of the Application Recognition Library, saving the contents on the batch server for later import (using the separate `ARLImport` task). ***Tip:** If you are managing your own scheduling, you do not need to separately schedule the following `ARLImport` and `ARLCleanup` tasks. The batch scheduler automatically queues these tasks after a successful download.* ***Note:** In a multi-tenant environment for managed service providers, the Application Recognition Library is downloaded once to a shared location, and is then available for import to the system.* Default schedule: Daily at 1am local time. Underlying executable: `MgsImportRecognition.exe -dl` ***Tip:** It is important that you use the batch scheduler to run the library downloads and imports. Other imports run at unpredictable times: inventory imports, business imports, and data exchange with FlexNet Manager for Engineering Applications and FlexNet Manager for SAP Applications are all run on demand as data is uploaded by inventory beacons. As well, some imports may be requested by operators using the web interface. If you use the batch scheduler to download the libraries, the batch scheduler will gracefully pause these competing tasks, or wait for their completion, before pushing through the content update, and then resume processing other tasks afterward. In contrast, if you do not use the batch scheduler and run the process directly from the `MgsImportRecognition.exe` command line, the database locking required for the library updates may mean that either the library update itself, or a competing task, will fail.*

Task	Scope	Notes
`ARLImport`	Group	Import the last downloaded Application Recognition Library, currently saved on the local disk. Also download and import the SKU library, and the individual PURL libraries as authorized by your license terms. ***Tip:*** *For normal operations, do not schedule (or execute) this task. In normal operations, the batch scheduler automatically schedules this task after the download of the ARL is completed.* ***Note:*** *In a multi-tenant environment for managed service providers, the SKU and PURL libraries are downloaded once, and the logical-AND of all tenant entitlements is loaded into the database. Access by individual tenants is then managed by their license terms.* Underlying executable: `MgsImportRecognition.exe -g` *`groupName`* `-ia -ne`
`BaselineImportProcessing`	Tenant	Used for processing imports of Microsoft Licensing Statements (MLS). Not available for external use. Underlying executable: SQL stored procedure.

Task	Scope	Notes
`BusinessAdapterConfig`	Tenant	Updates the data model (`FNMPDataModel.ini`), the DDI files, and the CSV templates used by the Business Importer (and therefore the Business Adapter Studio). The updated content is downloaded to the inventory beacons the next time they request an update (by default, every 15 minutes, and configurable through **Discovery & Inventory > Settings**, in the **Beacon settings** section). This update is particularly valuable for keeping the Business Importer up to date with changes to custom properties. For more information, including details of the standard data model and CSV templates, see *Using the FlexNet Business Importer*, a PDF file available through the title page of the online help. In a multi-tenant implementation, this may be run for a single tenant (with the tenant UID specified), or may be run without the `-t` option to update all tenants. Default schedule: Daily at 4am local time. Also triggered when a new tenant license is imported (in a multi-tenant implementation). Underlying executable: SQL stored procedure.
`BusinessAdapterImport`	Tenant	Imports any packages uploaded by the Business Importer to the central application server, saving the data in the compliance database ready for the next calculation of license consumption (which must be triggered separately). ***Note:*** *Although the scope of this task is per tenant (the data for only one tenant is imported at a time), the task can only run one-at-a-time within a group, as logging is shared for all tenants in a group.* Underlying executable: `mgsbi.exe`

`DataWarehouseUpdate`	Tenant	Update the data warehouse with the latest information (to allow for trend reporting and the like).
		Default schedule: Weekly on Sunday at 6am.
		Underlying executable:
		`ComplianceReader.exe -e`
		`BusinessIntelligenceRights`
		`-e BusinessIntelligenceData`

Task	Scope	Notes
`DataWarehouseUpdateRights`	Tenant	Copy the tenant list, and update the access rights to the data warehouse. Default schedule: triggered when a new tenant license is imported. Underlying executable: `ComplianceReader.exe -us false -importtype Exporters -e BusinessIntelligenceRights`
`EnterpriseGroupImport`	Tenant	Used for imports through the web interface. Not available for external use. Underlying executable: SQL stored procedure.
`EntitlementRecommendations`	Tenant	A task triggered through the web interface. Not available for external use. Underlying executable: `ComplianceReader.exe -us false -e EntitlementAutomation`
`FNMEAEnterpriseGroupExport`	Tenant	Transferring current enterprise group structure for use in FlexNet Manager for Engineering Applications. Not available for external use. Underlying executable: SQL stored procedure.
`FNMPDataMaintenance`	Tenant	Internal database maintenance. Not available for external use. Underlying executable: SQL stored procedure.
`FNMPSoftwareUsageHistoryUpdate`	Tenant	Internally, takes a snapshot of all licenses to improve reporting performance. Not available for external use. Underlying executable: SQL stored procedure.
`IBMPassportAdvantage`	Tenant	Used for import of IBM Passport Advantage reports through the web interface. Not available for external use. Underlying executable: SQL stored procedure.

Task	Scope	Notes
IBMPVULicenseUpdate	Tenant	Used for high-frequency tracking of PVU licenses. Triggered internally, and not available for external use. Task arguments: "-e Computer -e VirtualMachine -qualifiedsource \\"*ConnectionNameAndGUID*\\" -us false -e LicenseReconciliation -concurrent IBM -overrideparams PublisherFilter=IBM -processremotepackages false" Underlying executable: ComplianceReader.exe -e Computer -e VirtualMachine -qualifiedsource \\"*ConnectionNameAndGUID*\\" -us false -e LicenseReconciliation -concurrent IBM -overrideparams PublisherFilter=IBM -processremotepackages false
IMDataMaintenance	Group	Executes a database stored procedure for data maintenance within the FlexNet inventory database across all the tenants in the group. Underlying executable: SQL stored procedure.

Task	Scope	Notes
`IMImport`	Tenant	Runs the inventory import for FlexNet inventory (collected either by the FlexNet inventory agent locally installed on the inventory device, or by the FlexNet inventory core components operating from an inventory beacon to take zero-footprint inventory). The data is taken from the inventory database (regarded now as a data source), and copied into the staging tables within the compliance database by the inventory reader. It then queues a `InventoryImportWriters` task. By default, this import occurs daily at midnight. This task is intended for tenants in the cloud-based implementation. For these tenants, any third-party inventory is collected by disconnected inventory beacons (those not installed on the central application servers), and immediately uploaded, and imported on demand. For such tenants, only the FlexNet inventory remains to be imported prior to queueing the writers. Underlying executable: `ComplianceReader.exe`

Task	Scope	Notes

`InventoryImport`	Tenant	This task is a single invocation for a complex of inventory import and license consumption calculations, in a single convenience command for on-premises implementations only. With the first form of task arguments shown, inventory from all available connections is imported and processed. Export to the data warehouse is specifically excluded. You can also restrict this command to a single inventory source with the `-s` task argument, followed by the connection name. For example, adding
		`---s """FlexNet Manager Suite"""`
		will restrict processing to the default connection for inventory gathered by the FlexNet inventory agent and saved in the internal inventory database.
		This task is intended for use on premises, where it is possible that there are third-party inventory connections on an inventory beacon co-installed on the batch server. For these connections, there is no intermediate staging file, and no import on demand (as there is for connections exercised on disconnected inventory beacons). For this reason, all locally-available connections are imported before also importing FlexNet inventory, and queueing the writers.
		Default schedule: Daily at 2am local time.
		Underlying executable:
		`ComplianceReader.exe -us false`
		`-d BusinessIntelligenceRights`
		`-d BusinessIntelligenceData`
		`-t` *`tenantUID`*

`InventoryImportNoStats`	Tenant	This task is queued when an operator (in the `Administrator` role) selects the **Update inventory** check box and clicks the **Reconcile** button in the web interface. The name arises because this process, for speed, skips updating database statistics.
		Underlying executable:
		`ComplianceReader.exe -us false`
		`-d BusinessIntelligenceRights`
		`-d BusinessIntelligenceData`
		`-it ReadersAndWriters`
		`-us false`

Task	Scope	Notes

`InventoryImportReaders`	Tenant	By default, runs the import from all data connections (and all pending data packages) specified for the tenant into the staging tables within the compliance database. For inventory collected by FlexNet inventory agent, the data that has been uploaded into the internal inventory database is imported (that is, the inventory database is treated as another connection).
		The batch scheduler receives another specialized property with this task message:
		`-p "ChainWritersMessage=true"`
		This means that the writer tasks are queued after the success of this task, so that third-party inventory in particular is available as soon as possible (for details, see Rapid Processing of Third-Party Inventory).
		Default schedule: None (instead, for scheduled imports, see `InventoryImport`).
		Underlying executable:
		`ComplianceReader.exe -us false`
		`-d BusinessIntelligenceRights`
		`-d BusinessIntelligenceData`
		`-importtype Readers`

`InventoryImportSpreadsheet`	Tenant	Queued when an operator performs a one-off inventory spreadsheet upload through the web interface. Not available for external use.

`InventoryImportWriters`	Tenant	Takes the data currently available in the staging tables within the compliance database, de-duplicates records as necessary, writes the results into the main data tables of the compliance database, and calculates the resulting license consumption.
		Default schedule: None (instead, see `InventoryImport`).
		Underlying executable:
		`ComplianceReader.exe -us false`
		`-d BusinessIntelligenceRights`
		`-d BusinessIntelligenceData`
		`-importtype Writers`

Task	Scope	Notes

`LicenseReconcile`	Tenant	Runs only the license consumption calculations of the compliance writers (that is, does not include writing the last data from the staging tables into the compliance database).
		Underlying executable:
		`ComplianceReader.exe -us false`
		`-e LicenseReconciliation`

`POLineImport`	Tenant	Queued when purchases are imported through the web interface. Not available for external use. Underlying executable: SQL stored procedure.
`SAPInventoryImport`	Tenant	Import inventory from FlexNet Manager for SAP Applications. Default schedule: Daily at 10pm batch server time. Underlying executable: `SAPReader.exe -b`
`SAPPackageLicenseImport`	Tenant	Import the licenses calculated by SAP, writing results into the compliance database. Default schedule: Weekly on Sundays at 6am. Underlying executable: `ImportPURL.exe -l SAPPackages`
`SAPTransactionProfileImport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.
`SAPUserAndActivityImport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.
`SAPUserConsumptionImport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.
`SAPUserImport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.
`SAPUserRecommendationsExport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.
`SAPUserRoleImport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.

Task	Scope	Notes
`ServiceNowExport`	Tenant	Export data to ServiceNow, based on the integration set up between ServiceNow and FlexNet Manager Suite. May also be trigger by operator activity in the web interface. Default schedule: Weekly on Sundays at 3am. Underlying executable: `fnmp_servicenow_export.exe`
`UserAssignmentImport`	Tenant	Internal use. Not available for external use. Underlying executable: SQL stored procedure.

Additional Verbs for the Batch Scheduler

Other commands for the batch scheduler are useful for debugging and recovery work, in case of problems.

In normal operation, the batch scheduler almost exclusively makes use of the `run` verb, as described in Batch Scheduler Command Line. The additional verbs covered here are generally reserved for development, testing, and remediation.

Syntax:
`BatchProcessTaskConsole.exe help`

Prints a text message to the console showing the command-line options.

Syntax:
`BatchProcessTaskConsole.exe list-tasks`

Creates a list of tasks that are currently executing, together with requests for tasks to execute in future.

Syntax:
`BatchProcessTaskConsole.exe process-dispatch -p`

Sends a pause message to the batch scheduler service through the express (or process control) queue. Once the message is received and saved to the database, the batch scheduler service stops the queue processing and message dispatch to the batch processor. It writes a 'paused' record to the log file, and repeats this logging every minute until processing is resumed.

Syntax:
`BatchProcessTaskConsole.exe process-dispatch -r`

Sends a resume message to the batch scheduler service through the express (or process control) queue. Once the message is received and saved to the database, the batch scheduler service restarts the queue processing and message dispatch to the batch processor. It also stops writing paused records in the log file.

Syntax:
`BatchProcessTaskConsole.exe test` *taskName* [*options*] [`--` *taskArguments*]

Use with the same task names and arguments as listed in Batch Scheduler Command Line. This causes the batch scheduler to treat the request as usual; but when the message reaches the batch processor, it does not execute the task, but instead pauses for a brief period. Together with a subsequent examination of the log files, this test can help to ensure that the system is running correctly.

Syntax:
`BatchProcessTaskConsole.exe fail-task -m` *messageGUID*

This is an important but dangerous command, and should only be used when a task has been lost and the system has failed to heal itself, resulting in a backlog of tasks. This will manifest as the 'lost task' sitting in the processing state for a significant (multi-day) period, while the pending tasks are not progressing, even though actual processing on the task has finished. Use the `list-tasks` command to check the queue and running tasks. It is bad practice to use the `fail-task` command to terminate a task that is still running normally, albeit for a long time. For further information, see Troubleshooting Batch Processing.

Batch Processing Constraints

The batch scheduler imposes the following constraints on tasks that are queued for the batch processor. (These collections or groupings of tasks are labelled 'bands' to avoid confusion with database groups in massive implementations.)

Constraints are of two types:

- Within each of the following bands, for the scope(s) described, only one task may run at a time.
- Between certain bands, as specified below, operations are mutually exclusive. For example, any running task in band A prevents any task in band D from starting.

Therefore, when `ActiveDirectoryImport` is running, it blocks all other tasks in band A (unique task within band) *and* all tasks in band D (mutually exclusive bands).

Band A: Inventory imports

For each tenant (on a multi-tenant system), or across the system (for an on-premises implementation), only one of the following tasks can be run at a time:

- `ActiveDirectoryImport`
- `DataWarehouseUpdate`
- `DataWarehouseUpdateRights`
- `EntitlementRecommendations`
- `InventoryImport`
- `InventoryImportNoStats`
- `InventoryImportReaders`
- `InventoryImportSpreadsheet`
- `InventoryImportWriters`

- `LicenseReconcile`

In addition, `IBMPVULicenseUpdate` blocks band D (Content) in the same way as band A members do; but it is *not* mutually exclusive with the members of band A (Inventory imports).

Band B: Business imports

For each group (in a massive implementation with multiple compliance databases, or across the system (for an on-premises implementation), only one of the following tasks can be run at a time:

- `BusinessAdapterImport`
- `EnterpriseGroupImport`
- `IBMPassportAdvantage`
- `POLineImport`
- `UserAssignmentImport`

Band C: SAP imports

For each tenant (on a multi-tenant system), or across the system (for an on-premises implementation), only one of the tasks in band C or D can be run at a time:

- `SAPInventoryImport`
- `SAPPackageLicenseImport`
- `SAPUserAndActivityImport`
- `SAPUserRecommendationsExport`

Band D: SAP business imports

These tasks remain mutually exclusive with those in band C (SAP imports), but in addition are mutually exclusive with band B (Business imports):

- `SAPTransactionProfileImport`
- `SAPUserConsumptionImport`
- `SAPUserImport`
- `SAPUserRoleImport`

Band E: Content

Across the system (or across a group, for those massive implementations), only one of the following tasks can be run at a time:

- `ARLCleanup`
- `ARLDownload`

- `ARLImport`

Band F: General

For any individual tenant, only one instance of each of the following tasks can run at a time (no parallel instances of the same task, but these tasks are not mutually exclusive):

- `ActivityLogHistoryDelete`
- `BaselineImportProcessing`
- `BusinessAdapterConfig`
- `FNMEAEnterpriseGroupExport` (mutually exclusive with all tasks in band B - Business imports)
- `FNMPDataMaintenance`
- `FNMPSoftwareUsageHistoryUpdate`
- `IMDataMaintenance` (one running instance per group, where groups apply; and otherwise one per system for this task)
- `ServiceNowExport` (mutually exclusive with all tasks in either band A [Inventory imports] and band B [Business imports])

Mutually-exclusive bands

When two bands are mutually exclusive, it means that any task from either band blocks all tasks from the other band.

- Band A (Inventory imports) and band E (Content) are mutually exclusive
- Band D (SAP business imports) and band B (Business imports) are mutually exclusive
- Some members in band F (General), as marked, are mutually exclusive with tasks in bands A and/or B.

Separating Readers and Writers

The import and processing of inventory information is divided into two stages that are controlled by separate code entities within FlexNet Manager Suite:

- Compliance "readers" collect data that has been uploaded to the central application server, and write it into staging tables within the operations databases.
- Compliance "writers" take the data from the staging tables, normalizing it where required, and write the results into the operational tables in the compliance database. They perform recognition of newly-inventoried evidence against the ARL, and evaluate any pending automated purchase processing. Thereafter they recalculate license consumption (or 'reconciliation'), using the most recently updated data.

It is possible to run the compliance readers and writers in tandem, such that every 'read' is promptly followed by an immediate 'write' and reconciliation. However, the write and recalculate processes can be resource intensive, slowing performance for other tasks. Keeping in mind that inventory data may be incoming from multiple different sources (FlexNet inventory agent, third-party inventory tools, Active Directory, business imports, and so on), allowing a write and recalculate after every single data load may become problematic.

For this reason, the batch scheduler allows for triggering compliance readers and writers separately, completely independent of one another.

In its default operation, the batch scheduler handles this sequencing automatically.

However, if you are manually scheduling various processes, or running processes from the command line, you should be aware of the distinction between various tasks (described in Batch Scheduler Command Line). For example:

- This command imports inventory from the single default connection for inventory collected by FlexNet inventory agent, and immediately runs the writers (transferring data into the compliance database) and then running the license consumption calculations:

  ```
  BatchProcessTaskConsole.exe run InventoryImport ---s """FlexNet Manager Suite"""
  ```

- This command loads the same inventory to the staging tables, but does *not* include the writing to the compliance database nor the license consumption calculations:

  ```
  BatchProcessTaskConsole.exe run InventoryImportReaders ---s """FlexNet Manager
  Suite"""
  ```

  You may then choose to run a number of other imports (readers) from other inventory connections, and only later run the writers and recalculation (see `InventoryImportWriters`).

If you are doing your own scheduling for these processes, you should allow the batch scheduler to minimize the number of writer and recalculation tasks that are run. This ensures that your automation integrates successfully with other imports that may be triggered by (for example) an upload from an inventory beacon or an import of a CSV file through the web interface. The way to give the batch scheduler that freedom is to add the `ChainWritersMessage` parameter to the readers command. For example, this command (executed by Microsoft Task Scheduler, and therefore no longer using the console version of the executable) runs all inventory imports, one after another as appropriate; and only when all are completed does it schedule the writers and recalculation:

```
BatchProcessTask.exe run InventoryImportReaders ---s """FlexNet Manager Suite""" -p
"ChainWritersMessage=true"
```

Troubleshooting Batch Processing

The following notes may assist in troubleshooting the batch scheduler and batch processor on your batch server.

Examine log files

The batch scheduler and batch processor create log files under `%ProgramData%\Flexera Software\Compliance\Logging\BatchProcessScheduler`. Tasks go through the batch scheduler first, so you should first investigate `BatchProcessScheduler.log`. You can then use the ID given to each task to track processing results in `BtachProcessor.log`.

For a list of the status values that may be logged, and their meaning, see How Batch Scheduling and Processing Works.

Checking the state of batch processing

You can inspect the batch scheduler's view of what tasks are queued, executing, and recently completed by executing the following command:

```
BatchProcessTaskConsole.exe list-tasks
```

This command is equivalent to the following database query (which you could also use within Microsoft SQL Server Management Studio):

```
SELECT *FROM BatchProcessExecutionInfo bi
WHERE BatchProcessStatusID IN (1, 2, 3)
ORDER BY bi.StatusOrder, bi.DateOrder
```

For more information about using the `list-tasks` command in debugging, see Killing or Failing Tasks.

Checking the database record

You can use Microsoft SQL Server Management Studio to examine the contents of the `BatchProcessExecution` table (for details of the table columns, see *FNMSSchemaReferencePDF*, available through the title page of online help). There is also a convenient view on this table, called `BatchProcessExecutionInfo`. This can be used to monitor the health of executing tasks, including those requested by Windows Scheduled Tasks.

Additional troubleshooting

The following topics may also assist with troubleshooting.

Correct Identification and Connection

In a multi-server implementation, where the web application server is a distinct machine from the batch server, the fully qualified domain name of the batch server must be available so that both servers can access the Microsoft Message Queuing (MSMQ). The name is saved in the `ComplianceSetting` table of the compliance database, as `BatchSchedulerHostName`.

If this record is incorrect, it is best practice to re-run the PowerShell installation scripts with the correct data. However, you can also update the `ComplianceSetting` table directly.

In a multi-server implementation, on each server in turn, use the following command to determine the host name and default DNS suffix of the current machine:

```
ipconfig /all
```

Ensure that you can successfully ping each server from all of the others. In particular for MSMQ, ensure that from the web application server, you can ping the fully-qualified domain name stored for the batch server (and matched in the output of the `ipconfig` command). Ping tests reachability as well as DNS resolution. If the ping is not successful, remedy any DNS issues or barriers to connectivity (assuming that ping itself is not blocked).

If you make any change to the naming of the batch server, or change records of it available to other central application servers, you must manually restart the batch processor and batch scheduler services. In addition, you can either:

- Wait ten minutes for the ancillary IIS services to restart (this is the least disruptive in a production environment)
- Restart IIS manually (this restarting approach may be faster in a test environment).

Within about a minute of IIS restarting, the batch scheduler service has reconnected to the database, re-established the message queue from the database record, and messaged the batch processor service to resume processing.

Tip: *In a single-server environment, it is sufficient to specify* `localhost` *as the batch server name when configuring other server functionality.*

Monitoring, Stopping, and Restarting the Services

It is important to monitor health of the batch scheduler and batch processor services. If they are not operational, FlexNet Manager Suite is not performing tasks that manage data integrity. The web interface continues to operate, but data that relies on background processes (such as license consumption calculations) is not updated until the processes are once again operational.

In the main, you should not need to intervene manually with these services. By design, both are set to automatically restart after failure, and this is an important part of the system's ability to heal itself. For example, if the database becomes inaccessible or the message queues are misconfigured, the batch scheduler responds by shutting down. Thereafter, the Windows Service restart setting allows the batch scheduler to try again each minute until processing can begin again.

Tip: *This configuration is set during installation, and should not be changed without configuring a different method of restarting the service.*

If you do need to restart the batch *scheduler*, previously requested tasks that are queued are preserved. These have been saved to the database as part of their processing (see How Batch Scheduling and Processing Works). On restart, the batch scheduler restores its internal state (the task queues) and continues as before.

If you restart the batch *processor*, running tasks are not left as orphans. On shut-down, the batch processor forcibly closes any processes that it is currently executing. These tasks are marked as failures in the execution history in the log file. Failed tasks are not resumed on restart. For this reason, it is best practice to use the following process for a shut-down and restart of the services:

1. **1.** Pause the batch scheduler to stop it sending new tasks to the batch processor:

   ```
   BatchProcessTaskConsole process-dispatch -p
   ```

2. **2.** Monitor the running tasks, repeating until no tasks are listed as executing:

   ```
    BatchProcessTaskConsole.exe list-tasks
   ```

   Tip: *You can also review* `BatchProcessExecution/BatchProcessExecutionInfo` *in the database.*

3. **3.** Stop the services and complete whatever adjustments are necessary.

4. Restart the services. The batch scheduler restarts in its paused mode.
5. Resume normal processing of the pending queue, and dispatch of tasks to the batch processor:

   ```
   BatchProcessTaskConsole process-dispatch -r
   ```

For more details of pausing and resuming batch scheduling, see Additional Verbs for the Batch Scheduler.

Killing or Failing Tasks

There is no direct way to kill tasks in the batch processing service. You may be able to interrupt and close executables called by the batch processor.

You can also 'fail' tasks; but misusing this feature in an attempt to interrupt and kill the task poses a considerable risk to system stability and data integrity. This is because failing the task only instructs the batch scheduler process to regard the task as dead, but does not stop the batch processor from running the task.

A task should only be failed when it is 'lost'. This term means that execution has finished in the batch processor, but the batch scheduler has not been notified of its completion. If the task imposes constraints (listed in Batch Processing Constraints), its coninued presence in the batch scheduler list may be blocking other tasks. In the very rare case of a suspected lost task, first validate that the batch processor is (still) configured properly to send messages to the batch scheduler; and then you can validate that a task is lost, and if necessary fail it, using these steps:

1. On your batch server, inspect the batch processor log files under `%ProgramData%\Flexera Software\Compliance\Logging\BatchProcessScheduler`.
2. If there are any error messages indicating that the batch processor cannot send messages to the batch scheduler, suspend this process, and first remedy the configuration of your batch scheduler and batch processor.

   Particularly for server identification issues, you may wish to re-run the PowerShell configuration scripts provided for installation and implementation, as these set up the correct relationship between the two services. You may alternatively need to repair permissions on the message queue; ensure MSMQ is running on all applicable servers; or take other action as required to remedy the particular problem. When these two services are again communicating properly, you may resume stepping through this process to clean up any task you suspect was lost during the period of messaging failure.
3. Execute:

   ```
   BatchProcessTaskConsole.exe list-tasks
   ```

   The output includes the message GUID, which can be used when searching the batch scheduler/processor logs. Depending on when the breakdown occurred in status messaging from the batch processor back to the batch scheduler, the suspect task may be shown as either `Queued` (if the batch processor hasn't yet picked up the task, or if the message that the batch processor started work did not get through) or `Processing` (if only the end-of-task success or failure message was lost). Any other value of the task status means that the task is not lost, and you should exit this process and review alternative explanations.
4. Re-examine the batch processor log file, now looking for evidence that the suspect task has indeed finished. Alternatively, in cases where the batch processor starts a child process, examine that process or its logs for evidence of completion.

The underlying executables that are run in the child processes are listed in Batch Scheduler Command Line.

5. When the log files show the suspect task has definitely completed (successfully or otherwise, with mere completion being the requirement), and the `list-tasks` output still shows the same task as either `Queued` or `Processing`, copy the message ID from the output of the `list-tasks` command.
6. Substituting your copied message ID for the placeholder shown below, execute:

   ```
   BatchProcessTaskConsole.exe fail-task  -m messageGUID
   ```

   The batch scheduler updates the status of the task to `Error` to mark the failure (you can verify this by re-running the `list-tasks` command shown earlier).

Any blocked tasks can now be queued by the batch scheduler, and then executed by the batch processor.

Symptom: ARL Starts While Blocked

Even though other (time-consuming) tasks are running that should prevent the execution of the `ARLImport` task (as listed in Batch Processing Constraints), a queued request for `ARLImport` may suddenly trigger the execution of the task.

This is because the `ARLImport` task has (by default) a 60-minute 'starvation limit' that prevents it being held up (or 'starved' of processing time) for too long. Before the time limit is exceeded, tasks with lower exclusivity requirements (tenant scope, compared with the system/group scope for `ARLImport`) are allowed to run, even if requested later than the `ARLImport` task, where the latter is being delayed by other tasks. When the starvation limit is exceeded, the batch scheduler tightens constraints, and no longer allows tasks with lower exclusivity to 'sneak in' to the queue. Furthermore, as soon as the `ARLImport` is starved, any arriving request that would normally block the `ARLImport` is itself blocked first. These changes prioritize the queued `ARLImport` task for execution by moving it quickly to the front of the execution queue (for operational details, see How Batch Scheduling and Processing Works). This preemptive move prevents the task sitting in the `Submitted` state for an excessive (even indefinite) time, blocked by other constraining tasks.

By default, only the `ARLImport` task has a starvation limit. The number of minutes is stored in the `StarvedAt` column of the `BatchProcessType` database table. The use of this table means that it is theoretically possible to set a starvation time limit for all types of batch processor tasks. However, setting such 'preemptive strikes' on the batch scheduler is not recommended, since it is only useful for tasks with high exclusivity (like system) being starved by tasks with lower exclusivity (like tenant). Best practice is to allow the batch scheduler to fulfill its prioritization tasks without prejudice.

7

The Inventory Adapter Studio

Inventory Adapter Studio is a tool to develop adapters for custom inventory gathering into FlexNet Manager Suite.

This section covers the use of Inventory Adapter Studio and the management of the adapters you develop.

What Is Inventory Adapter Studio?

As well as gathering inventory directly from devices in your computing estate, FlexNet Manager Suite can also import inventory gathered by other software and hardware inventory tools. FlexNet Manager Suite ships with several factory-supplied adapters that read data from inventory tools such as Microsoft SCCM or IBM's ILMT. The Inventory Adapter Studio enables modification of these existing adapters; but more importantly, it allows creation of new adapters to connect with systems not supported out of the box.

Note: *The Inventory Adapter Studio is tailored specifically to building adapters for inventory tools. FlexNet Manager Suite is also able to import additional business-related data that influences license compliance calculations, but these connectors are built with the separate Business Adapter Studio.*

The Inventory Adapter Studio provides the following benefits:

- A graphical user interface that simplifies creation and editing of the underlying XML files that define the adapters.
- Template adapters, which include approved code for data transformation and import into the FlexNet Manager Suite operations database. This allows you to focus exclusively on the data gathering aspects of the adapter.
- Syntax highlighting, and highlighting of steps that require further editing.
- Data isolation by hiding test connections from your production implementation of FlexNet Manager Suite.
- Reduced testing effort, with a built-in filter to limit the number of records processed in a testing cycle.
- Context sensitive error reporting, with progress monitoring of each statement in the user interface.
- Detailed error reporting and tracing.

At the end of the section on the Inventory Adapter Studio, the object model for inventory adapters running on your inventory beacon in disconnected mode is fully documented.

Cautions, Prerequisites, and References

⚠ ***Caution:*** *Be aware that the Inventory Adapter Studio is an advanced tool, and incorrect use can result in data changes in your FlexNet Manager Suite environment that will affect your license position. If you are uncomfortable with performing these changes yourself, please contact the Flexera Software services team.*

The Inventory Adapter Studio has the following requirements:

- **Location.** The Inventory Adapter Studio may be installed either:
  - On an inventory beacon that will run the downstream functions of the adapter, connecting to the third-party inventory source within your enterprise. The intermediate files collected on this inventory beacon are then uploaded automatically to your central batch server. (This is called "disconnected mode" as it does not allow direct access to the underlying database.)
  - On the same central batch server as will perform the import process. In smaller implementations, use the server fulfilling that role. (This is called "connected mode", since it allows the inventory connector run from the central server to have direct access to your central database.)
- **File access.** On the server orbeacon where it is installed, Inventory Adapter Studio requires permission to create and edit files in the `C:\ProgramData\Flexera Software\Compliance\ImportProcedures` directory.
- **Downstream database access.** Inventory Adapter Studio requires permission to access the source databases. Read-only access may be sufficient, depending on how you write the adapter: many adapters write temporary tables on the source database to allow joins with existing data (for example, to create differential inventory of changes since the last import). Clearly, testing adapters such as these means that Inventory Adapter Studio must have full access to the source database.
- **Upstream database access.** When installed on the batch server, Inventory Adapter Studio needs both read and write access to the operations database of FlexNet Manager Suite. For large-scale systems where the operations database is split out to separate servers for the inventory database and compliance database, Inventory Adapter Studio requires read/write access to both databases. In contrast, when Inventory Adapter Studio (or any completed adapter) runs from an inventory beacon, the intermediate files are uploaded automatically to the central server, and automatically imported into the database.

Operator Requirements

To use the Inventory Adapter Studio successfully, you will need:

- A working knowledge of SQL, so that you can modify queries in the templates provided.
- Some data analysis experience.
- To edit the SQL queries to collect data from the source database(s), you need to know where to get the data in those source databases is located. This probably requires read access to the database and also access to the inventory tool’s user interface for data validation.

- Direct access to the FlexNet Manager Suite server. This may be on the server console directly, or using terminal services.
- A detailed working knowledge of the FlexNet Manager Suite product. This is required so that data imports can be verified, along with the expected application installations.
- Good insight into database schemas.

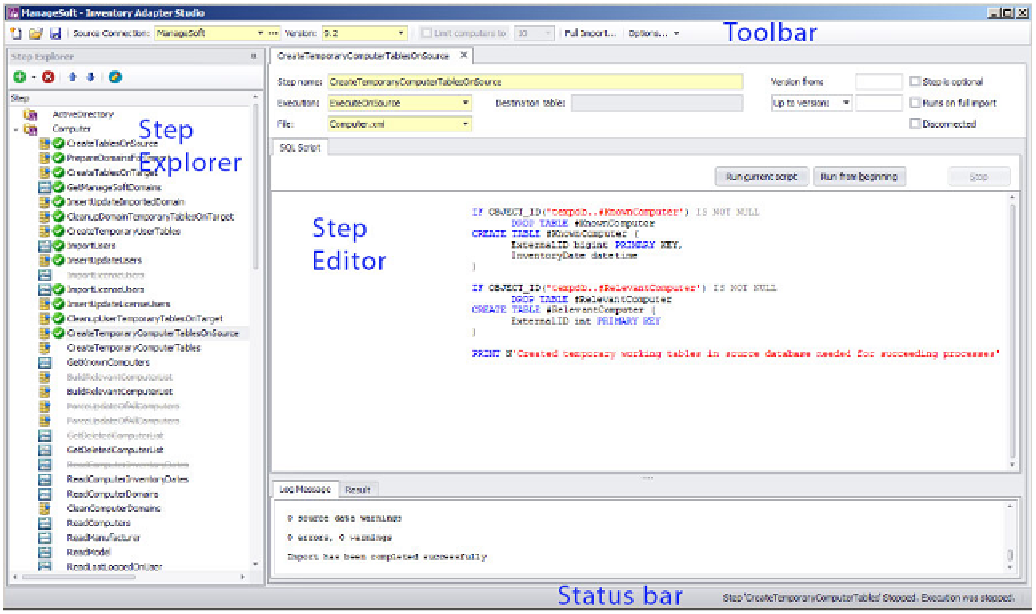
Restrictions

Several inventory adapters are supplied as standard with FlexNet Manager Suite (these are sometimes referred to as "Tier 1" adapters). These are installed on your central server, and are automatically downloaded to inventory beacons as required. This means:

- You cannot modify Tier 1 inventory adapters on an inventory beacon.
- You cannot store anything else in the same folder on the inventory beacon used to store Tier 1 adapters distributed by the central server. Changes are always removed automatically within a short time, keeping the distributed adapters safe and in line with the latest versions stored on the central server.
- You can, however, modify inventory adapters (using the Inventory Adapter Studio) on your central application server. These then become your latest version and are automatically distributed to your inventory beacons.
- You can install your custom inventory adapters into `%CommonAppData%\Flexera Software\Compliance\ImportProcedures\CustomInventory` on your batch server. As with Tier 1 adapters, adapters in this folder are automatically distributed to (and can be exercised on) all your inventory beacons.
- You can also create custom inventory adapters on inventory beacons, using the Inventory Adapter Studio and the object adapter model described in the following topics. These are stored separately, and are not overwritten by downloads from the central server. This also means that a custom inventory adapter is by nature restricted to the inventory beacon on which it is created. However, if you need the identical adapter operating from multiple inventory beacons, you can manually copy the adapter between beacons, always using the same file path (`%CommonAppData%\Flexera Software\Compliance\ImportProcedures\ObjectAdapters`).

The Inventory Adapter Studio Interface

The Inventory Adapter Studio has the following key areas in its interface:



Source Connection: ManageSoft

Version: 9.2

□ Limit computers to 30

Step name: CreateTemporaryComputerTablesOnSource

Execution: ExecuteOnSource

Destination table:

File: Computer.xml

Version from:

Up to version:

□ Step is optional

□ Runs on full import

□ Disconnected

```
IF OBJECT_ID('tempdb..#KnownComputer') IS NOT NULL
        DROP TABLE #KnownComputer
CREATE TABLE #KnownComputer (
        ExternalID bigint PRIMARY KEY,
        InventoryDate datetime
)

IF OBJECT_ID('tempdb..#RelevantComputer') IS NOT NULL
        DROP TABLE #RelevantComputer
CREATE TABLE #RelevantComputer (
        ExternalID int PRIMARY KEY
)

PRINT N'Created temporary working tables in source database needed for succeeding processes'
```

```
0 source data warnings
0 errors, 0 warnings
Import has been completed successfully
```

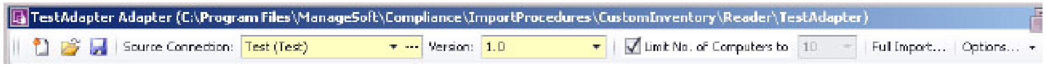
Step 'CreateTemporaryComputerTables' Skipped. Execution was skipped.

Element	Purpose
Toolbar	• Creates new adapters or open existing ones. • Manages database connections. • Saves changes. • Specifies the database connection to work on. • Specifies the data size limits to apply when testing.
Step Explorer	Shows the steps in the currently open adapter. These open the edit panels on the right. • Import execution status will show as icons in this element. • Bold steps in the templates show where user customization is required; other steps have been completed by Flexera Software. • Steps may be added, deleted or have their execution order changed using the toolbar in the step explorer.
Step editor	Shows: • The name of the step and its settings. • The script in the step, with a Run button for testing. • The logs, showing import results. • The Result panel, which shows datasets from your SQL queries.
Status bar	Shows import progress.

Each section is discussed in more detail in the following topics.

Toolbar

The toolbar contains the following controls:


TestAdapter Adapter (C:\Program Files\ManageSoft\Compliance\ImportProcedures\CustomInventory\Reader\TestAdapter)
Source Connection:
Test (Test)
Version:
1.0
☑ Limit No. of Computers to
10
Full Import...
Options...

New button

A button that launches the **Create New Adapter** dialog.

Open button

A button that launches the **Open Existing Adapter** dialog. This allows browsing of all custom and factory-supplied adapters.

Save button

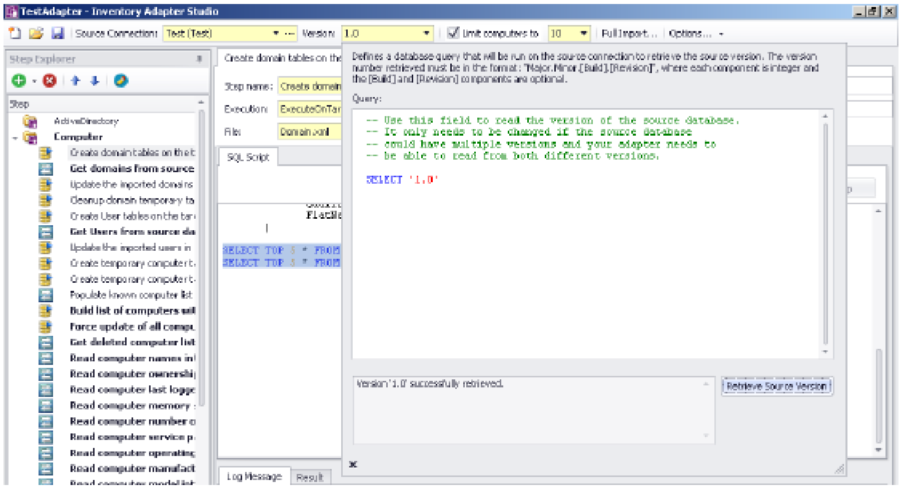
The Save button saves all files in the adapter that is being edited. This includes changes due to steps being moved in the Step Explorer, or versions being changed in the Version field on the toolbar.

Source Connection control

The drop-down portion of this control allows selection of an existing database connection. New connections can be created and existing connections may be edited using the '…' button, which launches the **Select Source Connection** dialog.

Version control

This control shows the version of the currently selected source connection. This version is evaluated by executing a query against the source database. Clicking the drop-down button displays a dialog that allows you to change this query for an adapter. Clicking the **Retrieve Source Version** button will execute the query and show the results in the dialog.



Defines a database query that will be run on the source connection to retrieve the source version. The version number retrieved must be in the format: "Major.Minor.[Build].[Revision]", where each component is integer and the [Build] and [Revision] components are optional.

```
-- Use this field to read the version of the source database.
-- It only needs to be changed if the source database
-- could have multiple versions and your adapter needs to
-- be able to read from both different versions.

SELECT '1.0'
```

Version '1.0' successfully retrieved.

Use of this control is particularly important if your adapter supports importing inventory data from multiple versions of the same system. This usually occurs as enterprises upgrade systems over time.

Limit Number of Computers control

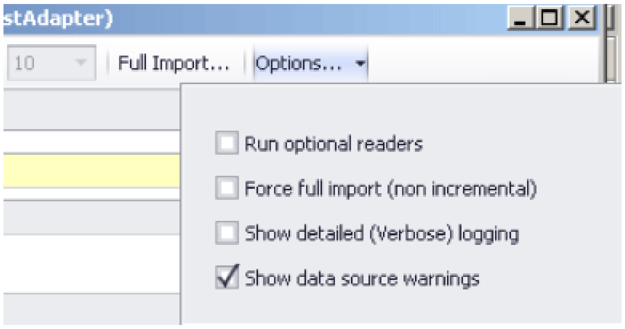
This control is checked and enabled by default for test connections. When set to a value, it limits the number of computers read by an adapter.

Full Import button

This button launches the **Full Import** dialog, which allows you to execute your adapter end to end and check your results in FlexNet Manager Suite.

Options

There are several options that apply to the Run buttons on the Edit panel. These control the way the Compliance Importer executes your adapter and correspond to command line arguments.



□ Run optional readers
□ Force full import (non incremental)
□ Show detailed (Verbose) logging
☑ Show data source warnings

Options include:

- **Run optional readers**: the next run command will exercise steps marked with the **Step is optional** attribute.
- **Force full import**: the next run command includes steps marked with the **Runs on full import** attribute.

Tip: *When the attribute values prevent the execution of the step in the next run, it is greyed out with a strike-through in the step explorer.*

Step Explorer

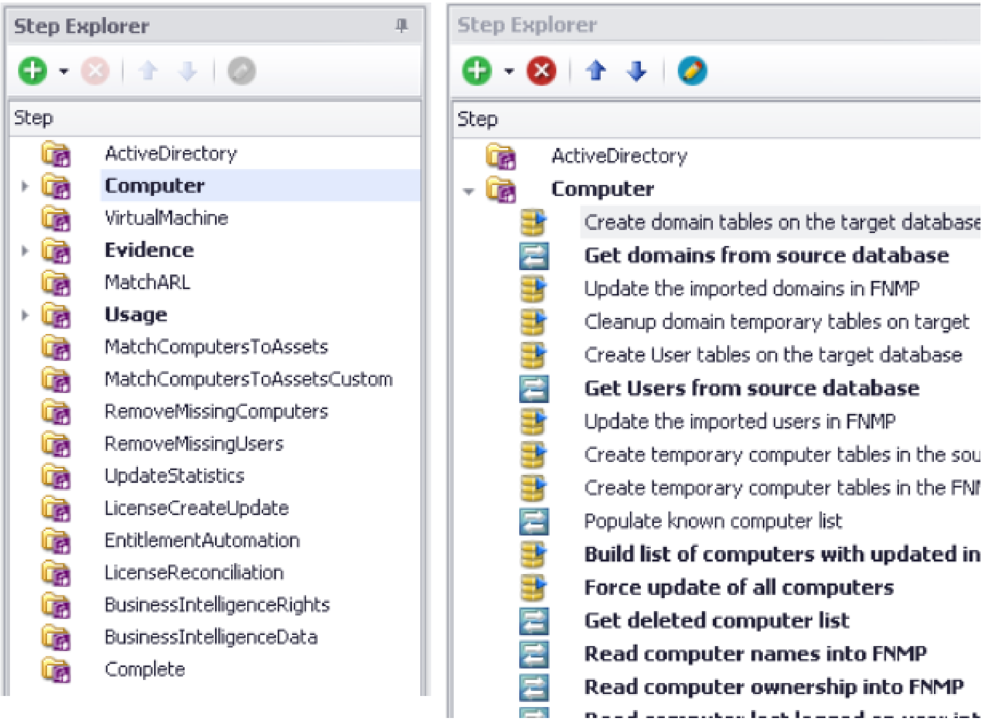
The step explorer shows the procedures in the Compliance Importer, and the steps within those procedures that will be executed for the current adapter.

The step explorer is a docking control and may be moved within the Adapter Studio interface. It also has a column that shows the file a step is being saved to.

Expanding one of the top level procedures shows all the steps within it.

Bold steps and procedures are parts of the template requiring your customization. There are queries in that part of the template that need to be replaced with code that applies to your data source.

Figure 3: Collapsed (left) and expanded, with bold steps requiring customization. Custom SQL and data transfer steps visible.



Step Explorer

Step

- ActiveDirectory
- **Computer**
- VirtualMachine
- **Evidence**
- MatchARL
- **Usage**
- MatchComputersToAssets
- MatchComputersToAssetsCustom
- RemoveMissingComputers
- RemoveMissingUsers
- UpdateStatistics
- LicenseCreateUpdate
- EntitlementAutomation
- LicenseReconciliation
- BusinessIntelligenceRights
- BusinessIntelligenceData
- Complete

Step Explorer

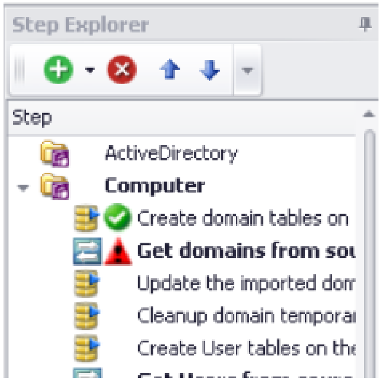
Step

- ActiveDirectory
- **Computer**
  - Create domain tables on the target database
  - **Get domains from source database**
  - Update the imported domains in FNMP
  - Cleanup domain temporary tables on target
  - Create User tables on the target database
  - **Get Users from source database**
  - Update the imported users in FNMP
  - Create temporary computer tables in the sou
  - Create temporary computer tables in the FNI
  - Populate known computer list
  - **Build list of computers with updated in**
  - **Force update of all computers**
  - **Get deleted computer list**
  - **Read computer names into FNMP**
  - **Read computer ownership into FNMP**

The toolbar allows steps to be added, removed, edited and to change their execution order. There are two types of steps that may be added:

- Custom SQL steps have a yellow database icon and run commands on the source or target database.
- Data transfer steps have a blue icon with white arrows, and copy data from one database to another using a bulk transfer.

When testing an adapter, the step explorer also shows the status of the current run with green and red icons.

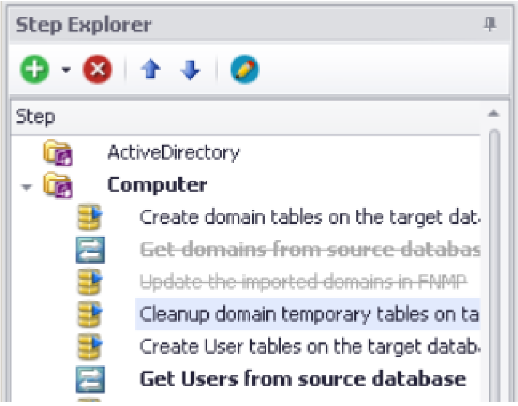


Step Explorer

Step

- ActiveDirectory
- **Computer**
  - ✓ Create domain tables on
  - ▲ **Get domains from sou**
  - Update the imported dom
  - Cleanup domain temporai
  - Create User tables on the

When the attribute values of a step will prevent it being executed for the version of the current connection, it will be greyed out with a strike-through in the step explorer.



ActiveDirectory

Computer

Create domain tables on the target dat

~~Get domains from source databas~~

~~Update the imported domains in FNMP~~

Cleanup domain temporary tables on ta

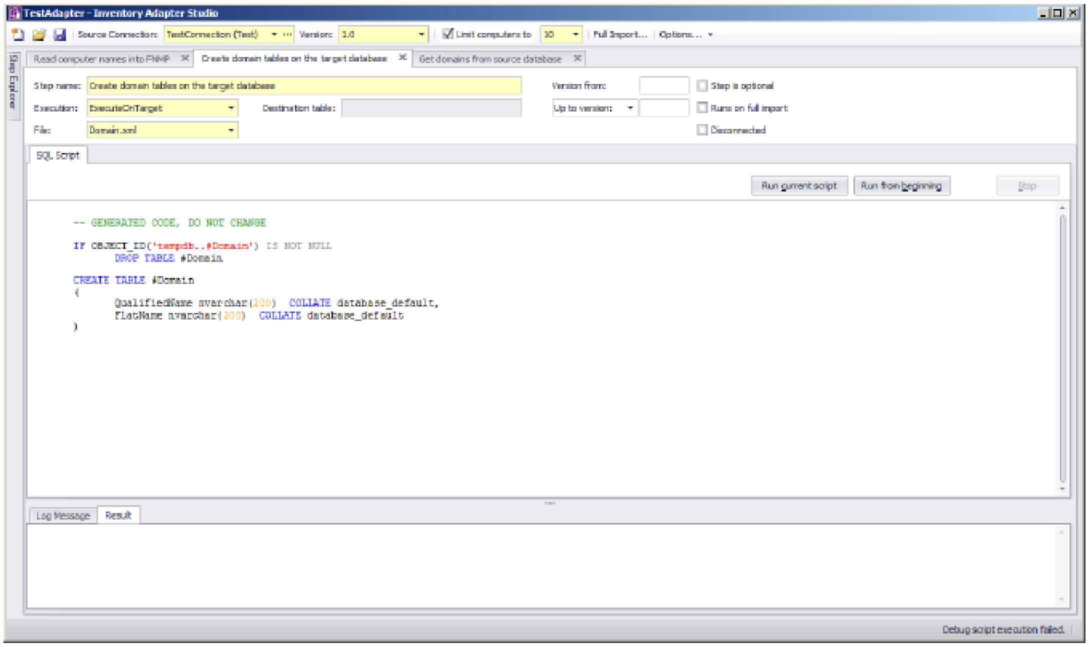
Create User tables on the target datab

Get Users from source database

Edit panel

The edit panel consists of three main areas:

- A properties section
- An SQL script
- A log message and result panel.


TestAdapter - Inventory Adapter Studio
Step Explorer
Read computer names into FNMP
Create domain tables on the target database
Get domains from source database
SQL Script
Run current script
Run from beginning
Stop
Log Message
Result

Source Connection: TestConnection (Test)

Version: 1.0

☑ Limit computers to 10

Full Import...

Options...

Step name: Create domain tables on the target database

Execution: ExecuteOnTarget

Destination table:

File: Domain.xml

Version from:

Up to version:

□ Step is optional

□ Runs on full import

□ Disconnected

```
-- GENERATED CODE, DO NOT CHANGE

IF OBJECT_ID('tempdb..#Domain') IS NOT NULL
        DROP TABLE #Domain

CREATE TABLE #Domain
(
        QualifiedName nvarchar(200)  COLLATE database_default,
        FlatName nvarchar(200)  COLLATE database_default
)
```

Debug script execution failed.

Properties section

Step name

This is the name of the step, and is shown on the step explorer as well as the top of the edit panel tab. It is best to choose a descriptive name to simplify future maintenance.

Execution

Possible values for custom steps are:

Value	Supported modes	Step type	Notes
`ExecuteOnSource`	*Connected, disconnected, split*	Custom SQL	The SQL script will run on the source database.
`ExecuteOnTarget`	Connected, split	Custom SQL	The SQL script will run on the FlexNet Manager Suite database.
`GetVariableFromSource`	Connected, disconnected, split	Custom SQL	Allows you to declare, and get a value for, a custom SQL variable populated from the source database. This variable and its value are automatically in scope and available for all subsequent steps in this inventory adapter, alongside the standard variable `ComplianceConnectionID`.
`SourceToObject`	Disconnected	Data Transfer	The SQL script reads from the source database, and writes approved data directly to an intermediate package saved on the inventory beacon. A separate process uploads this intermediate package to the application server, where another scheduled process imports the data into the operations database. `SourceToObject` steps may only write to the predefined objects displayed in the Inventory Adapter Studio.
`SourceToTarget`	Connected, split	Data Transfer	The SQL script runs on the source database, transferring resulting data to the central operations database. The destination table in the operations database must be identified in the next field.
`TargetToSource`	Connected, split	Data Transfer	The SQL script will run on the central operations database, transferring resulting data to the source database. The destination table in the source database must be identified in the next field. A typical use is to populate a temporary table on the source database with the current state of inventory in the central store. This allows decentralized processing (on the source database server) to produce differential inventory for upload.

Destination table

This field only applies to data transfer steps in adapters running in connected or split modes. It specifies the database table into which the results of the SQL query will be bulk copied. The table data types must exactly match the columns of the query, and columns must be in the correct order. The provided templates contain data conversions and string trimming as well as the correct ordering to make this task as easy as possible.

File

This is the file name where the step is saved. In the templates it is specified for you, and has little impact on the execution of the adapter.

Step is optional

An optional step will not be executed by default when the Compliance Importer is run. The only example of this in the factory-supplied adapters is when file information that does not match the Application Recognition Library is returned. Use this when the data returned by the step is not needed for critical tasks.

Runs on full import

By default, adapters perform differential imports and only update computer records that have changed since the last import. The `#RelevantComputers` temporary table in the templates implements this feature. This flag is set for steps that are designed to override this functionality. The provided templates have one step with this option set, and causes all computers to be updated instead of the differential import.

Version from

This is the first version field, and it causes the step to only execute when the **Version** field in the toolbar equals the specified value or higher. The version format must be in the 1.2.3.4 form.

Up to version/Before version

This is the second version field, and it causes the step to only execute when the **Version** field in the toolbar is less than the specified value (less than or equal in the case of **Up to Version**). The version format must be in the 1.2.3.4 form.

SQL Script section

Run current script

This button executes the script for the current step. The SQL is executed and any result sets is displayed in the **Result** tab. You may execute multiple queries and return multiple result sets. You may execute parts of the script by selecting them before using the button.

Different step types execute on the following databases by default: for details, see the **Execution** field in the *Properties section* above.

There is a right-click menu available in the script edit panel that allows you to specify execution of the script on a different database.

Run from beginning

This button executes the adapter from the beginning up to the current step. Once the current step is reached, execution is terminated, but the database connections are left open so you can run queries to inspect database values as desired. The results will be in the **Log Message** tab.

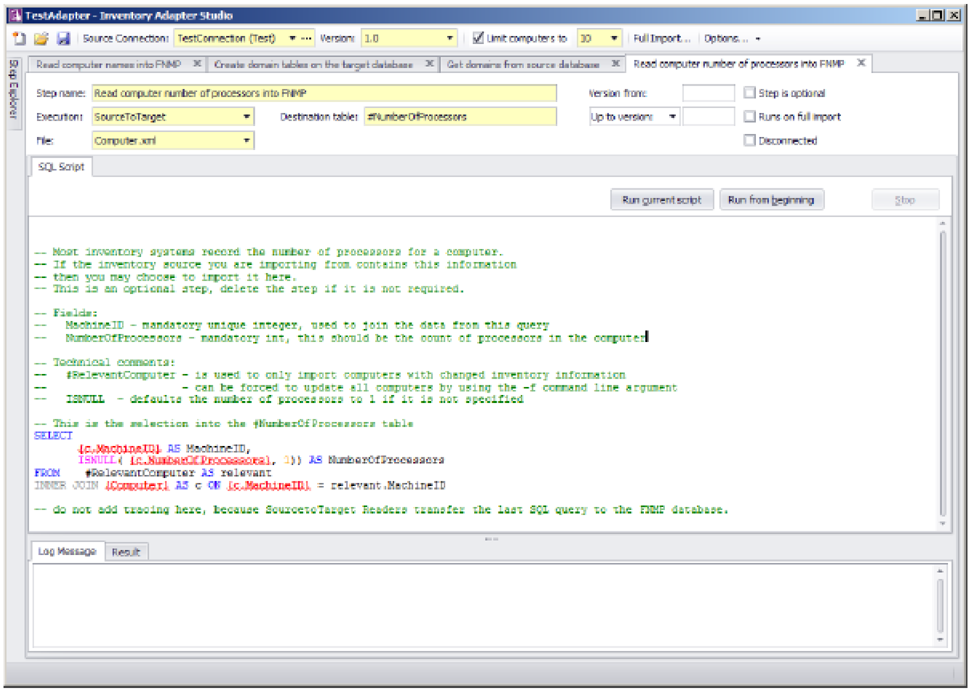
Stop

This button stops an adapter that is in the process of running.

SQL Script

This area contains the SQL scripts that make up the adapter. They are used for gathering data and transferring it to the FlexNet Manager Suite database. The template adapter provided performs all the differential updates required to move the data into the final FlexNet Manager Suite tables. This script tab provides SQL syntax highlighting, and a special red underlined highlight that shows where you need to modify queries with your own data values.

Figure 4: Red underlined text should be replaced with your own database column and table names.


TestAdapter - Inventory Adapter Studio
Read computer names into FNMP
Create domain tables on the target database
Get domains from source database
Read computer number of processors into FNMP
Step Explorer
SQL Script
Run current script
Run from beginning
Stop
Log Message
Result

Source Connection: TestConnection (Test)
Version: 1.0
☑ Limit computers to 10
Full Import ...
Options ...

Step name: Read computer number of processors into FNMP
Execution: SourceToTarget
Destination table: #NumberOfProcessors
File: Computer.xml
Version from:
Up to version:
□ Step is optional
□ Runs on full import
□ Disconnected

```
-- Most inventory systems record the number of processors for a computer.
-- If the inventory source you are importing from contains this information
-- then you may choose to import it here.
-- This is an optional step, delete the step if it is not required.

-- Fields:
--   MachineID - mandatory unique integer, used to join the data from this query
--   NumberOfProcessors - mandatory int, this should be the count of processors in the computer

-- Technical comments:
--   #RelevantComputer - is used to only import computers with changed inventory information
--                     - can be forced to update all computers by using the -f command line argument
--   ISNULL  - defaults the number of processors to 1 if it is not specified

-- This is the selection into the #NumberOfProcessors table
SELECT
      [c.MachineID] AS MachineID,
      ISNULL( [c.NumberOfProcessors], 1)) AS NumberOfProcessors
FROM    #RelevantComputer AS relevant
INNER JOIN [Computer] AS c ON [c.MachineID] = relevant.MachineID

-- do not add tracing here, because SourcetoTarget Readers transfer the last SQL query to the FNMP database.
```

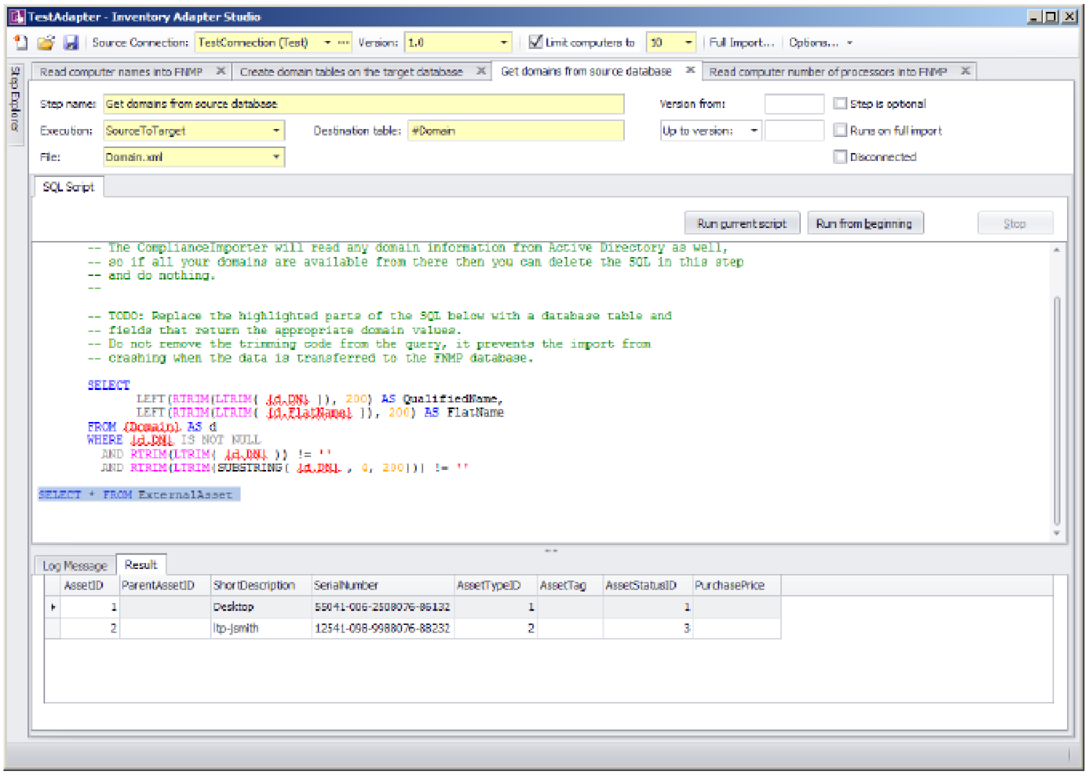
Log Message and Result panel

Log Message

The log message tab shows the results of executing the adapter. This is the same as the command line logging from the Compliance Importer. Look here for error messages. You can get more detail by setting the verbose tracing option on the toolbar.

Result

This shows the results of highlighting a query in the SQL Script and pressing the **Run Current Script** button. Multiple results sets can be displayed.



TestAdapter - Inventory Adapter Studio
Step Explorer
Read computer names into FNMP
Create domain tables on the target database
Get domains from source database
Read computer number of processors into FNMP
Full Import...
Options...
SQL Script
Run current script
Run from beginning
Stop
Log Message
Result

Source Connection: TestConnection (Test)

Version: 1.0

☑ Limit computers to 10

Step name: Get domains from source database

Execution: SourceToTarget

Destination table: #Domain

File: Domain.xml

Version from:

Up to version:

□ Step is optional

□ Runs on full import

□ Disconnected

```
      -- The ComplianceImporter will read any domain information from Active Directory as well,
      -- so if all your domains are available from there then you can delete the SQL in this step
      -- and do nothing.
      --

      -- TODO: Replace the highlighted parts of the SQL below with a database table and
      -- fields that return the appropriate domain values.
      -- Do not remove the trimming code from the query, it prevents the import from
      -- crashing when the data is transferred to the FNMP database.

      SELECT
             LEFT(RTRIM(LTRIM( {d.DN} )), 200) AS QualifiedName,
             LEFT(RTRIM(LTRIM( {d.FlatName} )), 200) AS FlatName
      FROM {Domain} AS d
      WHERE {d.DN} IS NOT NULL
        AND RTRIM(LTRIM( {d.DN} )) != ''
        AND RTRIM(LTRIM(SUBSTRING( {d.DN} , 0, 200))) != ''

SELECT * FROM ExternalAsset
```

AssetID	ParentAssetID	ShortDescription	SerialNumber	AssetTypeID	AssetTag	AssetStatusID	PurchasePrice
1		Desktop	55041-006-2508076-86132	1		1	
2		ltp-jsmith	12541-098-9988076-88232	2		3	

Installing Inventory Adapter Studio

For installation on the application server, download the installer `Inventory Adapter Studio` *`releaseNumber`*`.zip` from https://flexerasoftware.flexnetoperations.com. You require an account name and password for this site, which were originally sent to your enterprise as part of the order confirmation process.

Run the installer on a computer with FlexNet Manager Suite already installed. The Inventory Adapter Studio looks up the installation directory, and installs itself in the installation folder of FlexNet Manager Suite.

On your inventory beacon, no separate installation is required. Inventory Adapter Studio is installed as part of the installation process for the inventory beacon.

The Inventory Adapter Studio executable: `InventoryAdapterStudio.exe`
Default location (beacon): `C:\Program Files (x86)\Flexera Software\Inventory Beacon\DotNet\bin`
Default location (application server): `C:\Program Files (x86)\Flexera Software\FlexNet Manager Platform\DotNet\bin`
Template file storage: `C:\ProgramData\Flexera Software\Compliance\ImportProcedures\`, followed by:

- `AdapterStudioTemplates` for templates downloaded from the central application server
- `CustomInventory` for the template file for custom adapters in an on-premise installation where you have access to both the source and target databases simultaneously
- `Inventory` for standard adapters supplied with the product. These implement standard integration with other products.

- `ObjectAdapters`, with a subfolder `Reader` for adapters customized on an inventory beacon to run in disconnected mode.

Starting Inventory Adapter Studio

After installation, you can find a shortcut to Inventory Adapter Studio in the Windows Start menu (**All Programs** > **Flexera Software** > **Inventory Adapter Studio**).

Understanding Inventory Adapters

Inventory adapters exist to extract data from one database (the inventory source), transform it as required, and write it into the destination (or target) database.

To understand the work in creating or modifying an adapter, it is helpful to know a little about:

- The Compliance Importer, considered as the framework which runs adapters
- The resulting structural requirements for an inventory adapter
- What is provided in templates to help you quickly build inventory adapters
- The object model (legal database objects and their properties) for saving content into the destination database when your inventory adapter is running on your inventory beacon in disconnected mode (see Inventory Adapter Object Model).

The Architecture of Compliance Importer

Compliance Importer is the framework within which inventory adapters function, and therefore dictates the requirements for each adapter.

The Compliance Importer is the software that executes inventory adapters to import data into FlexNet Manager Suite. It is a generic data import framework, but specific procedures are provided to import inventory data from source databases.

Once data is imported, it is matched to existing information in FlexNet Manager Suite, the Application Recognition Library is applied, and license compliance is calculated.

The overall model of the Compliance Importer is as follows:

- A set of procedures is defined for the import process. Procedures are grouped by their purposes as Readers, Writers and Export procedures.
- Tables are defined as intermediate storage and workspace for data used by each procedure. In most cases these staging tables are shipped as part of the FlexNet Manager Suite database schema.
- The main purpose of readers is to read data from a source database, and use it to populate the staging tables in the operations database. To fulfil that function, readers in *connected mode* may also load data into the source database to be used as context in their queries. This contextual information should use temporary database tables so that there is no permanent change to the source database. When operating in disconnected mode on an inventory beacon, the readers work in two stages: writing the gathered data to an

intermediate package on the inventory beacon for later upload to the central application server; and subsequently loading the intermediate package data into the staging tables.

- Readers may also perform operations on data in the FlexNet Manager Suite or source database, usually to prepare data before returning results.
- Writers update the operations database, using the data in the staging tables to determine the changes to make.
- The Export step extracts data from the FlexNet Manager Suite database into a data warehouse for presentation in reports that track changes over time.

Understanding the function of the Reader procedures is especially important to preparing inventory adapters.

Structure of an Inventory Adapter

Each inventory adapter is a set of reader instructions for the compliance importer. The permitted structure depends on the origin and operational mode for this adapter.

Each adapter runs in one of (up to) three modes:

- "Connected mode", where the adapter has simultaneous access to both the source and target databases (for example, when the source database is accessible from the server running the operations database for FlexNet Manager Suite).

  Note: *For security reasons, connected mode is not available when you are using FlexNet Manager Suite as a cloud service.*

- "Disconnected mode", where you need to install an inventory beacon, either because the source database and target database are on separate networks, or because you are using FlexNet Manager Suite as a cloud service. For more information see Disconnected Mode.
- "Disconnected mode (Tier 1)", where the same operational conditions apply with the adapter running on an inventory beacon, but because the adapter is factory-supplied, security provisions take a different form, discussed below.

The operations that are available when creating a custom adapter depend on the mode in which it runs.

Note: *Adapters engineered by Flexera Software and provided as standard functionality (sometimes called Tier 1 adapters) may include operations of all types. However, when working on an inventory beacon, you must not edit any Tier 1 adapters. For security reasons, a modified Tier 1 adapter in disconnected mode is automatically failed, and cannot import any inventory. In contrast, when you edit on your central application server, you may customize Tier 1 adapters, as you then take responsibility for your own security arrangements.*

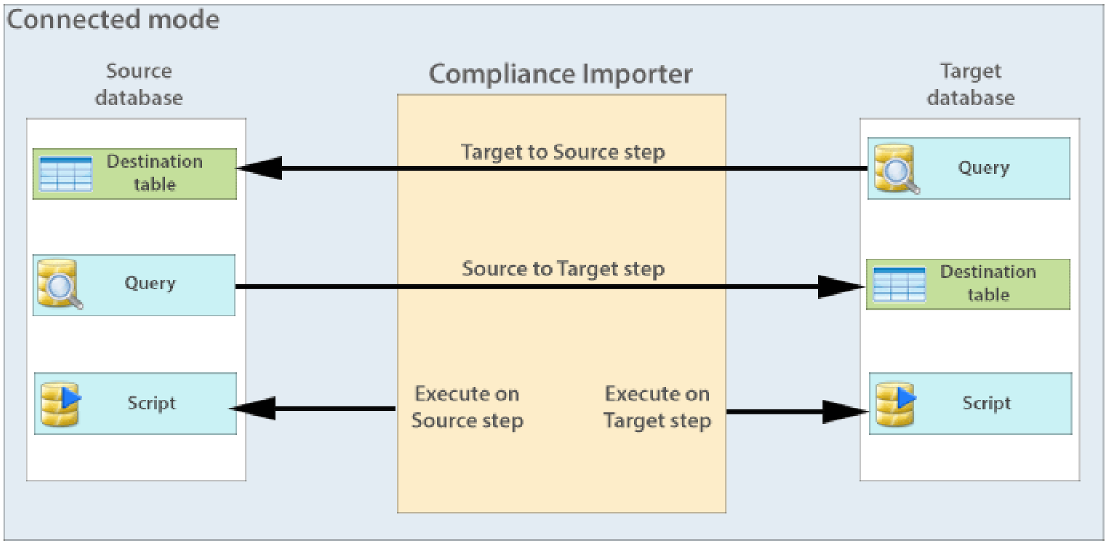
Table 7: Availability of all adapter operation types

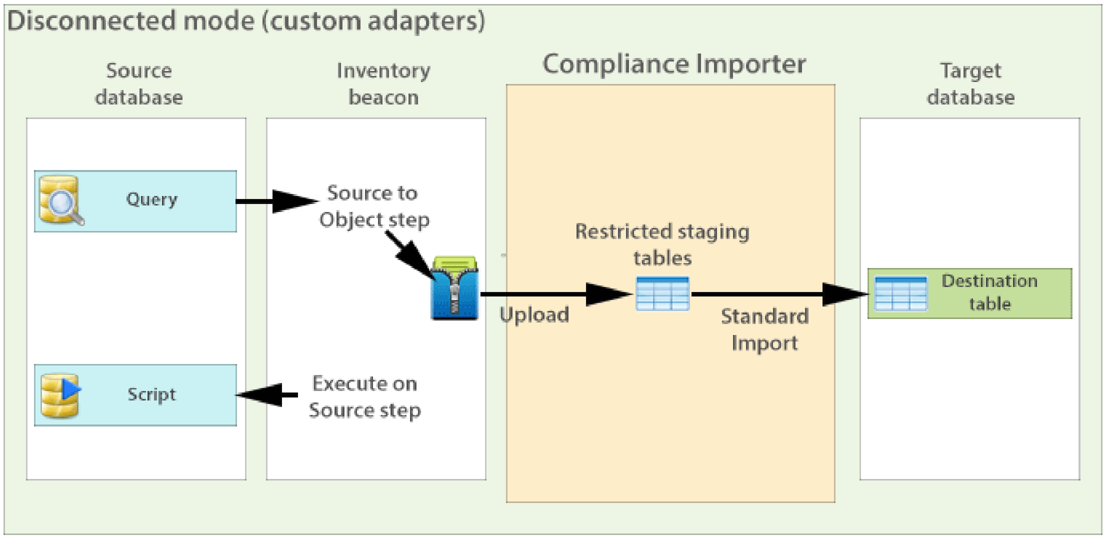
Type of operation	Description	Available in modes
Target to source	Executes a database query on the FlexNet Manager Suite database and copies the result to a table in the source database. This data is to provide context for a subsequent query on the source database.	Connected
Source to target	Executes a database query on the source database and copies the result to a table in the FlexNet Manager Suite database. 🚫 ***Restriction:*** *For fast transfers, the Compliance Importer uses SQL bulk copy operations to move data from one database to another. This means that the query on the source and the table on the target must match exactly in column order and data type.* For disconnected (tier 1) operations, a source to target step is modified so that data is saved to intermediate packages before upload.	Connected Disconnected (Tier 1)
Source to object	Replaces 'source to target' for use in disconnected mode with custom adapters. Instead of writing source data directly to the target database, it is written into an intermediate package format and saved on the inventory beacon. The intermediate packages are uploaded asynchronously to the cloud server, and processed (by default overnight) for import into the operations database. 🚫 ***Restriction:*** *Since you cannot modify the internal processing, the data in the intermediate packages must map correctly to a standard set of objects and their attributes (see Inventory Adapter Object Model).*	Disconnected
Execute on source	Executes an SQL script on the source database.	Connected Disconnected (switchable for disconnected *only*) Disconnected (Tier 1)
Execute on target	Executes an SQL script on the FlexNet Manager Suite database.	Connected Disconnected (Tier 1)

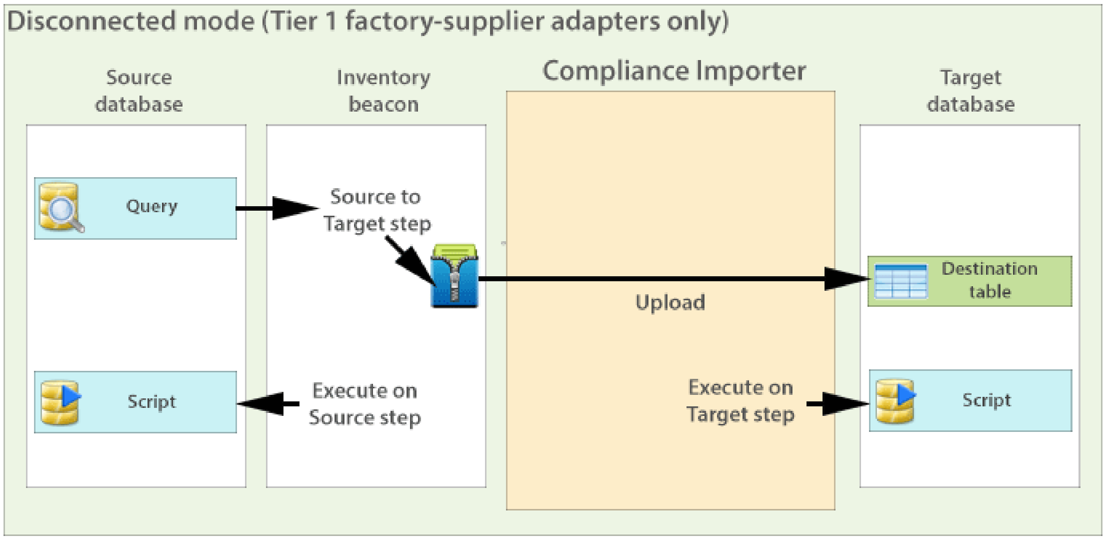
The three architectures are shown in the diagrams below. From a security perspective, the distinction between the modes is:

- Connected mode applies only for on-premises installations where the security of both databases is entirely in your control.

- Disconnected mode for custom adapters protects the central operations database in the cloud service by disallowing any custom SQL on the target side. This also limits the permissible imports to the standard set of objects and attributes available in the Inventory Adapter Studio running on an inventory beacon. You can also find an XML file defining those objects and attributes on your inventory beacon at `C:\ProgramData\Flexera Software\Compliance\ImportProcedures\ObjectAdapters\InventoryObjectModel.xml`.
- In disconnected mode, Tier 1 (factory-supplied) adapters are able to use factory-approved custom SQL on the target side. Security is provided by disallowing the slightest revision of any kind to these adapters. If you change anything on Tier 1 inventory adapters for disconnected mode, they will not run, and importing your inventory will completely fail.


Connected mode
Source database
Compliance Importer
Target database
Destination table
Target to Source step
Query
Query
Source to Target step
Destination table
Script
Execute on Source step
Execute on Target step
Script


Disconnected mode (custom adapters)
Source database
Inventory beacon
Compliance Importer
Target database
Query
Source to Object step
Restricted staging tables
Upload
Standard Import
Destination table
Script
Execute on Source step


Disconnected mode (Tier 1 factory-supplier adapters only)
Source database
Inventory beacon
Compliance Importer
Target database
Query
Source to Target step
Upload
Destination table
Script
Execute on Source step
Execute on Target step
Script

Structure of Templates for Inventory Adapters

Templates are provided for inventory adapters, to speed your development effort.

The adapter templates shipped with the Inventory Adapter Studio use the adapter structure as follows:

- Temporary database tables are set up on the source and FlexNet Manager Suite databases.
- Sample queries are written in Source to Target steps. These write to the temporary tables already created.
- To make each query as easy to write as possible, the minimum number of columns is sent in each query. This also documents the minimum requirements for importing the inventory source.
- Areas of the query that require change are enclosed with curly brackets, colored red, and underlined: {Replace this text}
- As many of the other steps as possible are already completed. They rely on the fact that data has been transferred in the Source to Target steps.

Each step in the templates has comments describing the updates that need to occur. Optional fields are identified, and the adapter will still work if the optional fields are not provided.

At the end of each procedure there is a lot of provided code that performs a differential update into the Imported database tables in the FlexNet Manager Suite database. It is recommended that you do not change this code for your adapter. There may be special cases where this is required, but an error will prevent any data from being imported into FlexNet Manager Suite.

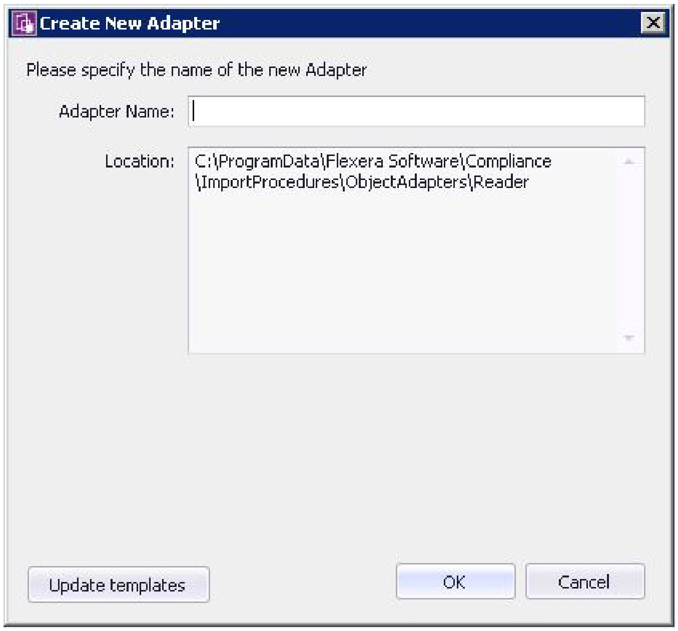
To Create a New Adapter

Use this process to create an adapter from scratch. There is a separate process for editing an existing adapter.

Once completed and published to FlexNet Manager Suite, each adapter may be used to import from multiple databases that have the same structure. In other words, a number of similar connections (to the databases) may reuse the same adapter.

1. Click the New icon in the toolbar.

   The **Create New Adapter** dialog opens.



C:\ProgramData\Flexera Software\Compliance\ImportProcedures\ObjectAdapters\Reader

***Tip:** If the Inventory Adapter Studio cannot locate downloaded templates, it displays a warning message in this dialog. You can download the latest templates using the **Update templates** button (if necessary, first re-establishing your link to the application server in the inventory beacon interface).*

2. Specify the name for your adapter. It is best practice to choose a name similar to the data source you plan to import from.

   You may not change the directory the new adapter is saved in. This is because FlexNet Manager Suite uses specific directories to separate out-of-the-box and custom adapters. For example, if you are creating this adapter on an inventory beacon, the default path is `C:\Program Files\Flexera Software\Compliance\ImportProcedures\ObjectAdapters`.

Your adapter appears, pre-populated with samples for each available object. You may remove the examples you do not need, and complete the ones required for your adapter.

***Tip:** The templates in the new adapter depend on the context in which you are working. For example, if you created this adapter on an inventory beacon, only `Source to Object` steps and `Execute on Source` steps are available.*

After you create a new adapter, you must create a new database connection that matches the type of the adapter.

To Edit an Existing Adapter or Template

You may edit an existing, custom adapter that was created in your enterprise.

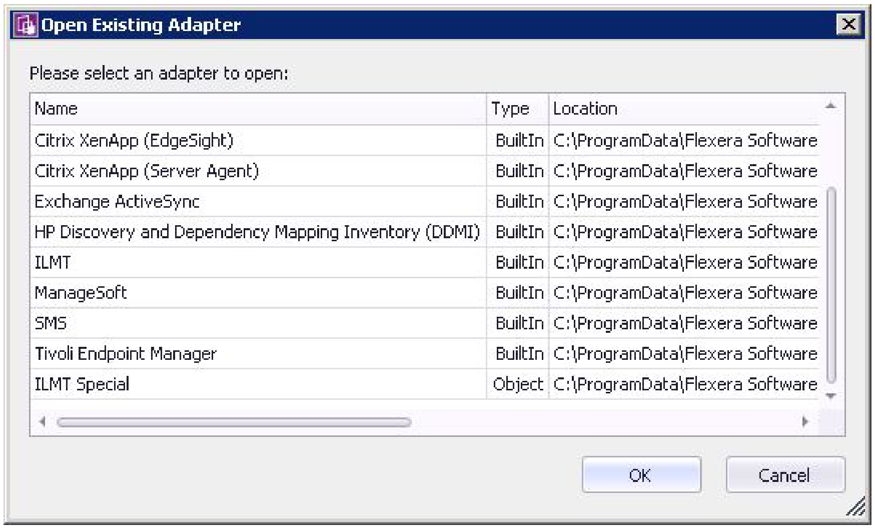
You may edit your custom adapters. In disconnected mode (that is, using the cloud service solution), do not attempt to edit any factory-supplied (Tier 1) adapters. If you edit any part of a Tier 1 adapter, it ceases to operate.

1. Click the Open icon in the toolbar.

The **Open Existing Adapter** dialog appears. The meaning of the **Type** column is as follows:

- Adapters of type `BuiltIn` are factory-supplied adapters that implement standard connectivity. You may read but not edit these adapters on an inventory beacon, but you may add customizations if you edit these on your central application server.
- Adapters you have previously edited on your application server are marked `Custom`. If you are now working on an inventory beacon, these customizations have been automatically replicated from the application server to your inventory beacon.
- Adapters of type `Object` are those which you have previously edited while working on your inventory beacon.

On an inventory beacon, you can only open `Object` adapters, stored (by default) in `C:\Program Files\Flexera Software\Compliance\ImportProcedures\ObjectAdapters`.



Please select an adapter to open:

Name	Type	Location
Citrix XenApp (EdgeSight)	BuiltIn	C:\ProgramData\Flexera Software
Citrix XenApp (Server Agent)	BuiltIn	C:\ProgramData\Flexera Software
Exchange ActiveSync	BuiltIn	C:\ProgramData\Flexera Software
HP Discovery and Dependency Mapping Inventory (DDMI)	BuiltIn	C:\ProgramData\Flexera Software
ILMT	BuiltIn	C:\ProgramData\Flexera Software
ManageSoft	BuiltIn	C:\ProgramData\Flexera Software
SMS	BuiltIn	C:\ProgramData\Flexera Software
Tivoli Endpoint Manager	BuiltIn	C:\ProgramData\Flexera Software
ILMT Special	Object	C:\ProgramData\Flexera Software

2. Select the desired custom adapter from the list, and click **OK**.

   Details of the adapter appear in the **Step Explorer** and edit panel.

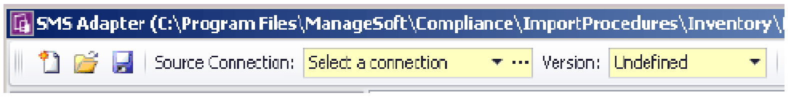
To Create a Source Connection

This process establishes the link between the adapter and the source inventory database. This connection may be used for both reading inventory, and also writing data (if additional context is required for good information gathering).

You must know either the server name or its IP address (together with database instance name, if any) to type in during the following process. (There is no browse facility to find the server.)

This process assumes that you already have the appropriate adapter open in the Step Explorer and edit panel. This process creates a test connection, because new adapters are not ready for production. Test connections are not imported by the Compliance Importer in its normal operations. Data from this connection is imported only after you publish the completed and tested connector.

1. In the toolbar, on right-hand end of the **Source Connection** control, click the [**...**] ellipsis button.

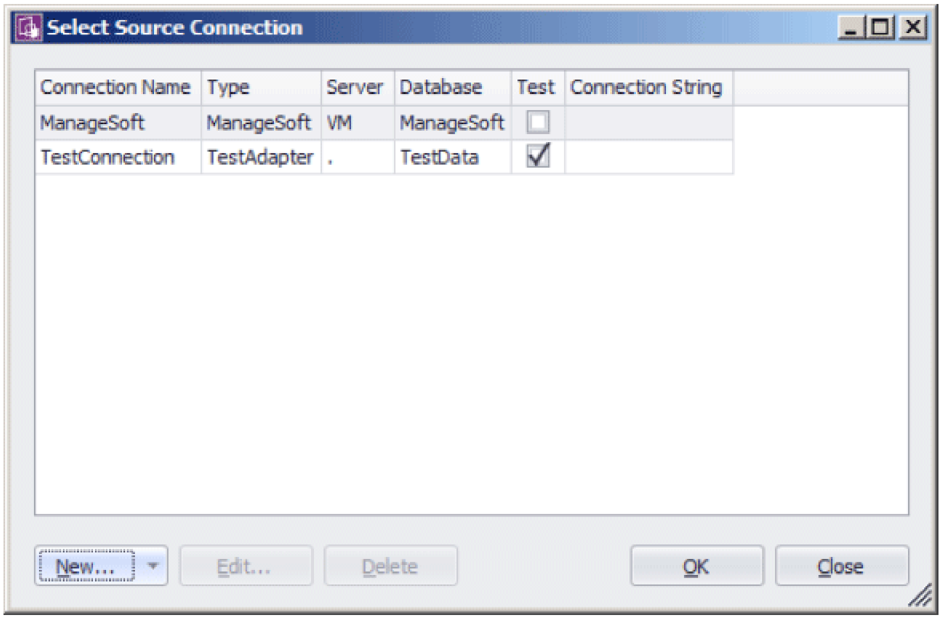


SMS Adapter (C:\Program Files\ManageSoft\Compliance\ImportProcedures\Inventory\

Source Connection: Select a connection

Version: Undefined

The **Select Source Connection** dialog opens.



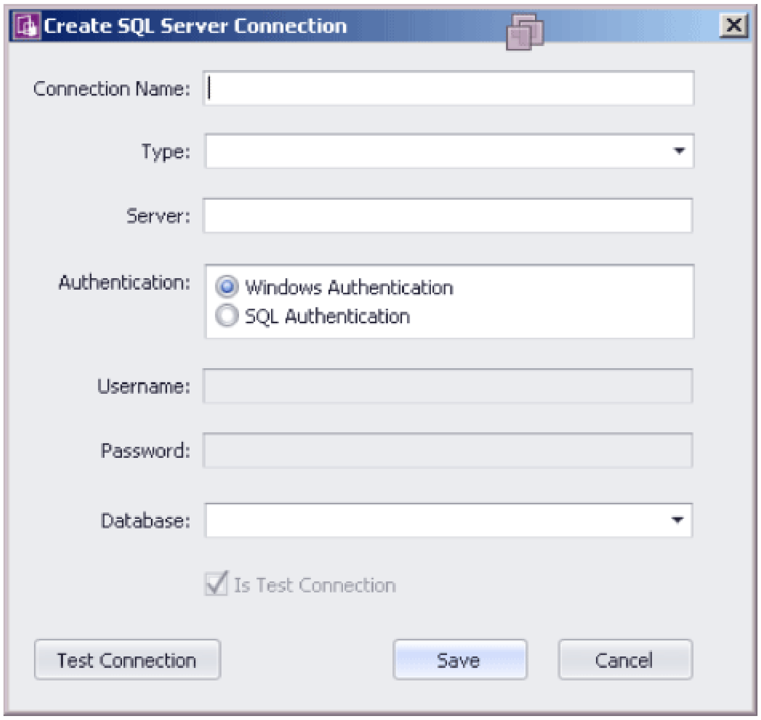
Select Source Connection

Connection Name	Type	Server	Database	Test	Connection String
ManageSoft	ManageSoft	VM	ManageSoft	☐	
TestConnection	TestAdapter	.	TestData	☑	

***Tip:** You must create a new test connection for this adapter. You may not reuse an existing connection for this adapter. (The existing connections are those previous declared on your inventory beacon, and editing or deleting from this dialog affects the connections for your inventory adapter.) Only test connections, those displaying a check mark in the **Test** column, may be created from the Inventory Adapter Studio.*

2. Click **New...**.

   The **Create SQL Server Connection** dialog opens. (If not, see note below.)



3. Complete the details:

   a. Provide a descriptive name in the **Connection Name** field, perhaps referencing the name of the adapter using this connection.

   b. From the **Type** pull-down, select the *name of the adapter* you are editing (or just created). Scroll down the list to find your adapter's name. Every connection must be tightly coupled to an adapter through this **Type** setting.

   c. In the **Server** field, type the server name or IP address. If the server hosts multiple SQL instances, you may append the appropriate instance name after a backslash. For example, with an instance called `Inst1232`, you could enter `10.200.3.102\Inst1232`.

   d. In the **Authentication** field, select the authentication method:

      Windows Authentication — Uses standard Windows authentication to access the server. The credentials of the operator currently logged on will be used to access the SQL Server database. Any operators that require access to the database must be added to the security groups that already have access to the database.

      SQL Authentication — If you select this option, you must then specify an account and password already known to SQL Server. This account’s credentials will be used to access the source database, regardless of the operator or account running the adapter.

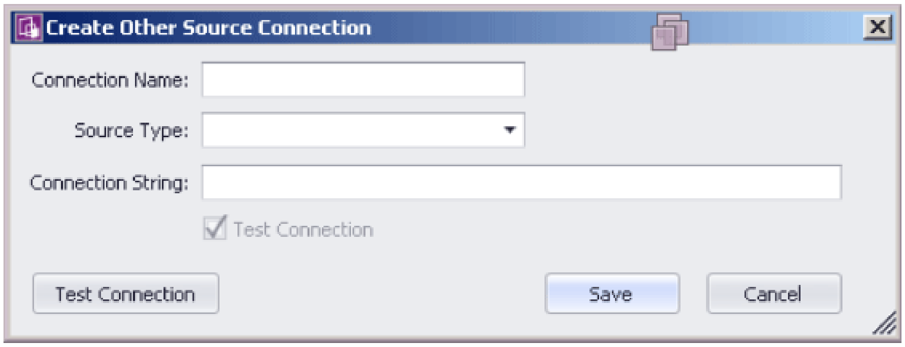
   e. If you selected **SQL Authentication**, complete the **Username** and **Password** fields with the account name and password to be used during SQL authentication.

   f. In the **Database** field, type the name of the database, or use the pull-down list to select from database names automatically detected on your specified server.

   g. Click **Test Connection**. If the compliance server can successfully connect to the nominated database using the server and authentication details supplied, a `Database connection succeeded` message displays. Click **OK** to close the message. Click **Save** to complete the addition of these connection details.

You cannot save the connection details if the connection test fails. If you cannot get the connection test to succeed, click **Cancel** to cancel the addition of these connection details.

***Note:** There is a second type of connection that may be created using the **New...** button on the **Select Source Connection** dialog. This is used for database connections to non-Microsoft databases. The difference is that a full database connection string must be entered manually for this connection.*



Overview: Process for Developing an Inventory Adapter

Here is your mental roadmap through the development process for inventory adapters, with links to the details.

1. Create a new adapter, normally pre-populated with an appropriate set of steps to gather and process data (To Create a New Adapter).
2. Specify a new connection to a data source. Initially this is a test connection during your development phase. (See To Create a Source Connection.)
3. Use the **Step Explorer** to:
   - Add a new step to one of the grouping folders (see Adding a New Step to an Inventory Adapter)
   - Remove any steps provided automatically that are not required in your inventory adapter (see Remove a Step from an Inventory Adapter)
   - Change the execution order of steps within your inventory adapter (see Reorder Steps in an Inventory Adapter)
   - Update the details included within an individual step.

   ***Note:** You cannot add, delete, or reorder folders in the **Step Explorer**. These are optimized for the order of insertion into the operations database. You may only modify or reorder the steps within a given folder.*

4. Test each step in your adapter as you develop it (see Tips for Editing an Adapter and Testing an Adapter). Cycle through until you have created and tested all the steps needed to complete your inventory adapter.
5. Run the entire adapter, and validate that the collected data is as you expect (again, see Tips for Editing an Adapter). On an inventory beacon, validation means unzipping the intermediate package and examining the XML file it contains. Look for your created intermediate package in `C:\Program Data\Flexera Software\Beacon\IntermediateData`.
6. Put the completed and test inventory adapter into production (see To Publish Your Adapter).

Adding a New Step to an Inventory Adapter

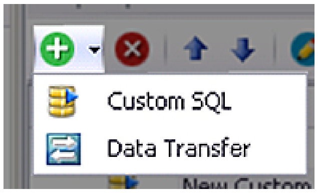
The add icon in the **Step Explorer** allows two broad kinds of additions to the current folder of steps.

You may add customized steps to your inventory adapter, choosing its position in the appropriate folder. (Remember that you cannot edit a factory-supplied inventory adapter on an inventory beacon. To edit a factory-supplier adapter, you must be working on your application server.)

1. In the **Step Explorer**, select one of the following:
   - An empty folder (this has no expander icon to the left of the folder name)
   - In an expanded folder of steps, the current step *after* which you want to insert a new step.

   Tip: *To insert a new step as the first in a folder containing existing steps, insert it as the second step and then move it up the list with the up-arrow icon above the list of steps.*

2. Use the down arrow next to the add icon to expand the choices, and click either:
   - `Custom SQL` to write any SQL scripting that runs on either the source database or your target operations database. Use these steps to massage data within the database, such as scrubbing data into a temporary table within the same database.
   - `Data Transfer` to move data from one database to another. These steps can include custom SQL statements to select the data for transfer.

   The new step appears in the **Step Explorer**, and its details appear in the editing pane on the right, potentially in a new tab (if you are already editing other steps).

3. In the editing pane, change the default value in the **Step name** field to something meaningful that will assist with future maintenance of this adapter.
4. Complete the details of your new step in the editing pane. For more about the fields in the editing pane and the permitted values, see Edit panel.

Remove a Step from an Inventory Adapter

Templates for custom inventory adapters may include sample steps that you don't require.

When planning removal of any steps from your custom inventory adapter, remember to consider the potential impact on subsequent steps. There is no undo available for deleting a step.

1. In the Step Explorer, select the step you want to remove. If this step has previously been operational, review its contents to check for possible flow-on effects from its removal.

   Tip: *Do not select a folder, as you cannot delete the folders. You may remove all the steps contained within a folder if need be; but the folders must remain. The delete icon is disabled when you select a folder.*

2. Click the delete icon (✖) at the top of the **Step Explorer**.

   A confirmation dialog appears. Remember that there is no undo available for this delete action.

3. Click **Yes** to proceed with the removal of the step (or **No** to reconsider).

Reorder Steps in an Inventory Adapter

You can arrange the steps within a folder in any order you prefer.

An inventory adapter executes in the order shown in the Step Explorer, from top to bottom. Therefore to change the execution order of the step in your adapter, simply change the display order.

1. In the **Step Explorer**, select the step you want to move.
2. Use the up and down icons at the top of the **Step Explorer** to move the step within its folder.

   Tip: *You cannot move a step outside the boundaries of its folder; and you cannot reorder the folders themselves.*

Remember to save your changes with the save icon in the toolbar of the Inventory Adapter Studio.

Disconnected Mode

Whenever there is a network discontinuity between the source and target databases, your inventory adapter must function in disconnected mode.

When an inventory adapter runs on your central application server in your FlexNet Manager Suite implementation, it can have free and simultaneous access both to the downstream source database (from which to collect inventory) and to the upstream target database (to which to upload the gathered inventory). If the source database can be directly contacted from the *application server*, there is no need for a disconnected mode. However, there are times when this free access is not available: for example, whenever the source inventory database is on a network separate from the application server.

In these cases, the inventory adapter must be scheduled to execute on an *inventory beacon* in *disconnected mode*.

In practical terms, this means recognizing that certain steps are automatically skipped when the inventory beacon is in disconnected mode, and that alternative steps can be planned to run only in this disconnected mode to ensure that the gathered inventory is still a valid dataset.

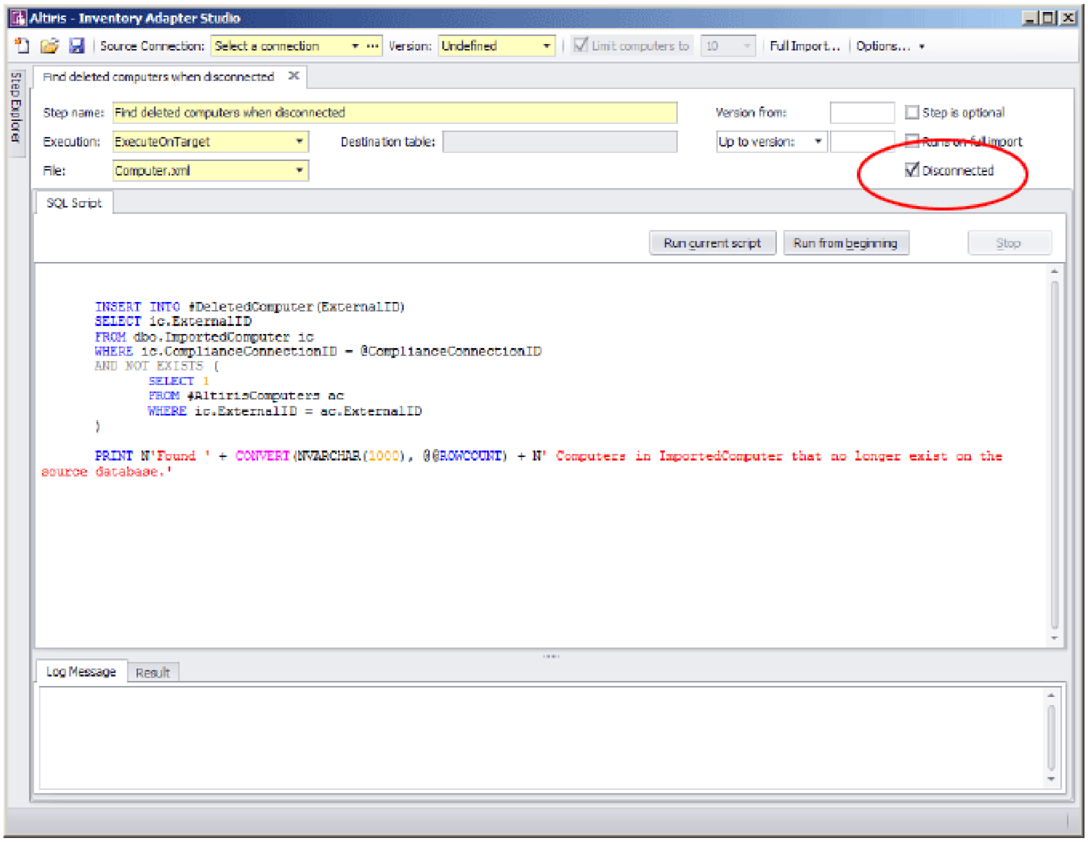
To Select a Step for Connected or Disconnected Modes

Procedural steps in an inventory adapter can be selected to run only in disconnected mode, while others are automatically disallowed in that mode.

All procedural steps of the types `TargetToSource` or `ExecuteOnTarget` are automatically disallowed in disconnected mode (such as when the adapter runs on an inventory beacon). Steps of all other types by default run in both connected and disconnected modes. Use this procedure to flag an individual step to run exclusively in disconnected mode, when it functions as an alternative to disallowed steps.

***Tip:** Only `TargetToSource` and `ExecuteOnTarget` steps are disallowed for disconnected mode. It is not possible to make steps of other types apply exclusively to connected mode. Either they apply in both connected and disconnected modes, or you can use this procedure to limit them to disconnected mode only.*

1. In the Step Explorer, select the step you want to restrict to disconnected mode, so that its details appear in the edit panel.
2. In the properties area at the top of the edit panel, select the **Disconnected** check box.



Source Connection: Select a connection
Version: Undefined
☑ Limit computers to 10

Find deleted computers when disconnected

Step name: Find deleted computers when disconnected
Execution: ExecuteOnTarget
Destination table:
File: Computer.xml
Version from:
Up to version:
□ Step is optional
□ Runs on full import
☑ Disconnected

```
        INSERT INTO #DeletedComputer(ExternalID)
        SELECT ic.ExternalID
        FROM dbo.ImportedComputer ic
        WHERE ic.ComplianceConnectionID = @ComplianceConnectionID
        AND NOT EXISTS (
                SELECT 1
                FROM #AltirisComputers ac
                WHERE ic.ExternalID = ac.ExternalID
        )

        PRINT N'Found ' + CONVERT(NVARCHAR(1000), @@ROWCOUNT) + N' Computers in ImportedComputer that no longer exist on the
source database.'
```

While this check box is selected, this step runs only when the adapter is executed in disconnected mode, such as on an inventory beacon. This setting is irrelevant when the **Execution** property is set to `TargettoSource` or `ExecuteOnTarget`, as all such steps are disabled for disconnected mode.

Why Special Steps Are Required for Disconnected Mode

Some examples help to clarify the reason for, and the workings of, steps that are executed only in disconnected mode.

The basic upload of data from the inventory beacon to the operations database is not disrupted by disconnected mode: the inventory beacon has special services to ensure than gathered inventory is uploaded at appropriate times.

However, there are other common scenarios for inventory adapters that *are* disrupted. Consider this algorithm, designed to optimize data gathering and upload in connected mode by only collecting differential inventory (inventory that has changed since last collection):

Logical step described	Step type
Create a temporary table `#KnownComputer` on the source, to hold IDs of previously inventoried computers and last known updated date.	`ExecuteOnSource`
Send the result of a `SELECT` statement on the target database, listing previously inventoried computer IDs and last known updated date, into the temporary table `#KnownComputer` on the source database.	`TargetToSource`
Source queries join against the temporary table `#KnownComputer` to optimise their returned results.	`ExecuteOnSource`

This works well in connected mode, and only new/changed inventory records are uploaded when this sequence is executed.

However, in disconnected mode, all `TargetToSource` steps are disabled, leaving the `#KnownComputer` temporary table empty. Following steps that attempt joins against the empty table fail, and no inventory is returned.

We therefore need an alternative step, available in disconnected mode only, to prevent the failure and allow reuse of all the other procedure steps so that inventory is returned. In disconnected mode, it is not possible to select content from the target database; but we can take a different action to prevent the temporary table sitting empty.

Logical step described	Step type	Disconnected	Runs in which modes
Create a temporary table `#KnownComputer` on the source, to hold IDs of previously inventoried computers and last known updated date.	`ExecuteOnSource`	Check box clear	Connected/ Disconnected
Send the result of a `SELECT` statement on the target database, listing previously inventoried computer IDs and last known updated date, into the temporary table `#KnownComputer` on the source database.	`TargetToSource`	Check box ignored	Connected only
Enforce full import by filling in `#KnownComputer` with all current IDs in the source system.	`ExecuteOnSource`	Check box set	Disconnected only
Source queries join against the temporary table `#KnownComputer` to optimise their returned results.	`ExecuteOnSource`	Check box clear	Connected/ Disconnected

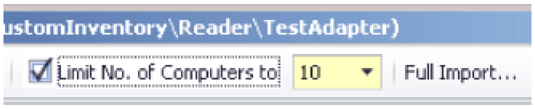
We can see that the single extra step allows us to use the adapter in both connected and disconnected modes. In connected mode, it performs a differential inventory. In disconnected mode where differential inventory is not possible, it substitutes a full inventory.

Tips for Editing an Adapter

The following principles are helpful when you are developing and testing your inventory adapter. If you need information about the fields in the editing pane and the permitted values, see Edit panel.

Minimize processing times

During development, use the setting to limit the number of computers for test imports. This will potentially save hours of processing while testing your adapter. The control applies a filter to the number of computers that the adapter reads from the source database, allowing validation of your work without requiring that all the data is read and processed.



ustomInventory\Reader\TestAdapter)

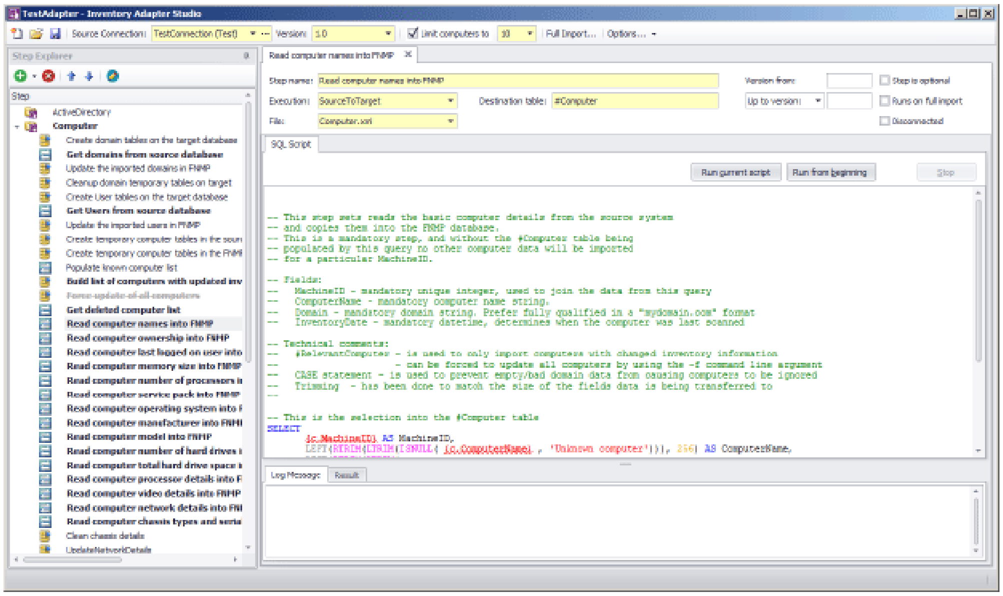
☑ Limit No. of Computers to 10

Start with a template

Start with one of the supplied templates and customize it to suit your data source. Focus on the areas needing change:

- In the Step Explorer, each step that requires editing is shown in bold text. The bold is automatically removed when all areas requiring change have been modified.

- When you have selected a step so that its details are shown in the edit panel, the individual edits required are shown within curly braces, underlined, and in red.
- Every step that needs editing has extensive comments on the data structures and requirements provided in the step details. Following these guidelines will provide the quickest path to a working adapter.



Source Connection: TestConnection (Test)
Version: 1.0
☑ Limit computers to 10

Step:
- ActiveDirectory
- **Computer**
  - Create domain tables on the target database
  - **Get domains from source database**
  - Update the imported domains in FNMP
  - Cleanup domain temporary tables on target
  - Create User tables on the target database
  - **Get Users from source database**
  - Update the imported users in FNMP
  - Create temporary computer tables in the sour
  - Create temporary computer tables in the FNM
  - Populate known computer list
  - **Build list of computers with updated inv**
  - ~~Force-update-of-all-computers~~
  - **Get deleted computer list**
  - **Read computer names into FNMP**
  - **Read computer ownership into FNMP**
  - **Read computer last logged on user into**
  - **Read computer memory size into FNMP**
  - **Read computer number of processors i**
  - **Read computer service pack into FNMP**
  - **Read computer operating system into F**
  - **Read computer manufacturer into FNMI**
  - **Read computer model into FNMP**
  - **Read computer number of hard drives i**
  - **Read computer total hard drive space i**
  - **Read computer processor details into F**
  - **Read computer video details into FNMP**
  - **Read computer network details into FNI**
  - **Read computer chassis types and seria**
  - Clean chassis details
  - UpdateNetworkDetails

Read computer names into FNMP

Step name: Read computer names into FNMP
Execution: SourceToTarget
Destination table: #Computer
File: Computer.xml
Version from:
Up to version:
□ Step is optional
□ Runs on full import
□ Disconnected

SQL Script

```
-- This step sets reads the basic computer details from the source system
-- and copies them into the FNMP database.
-- This is a mandatory step, and without the #Computer table being
-- populated by this query no other computer data will be imported
-- for a particular MachineID.

-- Fields:
--    MachineID - mandatory unique integer, used to join the data from this query
--    ComputerName - mandatory computer name string.
--    Domain - mandatory domain string. Prefer fully qualified in a "mydomain.com" format
--    InventoryDate - mandatory datetime, determines when the computer was last scanned

-- Technical comments:
--    #RelevantComputer - is used to only import computers with changed inventory information
--                      - can be forced to update all computers by using the -f command line argument
--    CASE statement - is used to prevent empty/bad domain data from causing computers to be ignored
--    Trimming  - has been done to match the size of the fields data is being transferred to
--

-- This is the selection into the #Computer table
SELECT
       {c.MachineID} AS MachineID,
       LEFT(RTRIM(LTRIM(ISNULL( {c.ComputerName} , 'Unknown computer'))), 256) AS ComputerName,
```

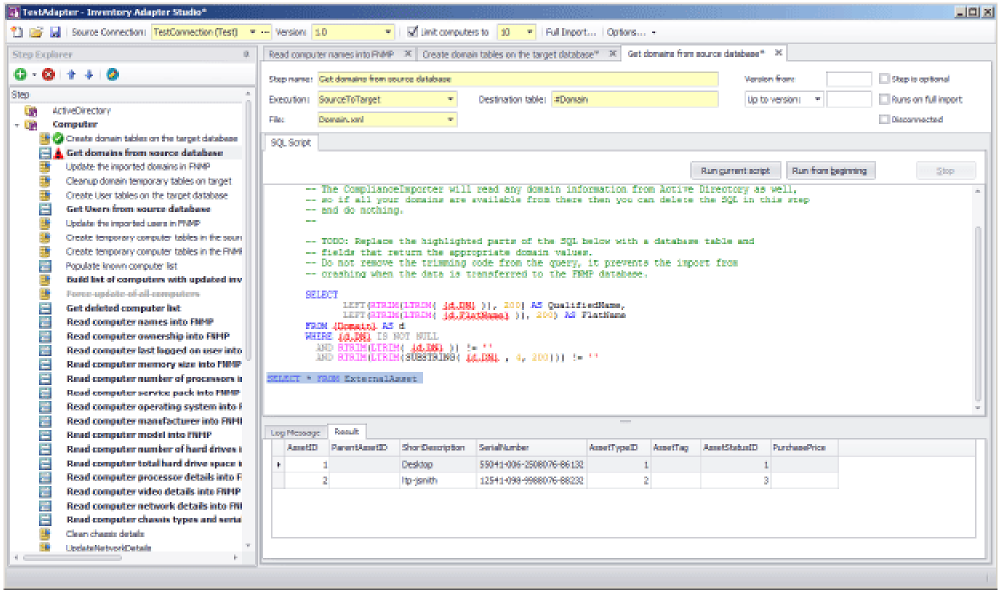
Test each SQL step

As you modify each step, you can test the SQL and inspect the data set it produces, by highlighting the section of your SQL to test, and clicking the **Run current script** button. The result is shown in the **Result** tab below.

Tip: *The* ***Run current script*** *button will run the entire step if there is no selection in the SQL script.*

Note: *If the selection (or, when there is no selection, the step) includes any red, underlined text that still requires customization, this produces a syntax error when run.*

Figure 5: This step still requires customization, but the customizable text is not included in the selection, which can safely be run to inspect the results of the individual statement.



TestAdapter - Inventory Adapter Studio*
Source Connection: TestConnection (Test)
Version: 1.0
☑ Limit computers to 10
Full Import...
Options...
Step Explorer
Step
Read computer names into FNMP
Create domain tables on the target database*
Get domains from source database*
SQL Script
Run current script
Run from beginning
Stop
Log Message
Result

ActiveDirectory
Computer
✓ Create domain tables on the target database
Get domains from source database
Update the imported domains in FNMP
Cleanup domain temporary tables on target
Create User tables on the target database
Get Users from source database
Update the imported users in FNMP
Create temporary computer tables in the sourc
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Populate known computer list
Build list of computers with updated inv
~~Force-update-of-all-computers~~
Get deleted computer list
Read computer names into FNMP
Read computer ownership into FNMP
Read computer last logged on user into
Read computer memory size into FNMP
Read computer number of processors i
Read computer service pack into FNMP
Read computer operating system into F
Read computer manufacturer into FNMI
Read computer model into FNMP
Read computer number of hard drives i
Read computer total hard drive space i
Read computer processor details into F
Read computer video details into FNMP
Read computer network details into FNI
Read computer chassis types and serial
Clean chassis details
UpdateNetworkDetails

Step name: Get domains from source database
Execution: SourceToTarget
Destination table: #Domain
File: Domain.xml
Version from:
Up to version:
□ Step is optional
□ Runs on full import
□ Disconnected

```
-- The ComplianceImporter will read any domain information from Active Directory as well,
-- so if all your domains are available from there then you can delete the SQL in this step
-- and do nothing.
--

-- TODO: Replace the highlighted parts of the SQL below with a database table and
-- fields that return the appropriate domain values.
-- Do not remove the trimming code from the query, it prevents the import from
-- crashing when the data is transferred to the FNMP database.

SELECT
     LEFT(RTRIM(LTRIM( [d.DN] )), 200) AS QualifiedName,
     LEFT(RTRIM(LTRIM( [d.FlatName] )), 200) AS FlatName
FROM [Domain] AS d
WHERE [d.DN] IS NOT NULL
  AND RTRIM(LTRIM( [d.DN] )) != ''
  AND RTRIM(LTRIM(SUBSTRING( [d.DN] , 4, 200))) != ''

SELECT * FROM ExternalAsset
```

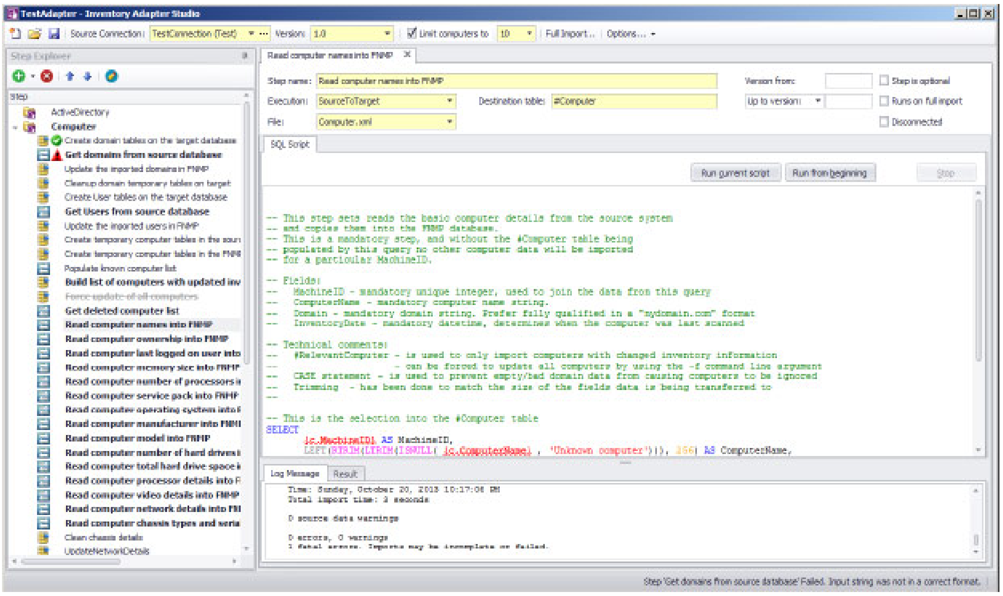
AssetID	ParentAssetID	ShortDescription	SerialNumber	AssetTypeID	AssetTag	AssetStatusID	PurchasePrice
1		Desktop	55041-006-2508076-86132	1		1	
2		hp-jsmith	12541-098-9988076-88232	2		3	

Test progressively

As you complete each step, click the **Run from beginning** button. This executes all the steps in the adapter from the start up to and including the one currently being edited. Errors are shown in the **Log Message** tab. In the Step Explorer, steps which succeed are marked with a check mark (tick) and those that fail show a red warning symbol.

Tip: *The adapter is executed in the appropriate mode. For example, when you are developing the adapter on an inventory beacon, it must run in disconnected mode, meaning that all* `Target to Source` *steps are skipped, and all steps with the* ***Disconnected*** *check box set are exercised.*

Note: *If any steps between the start and your present position are still bold (require editing to customize them), they will produce a syntax error on execution.*


TestAdapter - Inventory Adapter Studio
Step Explorer
Step
ActiveDirectory
Computer
Create domain tables on the target database
Get domains from source database
Update the imported domains in FNMP
Cleanup domain temporary tables on target
Create User tables on the target database
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Populate known computer list
Build list of computers with updated inv
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Read computer total hard drive space i
Read computer processor details into F
Read computer video details into FNMP
Read computer network details into FNI
Read computer chassis types and seria
Clean chassis details
UpdateNetworkDetails
Full Import...
Options...
Read computer names into FNMP
SQL Script
Run current script
Run from beginning
Stop
Log Message
Result

Source Connection: TestConnection (Test)

Version: 1.0

☑ Limit computers to 10

Step name: Read computer names into FNMP

Execution: SourceToTarget

Destination table: #Computer

File: Computer.xml

Version from:

Up to version:

□ Step is optional

□ Runs on full import

□ Disconnected

```
-- This step sets reads the basic computer details from the source system
-- and copies them into the FNMP database.
-- This is a mandatory step, and without the #Computer table being
-- populated by this query no other computer data will be imported
-- for a particular MachineID.

-- Fields:
--   MachineID - mandatory unique integer, used to join the data from this query
--   ComputerName - mandatory computer name string.
--   Domain - mandatory domain string. Prefer fully qualified in a "mydomain.com" format
--   InventoryDate - mandatory datetime, determines when the computer was last scanned

-- Technical comments:
--   #RelevantComputer - is used to only import computers with changed inventory information
--                     - can be forced to update all computers by using the -f command line argument
--   CASE statement - is used to prevent empty/bad domain data from causing computers to be ignored
--   Trimming  - has been done to match the size of the fields data is being transferred to
--

-- This is the selection into the #Computer table
SELECT
      ic.MachineID1 AS MachineID,
      LEFT(RTRIM(LTRIM(ISNULL( ic.ComputerName1 , 'Unknown computer'))), 256) AS ComputerName,
```

```
   Time: Sunday, October 20, 2013 10:17:06 PM
   Total import time: 3 seconds

   0 source data warnings

   0 errors, 0 warnings
   1 fatal errors. Imports may be incomplete or failed.
```

Step 'Get domains from source database' Failed. Input string was not in a correct format.

For repeated testing of an adapter collecting differential inventory, keep in mind that second and subsequent passes will not collect any results until there is a new inventory collected on a later date for some machine(s). In other words, as you continue testing on any given day, you can expect diminishing returns on any differential inventory collections.

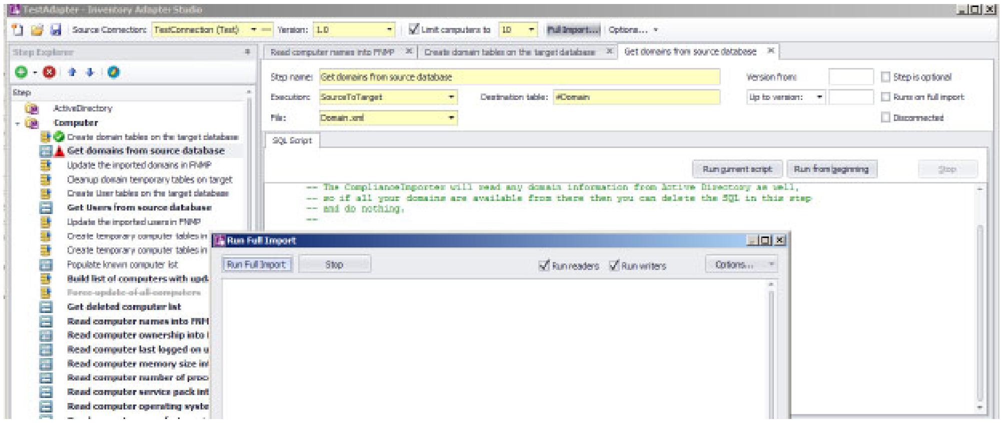
Final test

Finally, when you are ready to run an end-to-end test of your adapter, use the **Full Import** toolbar button.

When you are working on an inventory beacon (*disconnected mode*), in the **Run Full Import** dialog, the **Run readers** check box is set, and the **Run writers** check box is cleared, and both are disabled. This indicates that your full import gathers the data from your source databases to the intermediate package; but that the stage of writing data to the operations database is completely asynchronous, and cannot be controlled from the beacon. As long as the connection for this adapter is in test mode, the inventory data it gathers is never visible in the FlexNet Manager Suite compliance console.

Working on your application server gives you the option of executing the writers as well as the readers in the Compliance Importer. When the writers are run successfully, you can look for imported data in the FlexNet Manager Suite console. (You cannot, however, see the impact on compliance of this latest inventory until the next compliance calculation is run.)

Tip: *While the adapter is marked as a test adapter, only the writers for this individual adapter are run. This provides much faster validation of your work than when you edit a production connector: production connectors require that all writers system-wide are exercised together.*


TestAdapter - Inventory Adapter Studio
Full Import...
Options...
Step Explorer
Step
ActiveDirectory
Computer
Create domain tables on the target database
Get domains from source database
Update the imported domains in FNMP
Cleanup domain temporary tables on target
Create User tables on the target database
Get Users from source database
Update the imported users in FNMP
Create temporary computer tables in
Create temporary computer tables in
Populate known computer list
Build list of computers with upd
~~Force update of all computers~~
Get deleted computer list
Read computer names into FNM
Read computer ownership into
Read computer last logged on u
Read computer memory size in
Read computer number of proc
Read computer service pack inf
Read computer operating syste
Read computer names into FNMP
Create domain tables on the target database
Get domains from source database
SQL Script
Run current script
Run from beginning
Stop
Run Full Import
Run Full Import
Stop
Options...

Source Connection: TestConnection (Test)

Version: 1.0

☑ Limit computers to 10

Step name: Get domains from source database

Execution: SourceToTarget

Destination table: #Domain

File: Domain.xml

Version from:

Up to version:

□ Step is optional

□ Runs on full import

□ Disconnected

```
-- The ComplianceImporter will read any domain information from Active Directory as well,
-- so if all your domains are available from there then you can delete the SQL in this step
-- and do nothing.
--
```

☑ Run readers ☑ Run writers

To Save an Adapter

Nothing unusual about this!

Save early, save often.

1. Your adapter is saved every time you do any one of the following:

   a. Click the Save icon in the toolbar.

   b. Use the `Ctrl-S` keyboard shortcut.

   c. Click the **Run from beginning** button to test the adapter.

      All the files are saved first, because running the adapter uses the Compliance Importer to read the files from disk. Anything not saved is not tested by the **Run from beginning** button.

Testing an Adapter

Completely validating the operation of an inventory adapter requires checking two stages: the reader and the writers.

Once you have finished updating all the steps that require customization in your new adapter (so that nothing is left shown bold in the Step Explorer), it is time to test that it functions correctly. This can proceed in two stages:

- Executing the adapter from the **Run from beginning** button performs the first half of the import, reading data into staging tables in the FlexNet Manager Suite database.
- To validate the second stage, you need to perform a full import.

These two stages are described in the following tasks.

To Run a Full Import

Only a full import causes the Inventory Adapter Studio to work through the entire process for inventory import.

You should attempt a full import only after every step in your adapter has been individually tested. Keep in mind that importing large scale data incorrectly can create a significant workload to back out all the incorrect data! Consider using the **Limit computers to** filter for the early testing, even of the full import process.

1. Inspect the Step Explorer to validate that no step names are displayed in bold text (still awaiting customization).

   If there are bold steps in the Explorer, you cannot run a full import. Instead, circle back and complete the required customization.

2. In the toolbar, click **Full Import...**.

   The **Run Full Import** dialog appears.

3. For a full import, ensure that the **Run readers** and **Run writers** check boxes are both selected.

   Readers collect data from the source database and write it into staging tables in the FlexNet Manager Suite database. Writers massage the data in the staging tables and transfer it into the operations database. You may use these check boxes to test each stage independently when required.

4. Click **Run Full Import** within the dialog.

   The logging from the Compliance Importer is echoed in the dialog.

When the full import is finished, inventory gathered by your adapter has been written into staging tables and (provided that you also ran the writers) into the operations database.

To Diagnose Readers for Your Adapter

Because the inventory adapter is running on your application server, you can inspect the database tables directly to check operation.

Follow this procedure using SQL Server Management Studio on your operations database.

1. Look in the `ComplianceConnection` database table to find the `ComplianceConnectionID` used for your adapter (search for the name you gave your adapter).

   The `ComplianceConnectionID` is used as a key in all the staging tables of imported data.

2. Determine which staging tables you want to examine for imported data. The staging tables populated by the default templates are:

   - `ImportedDomain`
   - `ImportedComputer`
   - `ImportedUser`
   - `ImportedFileEvidence`
   - `ImportedInstalledFileEvidence`

- ImportedInstalledFileEvidenceUsage
- ImportedInstallerEvidence
- ImportedInstalledInstallerEvidence
- ImportedInstalledWMIEvidence.

3. Write SQL queries to check that the data you are importing appears in these tables. For example:

```
SELECT * FROM ImportedComputer WHERE ComplianceConnectionID = [the ID of your
   connection]
```

To Diagnose Writers for Your Adapter

Because your adapter runs on your central compliance server, you can inspect the database directly to see the results of your inventory import. You can combine this with the other techniques described here.

The simplest way to validate that your data is being imported all the way into the operations database is to inspect the results in the web interface.

1. To ensure that the uploaded data is processed from the staging tables into the operations database, do either of the following:
   - Wait until the next scheduled inventory import. By default, the inventory import and recalculation is triggered overnight.
   - Trigger an inventory import/recalculation now. Be aware that this processes all current data, and is not restricted to your new inventory import. As a result, it may take some time (hours, for a large computer estate). Use the following steps:
     a. In your compliance browser, navigate to the **Reconcile** page (**License Compliance** > **Reconcile**).

        🚫 ***Restriction:*** *You must be in a role with administrator rights to be able to include your new inventory import in the reconciliation you run manually.*

     b. Select the **Update inventory for reconciliation** check box.

        This setting ensures that uploaded content is incorporated into the operations database and used for the compliance recalculation. Wait for the import and reconciliation to succeed (monitor the **Last successful reconcile** display on the right of the title bar, refreshing your browser page as necessary).
2. When the reconciliation is complete, examine your imported information, for example in the following locations:
   - The **Discovery & Inventory > All Inventory** page (in the `Inventory` group) shows you all the computers that are being imported, as well as the hardware properties that you have set (remember to check the column chooser). Consider filtering by **Created** date to isolate your new imports.
   - The **Enterprise > All Users** page shows all the users you have imported and the attributes that have been set.

- The **License Compliance > All Evidence** page has separate tabs to show the installation evidence, file evidence, and access evidence (for application virtualization) that was imported.
- The **License Compliance** > **All Applications** page shows all the application installations identified as a result of the evidence import. If your inventory revealed an application for the first time, check for a status of `Unmanaged`.

***Note:** If imported evidence did not match any existing application rules, the application does not show in any application list. It will appear only when the Application Recognition Library is updated with new rules incorporating your new evidence.*

- Usage data is not easily visible in the user interface (usage is displayed on licenses, but for this validation you need to see it on applications as well). The following query will show the applications on computers that have usage data recorded:

```
SELECT st.FullName AS [Application Name],
                        c.ComputerName,
                        d.QualifiedName AS UserDomain,
                        u.SAMAccountName,
                        usage.UsageSessions,
                        usage.UsageActiveTime,
                        usage.LastUsedDate
                        FROM  dbo.InstalledSoftware
                        AS isw
                        JOIN dbo.InstalledSoftwareUsage AS usage
                        ON usage.ComplianceComputerID =
isw.ComplianceComputerID AND usage.SoftwareTitleID = isw.SoftwareTitleID
                        JOIN dbo.SoftwareTitle AS st
                        ON st.SoftwareTitleID = isw.SoftwareTitleID
                        JOIN dbo.ComplianceComputer AS c
                        ON c.ComplianceComputerID = isw.ComplianceComputerID
                        LEFT OUTER JOIN dbo.ComplianceUser AS u
                        ON u.ComplianceUserID = usage.ComplianceUserID
                        LEFT OUTER JOIN dbo.ComplianceDomain AS d
                        ON u.ComplianceDomainID = d.ComplianceDomainID
```

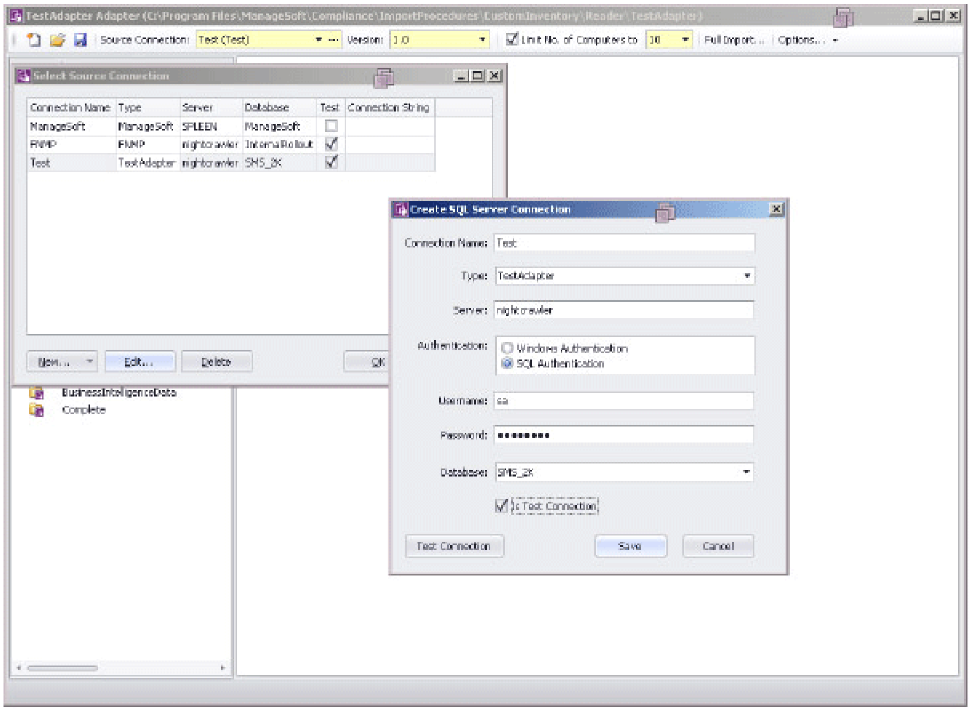
To Publish Your Adapter

Publishing an inventory adapter means taking it out of test mode and putting it into production.

The data uploaded by a published adapter goes into your production database. Be sure you have adequately validated the information gathered by your adapter before taking this step. On an inventory beacon, validation includes unzipping the archive package, saved at `C:\ProgramData\Flexera Software\Beacon\IntermediateData`, and examining the data contained in the XML file. When you are satisfied with the gathered data, you can publish your adapter into production.

1. In the toolbar, on right-hand end of the **Source Connection** control, click the [**...**] ellipsis button.
2. In the **Select Source Connection** dialog, ensure that the correct connection is selected, and click **Edit...**.

3. In the **Create SQL Server Connection** dialog, clear the **Is Test Connection** check box.


TestAdapter Adapter (C:\Program Files\ManageSoft\Compliance\ImportProcedures\CustomInventory\Reader\TestAdapter)
Source Connection:
Version:
☑ Limit No. of Computers to
Full Import...
Options...
Select Source Connection
New...
Edit...
Delete
OK
BusinessIntelligenceData
Complete
Create SQL Server Connection
Test Connection
Save
Cancel

Source Connection: Test (Test)
Version: 1.0
☑ Limit No. of Computers to 10

Connection Name	Type	Server	Database	Test	Connection String
ManageSoft	ManageSoft	SPLEEN	ManageSoft	☐	
FNMP	FNMP	nightcrawler	InternalRollout	☑	
Test	TestAdapter	nightcrawler	SMS_2K	☑	

Connection Name: Test
Type: TestAdapter
Server: nightcrawler
Authentication: ○ Windows Authentication ● SQL Authentication
Username: sa
Password: ●●●●●●●●●
Database: SMS_2K
☑ Is Test Connection

4. Click **Save**.

5. Click **OK**.

   This connection is now visible in the connections dialog on the application server. The Compliance Importer can now use this connection with your adapter for future inventory imports. You declare and choose a schedule for execution of this connection in the inventory beacon user interface.

Inventory Adapter Object Model

A reference for all database objects, and their properties, that can be imported through your inventory beacon in disconnected mode.

Here is a complete list of the database objects (and their permissible attributes) that you may import through a custom inventory adapter that runs on your inventory beacon.

Inventory Object: AccessingDevice

AccessingDevice objects are uploaded to the ImportedAccessingDevice table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedAccessingDevice table holds a record client access device information.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AccessingDeviceID	A numeric reference into a static table. May be null.	Matching accessing device ID. Foreign key to the AccessingDevice table.
ComputerName	Alpha-numeric text (maximum 256 characters). May be null.	Computer name of the client accessing device.
Domain	Alpha-numeric text (maximum 100 characters). May be null.	Domain name of the client accessing device.
ExternalAccessing DeviceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used to identify the device in source connection
IPAddress	An ASCII string of alphanumeric characters and punctuation (length 256 characters). May be null.	IP Address of the client accessing device.
SerialNo	Alpha-numeric text (maximum 100 characters). May be null.	Serial no of the client accessing device.

Inventory Object: AccessingUser

AccessingUser objects are uploaded to the ImportedAccessingUser table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedAccessingUser table holds a record of the user access infomarion.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AccessingUserID	A numeric reference into a static table. May be null.	The matchihng AccessingUser ID. Foreign key to the AccessingUser table.
DomainName	Alpha-numeric text (maximum 100 characters). May be null.	Domain name of the accessing user.

Property	Attributes	Notes
`ExternalAccessing UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The accessing user id. This is part of the key.
`SAMAccountName`	Alpha-numeric text (maximum 64 characters). May be null.	SAM account name of the accessing user.
`UserName`	Alpha-numeric text (maximum 256 characters).	User name of the accessing user.

Inventory Object: ActiveDirectoryComputer

`ActiveDirectoryComputer` objects are uploaded to the `ImportedActiveDirectoryComputer` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedActiveDirectoryComputer` table stores the incoming active directory data for computers.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ComputerName`	Alpha-numeric text (maximum 64 characters).	The name of the computer. In Windows, this is the NetBIOS name of the local computer, as returned by `GetComputerName()`. For UNIX, it is the host name of the machine, as returned by `gethostname(2)`.
`DomainName`	Alpha-numeric text (maximum 100 characters).	The domain name for the computer.
`GUID`	A universally unique identifier. Mandatory. Database key.	The GUID of the computer.
`SID`	Alpha-numeric text (maximum 256 characters). May be null.	The SID of the computer.

Inventory Object: ActiveDirectoryDomain

ActiveDirectoryDomain objects are uploaded to the ImportedActiveDirectoryDomain table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedActiveDirectoryDomain table stores the incoming active directory domains for a connection source.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
DomainFQDN	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The fully qualified name domain name of the AD domain
FlatName	Alpha-numeric text (maximum 32 characters).	The AD domain flat name
LastADImportTime	Date/time field.	The last time the AD data was imported

Inventory Object: ActiveDirectoryExternalMember

ActiveDirectoryExternalMember objects are uploaded to the ImportedActiveDirectoryExternalMember table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedActiveDirectoryExternalMember table stores the incoming active directory data for external AD member objects.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
ParentGroupGUID	A universally unique identifier. Mandatory. Database key.	The parent AD group GUID.
SID	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The SID of the member object.

Inventory Object: ActiveDirectoryGroup

`ActiveDirectoryGroup` objects are uploaded to the `ImportedActiveDirectoryGroup` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedActiveDirectoryGroup` table stores the incoming active directory data for a connection source.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`DomainName`	Alpha-numeric text (maximum 100 characters).	The domain name for the user.
`GUID`	A universally unique identifier. Mandatory. Database key.	The GUID of the AD group.
`Name`	Alpha-numeric text (maximum 128 characters). May be null.	The AD group name
`SID`	Alpha-numeric text (maximum 256 characters). May be null.	The SID of the AD group.

Inventory Object: ActiveDirectoryMember

`ActiveDirectoryMember` objects are uploaded to the `ImportedActiveDirectoryMember` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedActiveDirectoryMember` table stores the incoming active directory data for AD member objects.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`GUID`	A universally unique identifier. Mandatory. Database key.	The GUID of the member object.
`ParentGroupGUID`	A universally unique identifier. Mandatory. Database key.	The parent AD group GUID.

Inventory Object: ActiveDirectoryUser

`ActiveDirectoryUser` objects are uploaded to the `ImportedActiveDirectoryUser` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedActiveDirectoryUser` table stores the incoming active directory data for users.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`DomainName`	Alpha-numeric text (maximum 100 characters).	The domain name for the user.
`GUID`	A universally unique identifier. Mandatory. Database key.	The GUID of the user.
`SAMAccountName`	Alpha-numeric text (maximum 20 characters).	The user name.
`Sid`	Alpha-numeric text (maximum 256 characters). May be null.	The Sid for the user.

Inventory Object: ActiveSyncDevice

`ActiveSyncDevice` objects are uploaded to the `ImportedActiveSyncDevice` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedActiveSyncDevice` table stores details of ActiveSync partnerships. A partnership is a user/device pair, so there may be multiple rows for one device.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ActiveSyncID`	Alpha-numeric text (maximum 512 characters). Mandatory. Database key.	The EASIdentity presented by the source, a combination of the AD user and the unique device ID. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`DeviceID`	Alpha-numeric text (maximum 100 characters). May be null.	The unique device identifier.
`DeviceModel`	Alpha-numeric text (maximum 100 characters). May be null.	The device model.
`DeviceOS`	Alpha-numeric text (maximum 100 characters). May be null.	The device operating system.
`DeviceType`	Alpha-numeric text (maximum 50 characters). May be null.	The device type.
`DeviceUserAgent`	Alpha-numeric text (maximum 100 characters). May be null.	The device user agent; an ActiveSync client-specific value that may identify the device type.
`Domain`	Alpha-numeric text (maximum 100 characters). May be null.	The domain of the device. This may be a flat name or FQDN.
`EmailAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The user's primary email address.
`ExchangeServer`	Alpha-numeric text (maximum 256 characters). May be null.	The source exchange server for this information.
`IMEI`	Alpha-numeric text (maximum 256 characters). May be null.	IMEI (International Mobile Equipment Identity) is a 15- or 17-digit code that uniquely identifies mobile phone sets. Leave blank (null) for other device types.

Property	Attributes	Notes
LastSuccessSync	Date/time field. May be null.	The last successful sync time for this partnership, in UTC.
LastSyncAttemptTime	Date/time field. May be null.	The last attempted sync time for this partnership, in UTC.
PhoneNumber	Alpha-numeric text (maximum 128 characters). May be null.	The phone number of the device. Used for mobile devices.
UserDisplayName	Alpha-numeric text (maximum 256 characters). May be null.	The AD user display name.
WhenCreatedUTC	Date/time field. May be null.	The date/time this partnership was created, in UTC.

Inventory Object: ClientAccessEvidence

ClientAccessEvidence objects are uploaded to the ImportedClientAccessEvidence table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedClientAccessEvidence table holds all of the client access evidence which has been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
Edition	Alpha-numeric text (maximum 50 characters). May be null.	The edition of the installed product.
ExternalAccessEvidenceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier of the client access evidence.
ProductName	Alpha-numeric text (maximum 256 characters). May be null.	The name of the product being accessed by user or computer. This may include version and edition too.
UALRoleGUID	A universally unique identifier. May be null.	The UAL role GUID of the product being accessed by user or computer. This is used when retrive data using UAL
UALRoleName	Alpha-numeric text (maximum 256 characters). May be null.	The UAL role name of the product being accessed by user or computer. This is used when retrive data using UAL.

Property	Attributes	Notes
`Version`	Alpha-numeric text (maximum 72 characters). May be null.	The version of the installed product.

Inventory Object: ClientAccessEvidenceMapping

`ClientAccessEvidenceMapping` objects are uploaded to the `ImportedClientAccessEvidenceMapping` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedClientAccessEvidenceMapping` is the mapping table for imported access evidence and access evidence

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessEvidenceID`	A numeric reference into a static table. Mandatory. Database key.	Access evidend id. Foreign key to `AccessEvidence` table.
`ExternalAccessEvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	External Access evidend id. Foreign key to `ImportedClientAccessedAccessEvidence` table.

Inventory Object: ClientAccessedAccessEvidence

`ClientAccessedAccessEvidence` objects are uploaded to the `ImportedClientAccessedAccessEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedClientAccessedAccessEvidence` table holds a record of the installer evidence that has been installed on a computer from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClientAccessSource`	Alpha-numeric text (maximum 100 characters). Default: 'Unknown'. Mandatory. Database key.	Referencing to the client access source type.
`ExternalAccessEvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	Access evidence id .Foreign key to the `ImportedClientAccessEvidence` table.

Property	Attributes	Notes
`ExternalAccessing DeviceID`	Unsigned integer (`bigint`). Mandatory. Database key.	Accessing computer id .Foreign key to the `ImportedAccessingDevice` table ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`ExternalAccessing UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	Accessing userid. Foreign key to the `ImportedAccessingUser` table ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`ExternalServer ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	Server computer id .Foreign key to the `ImportedComputer` table. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`ImportedClient AccessedAccess EvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence.

Inventory Object: ClientAccessedAccessOccurrence

ClientAccessedAccessOccurrence objects are uploaded to the ImportedClientAccessedAccessOccurrence table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedClientAccessedAccessOccurrence table holds the access information of device or user

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AccessCount	Unsigned integer (int). Default: 1.	Number of access frequency for given date
AccessDate	Date/time field. May be null.	The access date.
ImportedClientAccessedAccessEvidenceID	Unsigned integer (bigint). Mandatory. Database key.	Access evidence id. Foreign key to the ImportedClientAccessedAccessEvidence table.
InventoryDate	Date/time field.	Date on which inventory occurance was recorded.
LicenseDate	Date/time field. Mandatory. Database key.	Date which will be used for licensing purpose.

Inventory Object: Cluster

Cluster objects are uploaded to the ImportedCluster table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedCluster table holds all of the clusters which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
ClusterTypeID	A numeric reference into a static table. Default: 1.	The type of cluster.
DPM	Boolean (0 or 1). May be null.	Whether Distributed Power Management (DPM) is enabled
DRS	Boolean (0 or 1). May be null.	Whether Distributed Resource Scheduler (DRS) is enabled

Property	Attributes	Notes
ExternalID	Unsigned integer (bigint). Mandatory. Database key.	The unique identifier for this imported cluster. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
ExternalName	Alpha-numeric text (maximum 256 characters). May be null.	The identifier of the cluster in the external cluster management system.
InventoryAgent	Alpha-numeric text (maximum 64 characters). Default: ''. May be null.	The name of the person or tool that performed the last inventory.
InventoryDate	Date/time field. May be null.	The date the cluster last had inventory reported.
Name	Alpha-numeric text (maximum 256 characters).	The user-visible name of the cluster.
Namespace	Alpha-numeric text (maximum 256 characters). May be null.	The name of the domain/datacenter containing the cluster.

Inventory Object: ClusterGroup

ClusterGroup objects are uploaded to the ImportedClusterGroup table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedClusterGroup table holds all of the group objects defined on clusters which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
ClusterExternalID	Unsigned integer (bigint). Mandatory. Database key.	The unique identifier for the imported cluster.
ClusterID	A numeric reference into a static table. May be null.	The assigned identifier for this cluster group.

Property	Attributes	Notes
`ClusterTypeID`	A numeric reference into a static table. Default: 3.	Foreign key to the `ClusterType` table.
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for this imported cluster group. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`Name`	Alpha-numeric text (maximum 256 characters).	The name of the cluster group.

Inventory Object: ClusterGroupMember

`ClusterGroupMember` objects are uploaded to the `ImportedClusterGroupMember` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedClusterGroupMember` table holds all of the group memberships defined on clusters which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClusterGroupExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for the imported cluster group.

Property	Attributes	Notes
ComputerExternalID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the external computer which is a member of the group. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: ClusterHostAffinityRule

ClusterHostAffinityRule objects are uploaded to the ImportedClusterHostAffinityRule table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedClusterHostAffinityRule table holds all of the host affinity rules for a cluster which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
ClusterExternalID	Unsigned integer (bigint). Mandatory. Database key.	The unique identifier for the imported cluster.
ClusterHostAffinityRuleTypeID	A numeric reference into a static table. Default: 1.	A unique identifier indicating a type of Cluster Host Affinity Rule.
ClusterHostGroupExternalID	Unsigned integer (bigint). Mandatory. Database key.	The unique identifier for the imported cluster host group.
ClusterVMGroupExternalID	Unsigned integer (bigint). Mandatory. Database key.	The unique identifier for the imported cluster VM group.
Name	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The name of the cluster group.

Inventory Object: ClusterNode

`ClusterNode` objects are uploaded to the `ImportedClusterNode` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedClusterNode` table holds all of the cluster nodes which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClusterExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for the imported cluster.
`ClusterNodeTypeID`	A numeric reference into a static table. Default: 1.	Foreign key to the `ClusterNodeType` table.
`ComputerExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the external computer which is a member of the cluster. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: Computer

`Computer` objects are uploaded to the `ImportedComputer` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedComputer` table holds all of the computers which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`CalculatedUser`	Alpha-numeric text (maximum 128 characters). May be null.	The domain/SAMAccountName of the calculated user. Some inventory systems calculate the user who owns a computer. For example, it might be the user who, over the last ten logins, logged in most often.

Property	Attributes	Notes
`ChassisType`	Alpha-numeric text (maximum 128 characters). May be null.	The type of case of the computer. The value must be a (case insensitive) exact match for one of the values shown. Note that some license types use this information to optimize the licensing position, particularly with desktop and laptop computers.
`ComplianceComputerTypeID`	Unsigned integer (`int`). May be null.	If you know that the computer is a virtual machine or VM host, record that data here. If you are unsure, leave this cell empty (NULL): this allows the system to infer the computer type (for example, a computer with VMs linked to it is inferred to be a VM host). If data comes from multiple inventory sources, leaving this value as null also allows the value to be inserted from another source. So, unless there is a very good reason, do not just specify 'Computer', but allow the inference rules to help.
`ComputerName`	Alpha-numeric text (maximum 256 characters). May be null.	The name of the computer. In Windows, this is the NetBIOS name of the local computer, as returned by `GetComputerName()`. For UNIX, it is the host name of the machine, as returned by `gethostname(2)`.
`Domain`	Alpha-numeric text (maximum 100 characters). May be null.	The domain of the computer.
`EmailAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The email address associated with the device. Typically used for mobile devices.
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`FirmwareSerialNumber`	Alpha-numeric text (maximum 100 characters). May be null.	Serial number in the system firmware such as BIOS, EEPROM etc.
`HardwareInventoryDate`	Date/time field. May be null.	The date (and optionally time) when the hardware was last inventoried. For automated/scheduled data uploads through an inventory beacon, make sure that inventory dates are kept current, as they are used to report out-of-date inventory sources. For a one-time upload to the central application server, leave inventory dates empty (null). At each import from the saved file, the import date is used as the inventory date, which prevents the inventory becoming stale. Notice that this value is not available in the web interface.
`HostID`	Alpha-numeric text (maximum 100 characters). May be null.	The HostID hardware property for the server hosting this machine partition (when inventorying a machine partition such as Solaris Zone, AIX lPar, HP-UX nPar/vPar).
`HostIdentifyingNumber`	Alpha-numeric text (maximum 128 characters). May be null.	Virtual hosts may have an identifier that is unique only across that hardware model. It is less unique than the true hardware serial number, for example.
`HostType`	Alpha-numeric text (maximum 128 characters). May be null.	The type of the physical host computer.
`ILMTAgentID`	Unsigned integer (`bigint`). May be null.	The unique ID used by the IBM License Metric Tool (ILMT) inventory agent on this device, if the inventory source is aware of this value. This can be used to track a computer over time and can be used to socialize different inventory sources. Currently the ILMT and ManageSoft inventory adapters report this value.
`IMEI`	Alpha-numeric text (maximum 256 characters). May be null.	IMEI (International Mobile Equipment Identity) is a 15- or 17-digit code that uniquely identifies mobile phone sets. Leave blank (null) for other device types.
`IPAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The IP address of the computer.

Property	Attributes	Notes
`IgnoredDueToLicense`	Boolean (0 or 1). Default: 0.	True if this machine is not imported into compliance computer table due to license limitation
`IncompleteRecord`	Boolean (0 or 1). May be null.	Used to identify records which do not have all information specified. Primarily used for `ManageSoft` source connections where the domain name was not reliably reported.
`InventoryAgent`	Alpha-numeric text (maximum 128 characters).	The name of the person or tool that performed the last inventory. For imported spreadsheets, you may wish to include the name of the person preparing the data, in case there is subsequent follow-up required.
`InventoryDate`	Date/time field. May be null.	The date the computer last had inventory reported.
`IsDuplicate`	Boolean (0 or 1). Default: 0.	Used to identify that imported computer is a duplicate of another, whereby a new computer will not created.
`IsRemoteACLDevice`	Boolean (0 or 1). Default: 0.	Used to determine if the current record is a remote ACL based device.
`LastLoggedOnUser`	Alpha-numeric text (maximum 128 characters). May be null.	The DOMAIN/SAMAccountName of the user last logged onto the computer.
`LastSuccessful InventoryDate`	Date/time field. May be null.	For incremental imports, this represents the inventory date of the computer in the source at the time this record was last successfully imported. If the import procedure has failed, this may be different to the inventory date. At the end of a successful incremental import, this value is updated to match the inventory date. If no value is present in this field, either there has not been a successful import of this computer or the reader for this record is not using an incremental update model.
`LegacySerialNo`	Alpha-numeric text (maximum 100 characters). May be null.	A previous serial number of this computer that can also be used for matching.
`MACAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The MAC address of the computer.

Property	Attributes	Notes
MDScheduleContainsPVUScan	Boolean (0 or 1). Default: 0. May be null.	Does this managed device include an event in its current schedule for running extra IBM PVU hardware scans.
MDScheduleGenerated Date	Date/time field. May be null.	The last time the managed device schedule was regenerated.
MachineID	Alpha-numeric text (maximum 100 characters). May be null.	For AIX, it is the System ID. For HP-UX, it is the Machine/Software ID. It is unset for other platforms.
Manufacturer	Alpha-numeric text (maximum 128 characters). May be null.	The manufacturer of the computer hardware.
MaxClockSpeed	Unsigned integer (int). May be null.	The maximum clock speed of the fastest processor in the computer.
ModelNo	Alpha-numeric text (maximum 128 characters). May be null.	The model number of the computer.
NumberOfCores	Unsigned integer (int). May be null.	The number of cores in the computer.
NumberOfDisplay Adapters	Unsigned integer (int). May be null.	The number of graphics cards in the computer.
NumberOfHardDrives	Unsigned integer (int). May be null.	The number of hard drives in the computer.
NumberOfLogicalProcessors	Unsigned integer (int). May be null.	The number of logical processors in the computer.
NumberOfNetworkCards	Unsigned integer (int). May be null.	The number of network cards in the computer.
NumberOfProcessors	Unsigned integer (int). May be null.	The number of processors in the computer.
NumberOfSockets	Unsigned integer (int). May be null.	The number of sockets in the computer.
OperatingSystem	Alpha-numeric text (maximum 128 characters). May be null.	The operating system of the computer.
PartialNumberOfProcessors	Fractional number (float). May be null.	The fractional processor count available to this computer.

Property	Attributes	Notes
`PhoneNumber`	Alpha-numeric text (maximum 128 characters). May be null.	The phone number of the device. Used for mobile devices.
`ProcessorType`	Alpha-numeric text (maximum 256 characters). May be null.	The type of processor in the computer.
`SerialNo`	Alpha-numeric text (maximum 100 characters). May be null.	The serial number of the computer.
`ServicePack`	Alpha-numeric text (maximum 128 characters). May be null.	The service pack installed for the operating system.
`ServicesInventoryDate`	Date/time field. May be null.	The date when services (for example, Oracle) were last scanned on this computer. For automated/scheduled data uploads through an inventory beacon, make sure that inventory dates are kept current, as they are used to report out-of-date inventory sources. For a one-time upload to the central application server, leave inventory dates empty (null). At each import from the saved file, the import date is used as the inventory date, which prevents the inventory becoming stale.
`TotalDiskSpace`	Unsigned integer (`bigint`). May be null.	The total size of all hard drives in the computer.
`TotalMemory`	Unsigned integer (`bigint`). May be null.	The total RAM in the computer, in bytes.
`UUID`	A universally unique identifier. May be null.	The BIOS UUID of the computer.
`UntrustedSerialNo`	Boolean (0 or 1). Default: 0.	Is this computer known to have a serial number from a data source that should not be trusted.

Inventory Object: ComputerCustomProperty

`ComputerCustomProperty` objects are uploaded to the `ImportedComputerCustomProperty` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedComputerCustomProperty` table is used by the importer to import custom properties for computers.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier, in the source connection, of the computer that this property belongs to.
`PropertyNameID`	Unsigned integer (`int`). Mandatory. Database key.	The identifier for custom property in the `ImportedCustomPropertyName` table.
`PropertyValue`	Alpha-numeric text (maximum 256 characters).	The value of the custom property.

Inventory Object: ConsolidatedAccessEvidence

`ConsolidatedAccessEvidence` objects are uploaded to the `ConsolidatedAccessEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

ConsolidatedAccessEvidence provides a simpler interface to specify client access happening on application installed on server computers. It combines the server computer, and its access evidence details into a single row.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessCount`	Unsigned integer (`int`). Default: 1. May be null.	Number of times the product was accessed on the given access date.
`AccessDate`	Date/time field. Mandatory. Database key.	The access date of the access evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`AccessingDeviceComputerName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	IP Address of the device accessing the product. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`AccessingDeviceDomain`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	Domain name of the device accessing the product. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`AccessingDeviceIPAddress`	An ASCII string of alphanumeric characters and punctuation (length 256 characters). Mandatory. Database key.	IP Address of the accessing device. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`AccessingDevice SerialNo`	Alpha-numeric text (maximum 100 characters). May be null.	Serial number of the device accessing the product.

Property	Attributes	Notes
`AccessingUser`	Alpha-numeric text (maximum 128 characters). Mandatory. Database key.	The DOMAIN/SAMAccountName of the user accessing the product. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ClientAccessSource`	Alpha-numeric text (maximum 100 characters). Default: Manual. May be null.	The source type of the access evidence.
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. It must match the ComputerID from the Computer spreadsheet or the row will be ignored.
`Edition`	Alpha-numeric text (maximum 50 characters). Default: . Mandatory. Database key.	The edition of the software as reported by the access evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`InventoryDate`	Date/time field. Default: getdate(). May be null.	The date (and optionally time) the access evidence record was inventoried.
`ProductName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The product name of the software as reported by the access evidence.

Property	Attributes	Notes
`Version`	Alpha-numeric text (maximum 72 characters). Default: . Mandatory. Database key.	The version of the software as reported by the access evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: ConsolidatedCluster

`ConsolidatedCluster` objects are uploaded to the `ConsolidatedCluster` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The Cluster spreadsheet provides a simple interface for defining server clustering. It is useful when combined with the ClusterGroup and ClusterHostAffinityRule spreadsheets.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClusterID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for this imported cluster. This may be a string or an integer.
`ClusterName`	Alpha-numeric text (maximum 128 characters).	The name of the cluster in the external cluster management system.
`ClusterType`	Alpha-numeric text (maximum 128 characters).	The kind of cluster. The value must be an exact case-insensitive match to one of the permitted values.
`DPM`	Boolean (0 or 1). May be null.	Whether Distributed Power Management (DPM) is enabled on the cluster.
`DRS`	Boolean (0 or 1). May be null.	Whether Distributed Resource Scheduler (DRS) is enabled on the cluster.
`InventoryAgent`	Alpha-numeric text (maximum 64 characters). May be null.	The name of the person or tool that performed the last inventory. For imported spreadsheets, you may wish to include the name of the person preparing the data, in case there is subsequent follow-up required.

Property	Attributes	Notes
`InventoryDate`	Date/time field. May be null.	The date (with optional time) that the cluster last had inventory reported.
`Namespace`	Alpha-numeric text (maximum 256 characters). May be null.	Where the cluster is contained.

Inventory Object: ConsolidatedClusterGroup

`ConsolidatedClusterGroup` objects are uploaded to the `ConsolidatedClusterGroup` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ClusterGroup spreadsheet uses data from the Cluster spreadsheet and defines groups of servers as well as computers that are members of these groups.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClusterGroupID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for this cluster group. This may be a string or an integer.
`ClusterGroupName`	Alpha-numeric text (maximum 128 characters). May be null.	The name of the cluster group. Depending on the value of the ClusterGroupType this will be a group of hosts or virtual machines.
`ClusterGroupType`	Alpha-numeric text (maximum 128 characters).	The kind of cluster included in the group. The value must be an exact case-insensitive match to one of the permitted values.
`ClusterID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for the imported cluster. This may be a string or an integer and must match a value for the ClusterID in the cluster spreadsheet.
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the 'Computer' spreadsheet for a computer which is a member of the group. To identify all the members of the group, repeat as many lines as required in your spreadsheet where the other values in the row are identical, and only the 'ComputerID' value changes. Values in this column must match a ComputerID in the computer spreadsheet or the row will be skipped.

Inventory Object: ConsolidatedClusterHostAffinityRule

`ConsolidatedClusterHostAffinityRule` objects are uploaded to the `ConsolidatedClusterHostAffinityRule` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ClusterHostAffinity spreadsheet defines the groups of virtual machines which may run on groups of host servers.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClusterHostAffinity RuleType`	Alpha-numeric text (maximum 128 characters).	The type of affinity rule. The value must be an exact case-insensitive match to one of the permitted values.
`ClusterHostGroupName`	Unsigned integer (`bigint`). Mandatory. Database key.	The name of the group of hosts that the ClusterVMGroupName virtual machines may run on.
`ClusterID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for the imported cluster, to which this affinity rule applies. This may be a string or an integer and must match a ClusterID from the cluster spreadsheet.
`ClusterVMGroupName`	Unsigned integer (`bigint`). Mandatory. Database key.	The name of the virtual machine group that may run on the ClusterHostGroupName hosts.
`Name`	Alpha-numeric text (maximum 128 characters). May be null.	The name of the cluster host affinity rule.

Inventory Object: ConsolidatedComputer

`ConsolidatedComputer` objects are uploaded to the `ConsolidatedComputer` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

'ConsolidatedComputer' consolidates data for the Computer, VirtualMachine, Domain, User and Cluster objects, providing a simpler way to populate this information. Any spreadsheet row that includes a 'HostComputerID' is making that row a virtual machine, and the import process expects that virtualization data will be provided.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AffinityEnabled	Boolean (0 or 1). Default: 0.	Set this to true (or 1) if this VM has affinity for its current host (so that it is unable to move to different host computers).
BIOSUUID	A universally unique identifier. May be null.	The BIOS UUID of the computer (physical or virtual), as provided by the operating system.
CPUAffinity	Alpha-numeric text (maximum 256 characters). May be null.	Contains a comma-separated list of processor numbers (Host Logical Processors) or ranges for which this virtual machine has affinity. Example: 1,3-5,8
CPUUsage	Unsigned integer (int). May be null.	The maximum CPU usage of the virtual machine (MHz).
CalculatedUser	Alpha-numeric text (maximum 128 characters). May be null.	The domain/SAMAccountName of the calculated user. Some inventory systems calculate the user who owns a computer. For example, it might be the user who, over the last ten logins, logged in most often.
ChassisType	Alpha-numeric text (maximum 128 characters). May be null.	The chassis type of the device.
ClusterID	Unsigned integer (bigint). Mandatory. Database key.	The unique identifier for the cluster containing this computer. This must match the ClusterID used in the Cluster spreadsheet. If both the ClusterID and the ClusterNodeType do not match the data provided in the Cluster spreadsheet then the computer will not be associated with a cluster. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`ClusterNodeType`	Alpha-numeric text (maximum 128 characters). Default: 1. May be null.	The Cluster node type of the computer. Must be a (case insentitive) exact match for one of the values shown. If both the ClusterID and the ClusterNodeType do not match the data provided in the Cluster spreadsheet then the computer will not be associated with a cluster.
`ComplianceComputerType`	Alpha-numeric text (maximum 128 characters). May be null.	If you know that the computer is a virtual machine or VM host, record that data here. If you are unsure, leave this cell empty (NULL): this allows the system to infer the computer type (for example, a computer with VMs linked to it is inferred to be a VM host). If data comes from multiple inventory sources, leaving this value as null also allows the value to be inserted from another source. So, unless there is a very good reason, do not just specify 'Computer', but allow the inference rules to help.
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The unique identifier for a computer (either physical or virtual). This identifier can either be an integer or a string. Keep this consistent across multiple imports: it is used to track the computer over time.
`ComputerName`	Alpha-numeric text (maximum 256 characters).	The name of the computer. In Windows, this is the NetBIOS name of the local computer, as returned by `GetComputerName()`. For UNIX, it is the host name of the machine, as returned by `gethostname(2)`.
`CoreAffinity`	Alpha-numeric text (maximum 256 characters). May be null.	Contains a comma-separated list of core numbers (or ranges) for which this virtual machine has affinity. Cores are numbered sequentially up the sequence of processors. Example: `1,5-8,10`

Property	Attributes	Notes
`DomainFlatName`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The flatname of the domain of the computer. Example: 'mycompany'. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`DomainQualifiedName`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The fully qualified domain name for the computer. Example: 'prod.mycompany.eu'. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`EmailAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The email address associated with the device. Typically used for mobile devices.
`FirmwareSerialNumber`	Alpha-numeric text (maximum 100 characters). May be null.	The Serial number in the system firmware such as BIOS, EEPROM etc.

Property	Attributes	Notes
`HostComputerID`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The ComputerID of the server this virtual machine is hosted on. This may be a string or an integer and must match the ComputerID for another computer in this spreadsheet. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`HostID`	Alpha-numeric text (maximum 100 characters). May be null.	The HostID hardware property for the server hosting this machine partition (when inventorying a machine partition such as Solaris Zone, AIX lPar, HP-UX nPar/vPar).
`HostIdentifyingNumber`	Alpha-numeric text (maximum 128 characters). May be null.	Virtual hosts may have an identifier that is unique only across that hardware model. It is less unique than the true hardware serial number, for example.
`HostType`	Alpha-numeric text (maximum 128 characters). May be null.	The type (similar to model number) of the host, used for matching.
`IMEI`	Alpha-numeric text (maximum 256 characters). May be null.	IMEI (International Mobile Equipment Identity) is a 15- or 17-digit code that uniquely identifies mobile phone sets. Leave blank (null) for other device types.
`IPAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The IP address of the computer in IPv4 or IPv6 format.
`InventoryDate`	Date/time field. Default: getdate(). May be null.	The date (and optionally time) the computer last had inventory reported. This field is generally used for differential updates (that is, if the date/time has not changed since the previous import, the data record is not imported/updated).

Property	Attributes	Notes
`LastLoggedOnUser`	Alpha-numeric text (maximum 128 characters). Mandatory. Database key.	The DOMAIN/SAMAccountName of the user last logged onto the computer. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`LastLogonDate`	Date/time field. May be null.	The date and time when the user last logged on to the computer.
`MACAddress`	Alpha-numeric text (maximum 256 characters). May be null.	The MAC address of the computer. This may be a comma-separated list if there is more than one active network adapter in the system. Do not include inactive network adapters and network adapters with invalid MAC addresses.
`MachineID`	Alpha-numeric text (maximum 100 characters). May be null.	For AIX, it is the System ID. For HP-UX, it is the Machine/Software ID. It is unset for other platforms.
`Manufacturer`	Alpha-numeric text (maximum 128 characters). May be null.	The manufacturer of the computer.
`MaxClockSpeed`	Unsigned integer (`int`). May be null.	The maximum clock speed of the fastest processor in the computer in kHz. Note that a number of server-based licenses depend on complete details of the processor types, counts and speeds to calculate a correct license position.
`MemoryUsage`	Unsigned integer (`bigint`). May be null.	The maximum memory usage of the virtual machine (bytes).
`ModelNo`	Alpha-numeric text (maximum 128 characters). May be null.	The model number of the computer.

Property	Attributes	Notes
`NumberOfCores`	Unsigned integer (`int`). May be null.	The total number of cores in the computer. If there is more than one physical processor in the computer, then this would be the sum of the core counts for all the processors. For example, in a computer with two quad-core processors, this value would be 8. Note that a number of server-based licenses depend on complete details of the processor types, counts and speeds to calculate a correct license position.
`NumberOfDisplay Adapters`	Unsigned integer (`int`). May be null.	The number of graphics cards in the computer.
`NumberOfHardDrives`	Unsigned integer (`int`). May be null.	The number of physical hard drives in the computer. While the intent is physical drives, often this can end up being the number of disk partitions.
`NumberOfLogical Processors`	Unsigned integer (`int`). May be null.	The number of logical processors in the computer. This is the number of 'execution contexts' the operating system has access to. It will commonly be equivalent to the number processors in a single core, non-multi-threaded processor architecture, to the number of cores in a multi-core single threaded processor architecture, and to the number of threads in a multi-threaded processor architecture. For example, in a two processor, quad-core and hyper-threaded computer, this value would be 16. Note that a number of server-based licenses depend on complete details of the processor types, counts and speeds to calculate a correct license position.
`NumberOfNetworkCards`	Unsigned integer (`int`). May be null.	The number of network cards in the computer.
`NumberOfProcessors`	Unsigned integer (`int`). May be null.	The total number of physical processors (CPU) in the computer. Note that a number of server-based licenses depend on complete details of the processor types, counts and speeds to calculate a correct license position.

Property	Attributes	Notes
`NumberOfSockets`	Unsigned integer (`int`). May be null.	The number of physical sockets into which a processor may be placed in the computer. It is rare that an inventory source can know this value. If unset, it is typically approximated by the number of processors.
`OperatingSystem`	Alpha-numeric text (maximum 128 characters). May be null.	The operating system of the computer. For virtual machines, it is the configured operating system of the guest. Note that this operating system identification is not used for licensing.
`PartialNumberOf Processors`	Fractional number (`float`). May be null.	Used in processor-based licensing, this is the non-integer number of cores allocated to this partition or virtual machine. When this property is null, the 'NumberOfCores' is used. Note that a number of server-based licenses depend on complete details of the processor types, counts and speeds to calculate a correct license position.
`PhoneNumber`	Alpha-numeric text (maximum 128 characters). May be null.	The phone number of the device. Used for mobile devices.
`PoolName`	Alpha-numeric text (maximum 100 characters). May be null.	The name of the pool that the virtual machine belongs to.
`PoolType`	Alpha-numeric text (maximum 100 characters). May be null.	The type of the pool that the virtual machine belongs to.
`ProcessorType`	Alpha-numeric text (maximum 256 characters). May be null.	The descriptive string of the processor(s) in the computer. This may be a comma-separated list in the case where there is more than one physical processor in the system. Note that a number of server-based licenses depend on complete details of the processor types, counts and speeds to calculate a correct license position.
`SerialNo`	Alpha-numeric text (maximum 100 characters). May be null.	The serial number of the computer.
`ServicePack`	Alpha-numeric text (maximum 128 characters). May be null.	The service pack installed for the operating system.

Property	Attributes	Notes
`TotalDiskSpace`	Unsigned integer (`bigint`). May be null.	The total size of all hard drives in the computer in bytes. Note that this can be a very large number on modern systems. The maximum value for a bigint is 9,223,372,036,854,775,807, which can represent about 9.2 exabyte. While in practice it is unlikely that this size of storage capacity is reached for a single system, some systems can end up with large values through virtualized drives. Therefore, it is worth considering capping values when calculating total disk space, particularly when converting values from kilobytes or megabytes to bytes.
`TotalMemory`	Unsigned integer (`bigint`). May be null.	The total RAM in the computer, in bytes.
`VMEnabledState`	Alpha-numeric text (maximum 128 characters). Default: 4. May be null.	The operational state of the virtual machine. If present, the value must be a (case insensitive) exact match to one of the values shown.
`VMLocation`	Alpha-numeric text (maximum 256 characters). May be null.	Location of the virtual machine on the file system.
`VirtualMachineType`	Alpha-numeric text (maximum 100 characters). May be null.	The type of the virtual machine. If present, the value must be a (case insensitive) exact match to one of the values shown.
`VirtualMachineUUID`	Alpha-numeric text (maximum 256 characters). May be null.	The unique identifier of the virtual machine provided by the virtualization infrastructure. (This may have the same value as the 'BIOSUUID', or have byte order reversed, or be altogether different.)

Inventory Object: ConsolidatedFileEvidence

`ConsolidatedFileEvidence` objects are uploaded to the `ConsolidatedFileEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

ConsolidatedFileEvidence provides a simpler interface to specify files and their usage on computers. It combines the computer, file evidence and usage details into a single row.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessMode`	Alpha-numeric text (maximum 128 characters). Default: 1. Mandatory. Database key.	The access mode of the file evidence. Leave this blank unless this row is a virtualized application. In that case choose one of the values below that matches your application or desktop virtualization infrastructure. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`Company`	Alpha-numeric text (maximum 100 characters). Default: . Mandatory. Database key.	The company in the file header. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. It must match the ComputerID from the Computer spreadsheet or the row will be ignored.

Property	Attributes	Notes
`Description`	Alpha-numeric text (maximum 200 characters). Default: . Mandatory. Database key.	The description in the file header. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`FileName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The name of the file used as evidence of software installation. For unix operating systems include the full path in the file name, including the opening '/'. For Windows operating systems the file path is specified in the FilePath column and this column must only contain the file name.
`FilePath`	Alpha-numeric text (maximum 400 characters). May be null.	The path of the file used as evidence of software installation.
`FileSize`	Unsigned integer (`int`). Default: 0. Mandatory. Database key.	The size of the file in bytes. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`FileVersion`	Alpha-numeric text (maximum 100 characters). Default: . Mandatory. Database key.	The version number of the file used as evidence of software installation. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`Language`	Alpha-numeric text (maximum 200 characters). May be null.	The language in the file header.
`LastUsedDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The last used date of the usage.
`NumberOfSessions`	Unsigned integer (`bigint`). May be null.	The number of sessions that the file evidence was in use by the user specified in the UserID column during the usage tracking period. If multiple users used the same application on the computer, create one row for each user with usage.
`ProductName`	Alpha-numeric text (maximum 200 characters). May be null.	The product name in the file header.
`ProductVersion`	Alpha-numeric text (maximum 200 characters). May be null.	The product version number in the file header.
`StartDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The start date of the usage.

Property	Attributes	Notes
`UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The DOMAIN/SAMAccountName for the user that the file evidence was used by. If this software was used by multiple users, create one row for each user of the software on the computer. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: ConsolidatedInstallerEvidence

`ConsolidatedInstallerEvidence` objects are uploaded to the `ConsolidatedInstallerEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

ConsolidatedInstallerEvidence provides a simpler interface to specify installed applications and their usage on computers. It combines the computer, installer evidence and usage details into a single row.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessMode`	Alpha-numeric text (maximum 128 characters). Default: 1. Mandatory. Database key.	The access mode of the installer evidence. Leave this blank unless this row is a virtualized application. In that case choose one of the values below that matches your application or desktop virtualization infrastructure. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. It must match the ComputerID from the Computer spreadsheet or the row will be ignored.
`DatabaseName`	Unsigned integer (`bigint`). Mandatory. Database key.	If this installer evidence is an Oracle Database, then this field specifies the name of the database. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`DiscoveryDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The date that the installer evidence was first seen.
`DisplayName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The display name of the software as reported by the installer evidence.
`Evidence`	Alpha-numeric text (maximum 32 characters). Default: . Mandatory. Database key.	Identifier for the type of installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`InstallDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The install date of the installer evidence.

Property	Attributes	Notes
`InstanceName`	Unsigned integer (`bigint`). Mandatory. Database key.	If this installer evidence is an Oracle Database, then this field specifies the name of the database instance. If there are multiple instances, create a row for each instance in this spreadsheet. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`LastUsedDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The last used date of the usage.
`NumberOfSessions`	Unsigned integer (`bigint`). May be null.	The number of sessions that the installer evidence was in use by the user specified in the UserID column during the usage tracking period. If multiple users used the same application on the computer, create one row for each user with usage.
`ProductCode`	Alpha-numeric text (maximum 55 characters). May be null.	The product code of the evidence. This is usually the MSI product code.
`Publisher`	Alpha-numeric text (maximum 200 characters). Default: . Mandatory. Database key.	The publisher of the software as reported by the installer evidence. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`StartDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The start date of the usage.
`UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The DOMAIN/SAMAccountName for the user that the installer evidence was used by. If this software was used by multiple users, create one row for each user of the software on the computer. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`Version`	Alpha-numeric text (maximum 72 characters). Default: . Mandatory. Database key.	The version of the software as reported by the installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: ConsolidatedOracleDatabaseUser

`ConsolidatedOracleDatabaseUser` objects are uploaded to the `ConsolidatedOracleDatabaseUser` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

ConsolidatedOracleDatabaseUser provides a list of the users for each Oracle database instance.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessMode`	Alpha-numeric text (maximum 128 characters). Default: 1. Mandatory. Database key.	The access mode of the installer evidence. Leave this blank unless this row is a virtualized application. In that case choose one of the values below that matches your application or desktop virtualization infrastructure. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`AccountStatus`	Alpha-numeric text (maximum 256 characters). May be null.	The current status of the end-user account.
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. It must match the ComputerID from the Computer spreadsheet or the row will be ignored.
`CreationDate`	Date/time field. May be null.	The date and time when the end-user was created.
`DatabaseName`	Unsigned integer (`bigint`). Mandatory. Database key.	This field specifies the name of the database. It must match a row in the InstallerEvidence spreadsheet for the same ComputerID or this row will be skipped.
`DefaultTablespace`	Alpha-numeric text (maximum 256 characters). May be null.	The default tablespace for an Oracle end-user.

Property	Attributes	Notes
`DisplayName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The display name of the software as reported by the installer evidence. It must match a row in the InstallerEvidence spreadsheet for the same ComputerID, Version, Publisher, DatabaseName and InstanceName or this row will be skipped.
`Evidence`	Alpha-numeric text (maximum 32 characters). Default: . Mandatory. Database key.	Identifier for the type of installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`InstanceName`	Unsigned integer (`bigint`). Mandatory. Database key.	This field specifies the name of the database instance. If there are multiple instances, create a row for each instance in this spreadsheet. It must match a row in the InstallerEvidence spreadsheet for the same ComputerID and DatabaseName or this row will be skipped.
`LastLogonDate`	Date/time field. May be null.	The date and time when the end-user last logged on to the computer.
`Name`	Alpha-numeric text (maximum 256 characters).	The name of the user.
`Publisher`	Alpha-numeric text (maximum 200 characters). Default: . Mandatory. Database key.	The publisher of the software as reported by the installer evidence. It must match a row in the InstallerEvidence spreadsheet for the same ComputerID, DisplayName, Version, DatabaseName and InstanceName or this row will be skipped.
`TempTablespace`	Alpha-numeric text (maximum 256 characters). May be null.	The temporary tablespace for an Oracle end-user.
`UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the instance end-user. This may be an integer or a string.

Property	Attributes	Notes
`Version`	Alpha-numeric text (maximum 72 characters). Default: . Mandatory. Database key.	The version of the software as reported by the installer evidence. It must match a row in the InstallerEvidence spreadsheet for the same ComputerID, DisplayName, Publisher, DatabaseName and InstanceName or this row will be skipped.

Inventory Object: ConsolidatedRemoteAccessFile

`ConsolidatedRemoteAccessFile` objects are uploaded to the `ConsolidatedRemoteAccessFile` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The spreadsheet consolidates ImportedRemoteUserToApplicationAccess, ImportedFileEvidence and ImportedUser tables.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessMode`	Alpha-numeric text (maximum 128 characters). Default: 1. Mandatory. Database key.	The AccessMode states how an application has been accessed. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`Company`	Alpha-numeric text (maximum 100 characters). Default: . Mandatory. Database key.	The company in the file header. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`Description`	Alpha-numeric text (maximum 200 characters). Default: . Mandatory. Database key.	The description in the file header. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`FileName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The name of the file used as evidence of software installation. For unix operating systems include the full path in the file name, including the opening '/'. For Windows operating systems the file path is specified in the FilePath column and this column must only contain the file name.
`FilePath`	Alpha-numeric text (maximum 400 characters). May be null.	The path of the file used as evidence of software installation.
`FileSize`	Unsigned integer (`int`). Default: 0. Mandatory. Database key.	The size of the file in bytes. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`FileVersion`	Alpha-numeric text (maximum 100 characters). Default: . Mandatory. Database key.	The version number of the file used as evidence of software installation. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`Language`	Alpha-numeric text (maximum 200 characters). May be null.	The language in the file header.
`ProductName`	Alpha-numeric text (maximum 200 characters). May be null.	The product name in the file header.
`ProductVersion`	Alpha-numeric text (maximum 200 characters). May be null.	The product version number in the file header.
`ServerID`	Unsigned integer (`bigint`). Mandatory. Database key.	This is the ComputerID of the server that publishes this virtual application. The ComputerID must match a computer from the Computer spreadsheet, and that computer must have an installation of the application this file is part of. If the server does not have an installation of an appropriate application then the user will not be shown as having access to that application. This is a mandatory field.
`UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The fully qualified name of the user.

Inventory Object: ConsolidatedRemoteAccessInstaller

`ConsolidatedRemoteAccessInstaller` objects are uploaded to the `ConsolidatedRemoteAccessInstaller` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The spreadsheet consolidates ImportedRemoteUserToApplicationAccess, ImportedInstallerEvidence and ImportedUser tables.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessMode`	Alpha-numeric text (maximum 128 characters). Default: 1. Mandatory. Database key.	The AccessMode states how an application has been accessed. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`DisplayName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The display name of the software as reported by the installer evidence and is part of the unique identifier for installer evidence.
`Evidence`	Alpha-numeric text (maximum 32 characters). Default: . Mandatory. Database key.	The evidence type of the software as reported by the installer evidence and is part of the unique identifier for installer evidence.
`ProductCode`	Alpha-numeric text (maximum 55 characters). May be null.	The product code of the evidence. This is usually the MSI product code and is not part of the unique identifier.
`Publisher`	Alpha-numeric text (maximum 200 characters). Default: . Mandatory. Database key.	Publishers of software applications (for example, "Microsoft").
`UserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The DOMAIN\SAMAccountName of the user.

Property	Attributes	Notes
`Version`	Alpha-numeric text (maximum 72 characters). Default: . Mandatory. Database key.	The version of the software as reported by the installer evidence and is part of the unique identifier for installer evidence.

Inventory Object: ConsolidatedVMPool

`ConsolidatedVMPool` objects are uploaded to the `ConsolidatedVMPool` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The VMPool spreadsheet provides a simple method to associate virtual machines with groups (pools) on their host.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`HostComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer which is hosting the pool. The HostComputerID should match the ComputerID in the Computer spreadsheet. Otherwise the record will be ignored.
`NumberOfCores`	Fractional number (`float`). May be null.	The number of cores in this pool.
`NumberOfProcessors`	Fractional number (`float`). May be null.	The number of processors in this pool.
`ObjectType`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The type of pool. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ParentName`	Alpha-numeric text (maximum 100 characters). May be null.	The name of the parent pool.
`ParentObjectType`	Alpha-numeric text (maximum 256 characters). May be null.	The type of pool of the parent.

Property	Attributes	Notes
`PoolFriendlyName`	Alpha-numeric text (maximum 256 characters).	The friendly name of the pool.
`PoolName`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The name of the pool.

Inventory Object: ConsolidatedWMIEvidence

`ConsolidatedWMIEvidence` objects are uploaded to the `ConsolidatedWMIEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

ConsolidatedWMIEvidence provides a simpler interface to specify Windows Management Instrumentation (WMI) properties on computers. Other Web-Based Enterprise Management (WBEM) properties are supported from Unix computers as well. The most important data to provide in this spreadsheet is operating system installs. The 'Win32_OperatingSystem' class and the 'Name' property contains this data.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClassName`	Alpha-numeric text (maximum 50 characters). Mandatory. Database key.	The WMI class name of the evidence. An example is 'Win32_OperatingSystem'.
`ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. It must match the ComputerID from the Computer spreadsheet or the row will be ignored.

Property	Attributes	Notes
InstanceName	Alpha-numeric text (maximum 256 characters). Default: . Mandatory. Database key.	The name of the WMI class instance. This is important when there a multiple instances of a WMI class on a computer. An example is the 'Win32_VideoController' class that may have many instances with the same properties. In this case you need to specify the name of the instance here, 'Intel(R) HD Graphics Family' or 'NVIDIA Quadro K2100M' for example. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
PropertyName	Alpha-numeric text (maximum 50 characters). Mandatory. Database key.	The WMI property name of the WMI evidence. An example is 'Name'.
PropertyValue	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The value of the property of the WMI evidence. An example is 'Microsoft Windows 7 Enterprise'

Inventory Object: Domain

Domain objects are uploaded to the ImportedDomain table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedDomain table holds all of the domains which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
ComplianceDomainID	Unsigned integer (int). May be null.	Identifier of the domain in the ComplianceDomain table that this imported domain links to. This is populated as part of the import process and does not need to be provided by the source connections.

Property	Attributes	Notes
`FlatName`	Alpha-numeric text (maximum 200 characters). Mandatory. Database key.	The flat name of the domain. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`QualifiedName`	Alpha-numeric text (maximum 200 characters). Mandatory. Database key.	The fully qualified name of the domain. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: EvidenceAttribute

`EvidenceAttribute` objects are uploaded to the `ImportedEvidenceAttribute` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedEvidenceAttribute` table holds all of the instance attributes from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AttributeID	Unsigned integer (int). Mandatory. Database key.	The identifier used in the source connection for the instance attribute. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
AttributeName	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The name of the instance attribute. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: FileEvidence

FileEvidence objects are uploaded to the ImportedFileEvidence table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedFileEvidence table holds all of the file evidence which has been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AccessModeID	Unsigned integer (int). Default: 1. May be null.	The access mode ID of the file evidence.
Company	Alpha-numeric text (maximum 100 characters). May be null.	The company in the file header.
Description	Alpha-numeric text (maximum 200 characters). Default: ''.	The description in the file header.

Property	Attributes	Notes
`ExternalFileID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the file evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`FileName`	Alpha-numeric text (maximum 256 characters). May be null.	The name of the file used as evidence of software installation.
`FilePath`	Alpha-numeric text (maximum 400 characters). May be null.	The path of the file used as evidence of software installation.
`FileSize`	Unsigned integer (`int`). May be null.	The size of the file.
`FileVersion`	Alpha-numeric text (maximum 100 characters). May be null.	The version number of the file used as evidence of software installation.
`Language`	Alpha-numeric text (maximum 200 characters). May be null.	The language in the file header.
`ProductName`	Alpha-numeric text (maximum 200 characters). May be null.	The product name in the file header.
`ProductVersion`	Alpha-numeric text (maximum 200 characters). May be null.	The product version number in the file header.

Inventory Object: ILMTPVUCounts

`ILMTPVUCounts` objects are uploaded to the `ImportedILMTPVUCounts` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

This table allows the summarised PVU sub capacity numbers to be imported from ILMT. These numbers are calculated by ILMT for a particular date range as PVU "reports".

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ExternalNodeID`	Unsigned integer (`bigint`). Mandatory. Database key.	The external ID of the server to which these points apply.
`ExternalVMID`	Unsigned integer (`bigint`). Mandatory. Database key.	The external ID of the virtual machine associated with the node (server). ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`FullCapacityCores`	Unsigned integer (`int`). Default: 0.	The number of full-capacity licensable cores for the license on the computer.
`FullCapacityPVU`	Unsigned integer (`int`). Default: 0.	The number of full-capacity PVU counts consumed for the license on the computer.
`PeakFullCapacityPVU`	Unsigned integer (`int`). Default: 0.	The peak number of full-capacity PVU counts consumed for the license on the computer.
`PeakSubCapacityPVU`	Unsigned integer (`int`).	The peak number of sub-capacity PVU counts consumed for the license on the computer.
`Publisher`	An ASCII string of alphanumeric characters and punctuation (length 254 characters). Mandatory. Database key.	The name of the publisher of the title these points apply to.
`SubCapacityCores`	Unsigned integer (`int`). Default: 0.	The number of sub-capacity licensable cores for the license on the computer.

Property	Attributes	Notes
SubCapacityPVU	Unsigned integer (int). Default: 0.	The number of sub-capacity PVU counts consumed for the license on the computer.
TitleName	Alpha-numeric text (maximum 512 characters). Mandatory. Database key.	The name of the title these points apply to.

Inventory Object: InstalledFileEvidence

InstalledFileEvidence objects are uploaded to the ImportedInstalledFileEvidence table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedInstalledFileEvidence table holds a record of the file evidence that has been installed on a computer from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
ExternalFileID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the file evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
ExternalFilePathID	Unsigned integer (bigint). May be null.	The identifier used in the source connection for the path of the file evidence.

Property	Attributes	Notes
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the file evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: InstalledFileEvidenceUsage

`InstalledFileEvidenceUsage` objects are uploaded to the `ImportedInstalledFileEvidenceUsage` table in the operations (inventory) database.

The `ImportedInstalledFileEvidenceUsage` table holds a record of end-users that are using file evidence from the source connection.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ActiveTimeInSeconds`	Unsigned integer (`bigint`). May be null.	The number of seconds that the file evidence was in use during the usage tracking period.
`ExternalFileID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the file evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the file evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalUserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the end-user that has used the file evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`LastUsedDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The last used date of the file evidence.
`NumberOfSessions`	Unsigned integer (`bigint`). May be null.	The number of sessions that the file evidence was in use during the usage tracking period.
`StartDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The start date of the file evidence usage tracking period.

Inventory Object: InstalledInstallerEvidence

`InstalledInstallerEvidence` objects are uploaded to the `ImportedInstalledInstallerEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedInstalledInstallerEvidence` table holds a record of the installer evidence that has been installed on a computer from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`DiscoveryDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The date that the installer evidence was first seen.
`ExternalComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the installer evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalInstaller EvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`ExternalInstanceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the instance that the installer evidence is associated with. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`InstallDate`	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The install date of the installer evidence.

Inventory Object: InstalledInstallerEvidenceAttribute

`InstalledInstallerEvidenceAttribute` objects are uploaded to the `ImportedInstalledInstallerEvidenceAttribute` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedInstalledInstallerEvidenceAttribute` table holds a record of the values of the instance attributes for each installer evidence which is reported to be installed on a computer.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AttributeID`	Unsigned integer (`int`). Mandatory. Database key.	The identifier used in the source connection for the instance attribute.

Property	Attributes	Notes
`ExternalComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the installer evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`ExternalInstallerEvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`ExternalInstanceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the instance that the installer evidence is associated with. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`Value`	Alpha-numeric text (maximum 2Gb storage, or about 1 billion double-byte characters).	The value of the instance attribute for the installed installer evidence.

Inventory Object: InstalledInstallerEvidenceUsage

`InstalledInstallerEvidenceUsage` objects are uploaded to the `ImportedInstalledInstallerEvidenceUsage` table in the operations (inventory) database.

The `ImportedInstalledInstallerEvidenceUsage` table holds a record of installed evidence being used from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the installer evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`ExternalInstallerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
ExternalInstanceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the instance that the installer evidence is associated with. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
ExternalUserID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the user that the installer evidence was used on. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
LastUsedDate	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The last used date of the installed installer evidence.
NumberOfSessions	Unsigned integer (bigint). May be null.	The number of sessions that the installer evidence was in use during the usage tracking period.
StartDate	An ASCII string of alphanumeric characters and punctuation (length 10 characters). May be null.	The start date of the installer evidence usage tracking period.

Inventory Object: InstalledWMIEvidence

`InstalledWMIEvidence` objects are uploaded to the `ImportedInstalledWMIEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedInstalledWMIEvidence` table holds a record of the WMI evidence that has been installed on a computer from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ExternalComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the WMI evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalEvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the WMI evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
InstanceName	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The name of the WMI class instance used in the source connection for the WMI evidence ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: InstallerEvidence

InstallerEvidence objects are uploaded to the ImportedInstallerEvidence table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedInstallerEvidence table holds all of the installer evidence which has been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AccessModeID	Unsigned integer (int). Default: 1. May be null.	The access mode ID of the file evidence.
DisplayName	Alpha-numeric text (maximum 256 characters). May be null.	The display name of the software as reported by the installer evidence.
Evidence	Alpha-numeric text (maximum 32 characters). May be null.	Identifier for the type of installer evidence.

Property	Attributes	Notes
`ExternalInstallerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ProductCode`	Alpha-numeric text (maximum 55 characters). May be null.	The product code of the evidence. This is usually the MSI product code.
`Publisher`	Alpha-numeric text (maximum 200 characters). May be null.	The publisher of the software as reported by the installer evidence.
`Version`	Alpha-numeric text (maximum 72 characters). May be null.	The version of the software as reported by the installer evidence.

Inventory Object: InstallerEvidenceRepackageMapping

`InstallerEvidenceRepackageMapping` objects are uploaded to the `ImportedInstallerEvidenceRepackageMapping` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedInstallerEvidenceRepackageMapping` table is used by the importer to map the original and current installer evidence of repackaged softwares as reported by the ISO tag evidence.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`CurrentDisplayName`	Alpha-numeric text (maximum 256 characters). May be null.	The current display name of the repackaged software as reported by the ISO tag evidence.
`CurrentPublisher`	Alpha-numeric text (maximum 200 characters). May be null.	The current publisher of the repackaged software as reported by the ISO tag evidence.

Property	Attributes	Notes
`CurrentVersion`	Alpha-numeric text (maximum 72 characters). May be null.	The current version of the repackaged software as reported by the ISO tag evidence.
`OrigDisplayName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The original display name of the repackaged software as reported by the ISO tag evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`OrigPublisher`	Alpha-numeric text (maximum 200 characters). Mandatory. Database key.	The original publisher of the repackaged software as reported by the ISO tag evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`OrigVersion`	Alpha-numeric text (maximum 72 characters). Mandatory. Database key.	The original version of the repackaged software as reported by the ISO tag evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: Instance

`Instance` objects are uploaded to the `ImportedInstance` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedInstance` table holds all of the instances which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AuditEvidence`	Binary data from a file (maximum 2Gb). May be null.	Oracle LMS CVS files in zip archive.
`AuditEvidenceDate`	Date/time field. May be null.	Oracle LMS CSV files collection date.
`ExternalComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`InstanceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the instance. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`InstanceName`	Alpha-numeric text (maximum 256 characters). May be null.	The name of the instance.

Property	Attributes	Notes
ParentInstanceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the parent instance. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: InstanceUser

InstanceUser objects are uploaded to the ImportedInstanceUser table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedInstanceUser table holds all of the end-users of an instance which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AccountStatus	Alpha-numeric text (maximum 256 characters). May be null.	The current status of the end-user account.
ApplicationID	Alpha-numeric text (maximum 400 characters). Mandatory. Database key.	The Oracle EBS application ID the user has access to. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
ComputerID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the computer.
CreationDate	Date/time field. May be null.	The date and time when the end-user was created.

Property	Attributes	Notes
DefaultTablespace	Alpha-numeric text (maximum 256 characters). May be null.	The default tablespace for an Oracle end-user.
ExternalID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the instance end-user.
InstanceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the instance.
LastLogonDate	Date/time field. May be null.	The date and time when the end-user last logged on to the computer.
TempTablespace	Alpha-numeric text (maximum 256 characters). May be null.	The temporary tablespace for an Oracle end-user.

Inventory Object: LicenseUser

LicenseUser objects are uploaded to the ImportedLicenseUser table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedLicenseUser table holds all of the external end-users (such as those used by Oracle or SAP licenses) retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
CostCenter	Alpha-numeric text (maximum 128 characters). May be null.	The cost center of the external end-user, as reported in SAP. Does not necessarily map to a cost centre in the GroupEx table.
Description	Alpha-numeric text (maximum 400 characters). May be null.	The description of the external end-user.
Email	Alpha-numeric text (maximum 400 characters). May be null.	An e-mail address for the external end-user.
EmployeeNumber	Alpha-numeric text (maximum 256 characters). May be null.	The employee number of the external end-user.

Property	Attributes	Notes
ExternalID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the external end-user. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
FirstName	Alpha-numeric text (maximum 256 characters). May be null.	The first name of the external end-user.
LastName	Alpha-numeric text (maximum 256 characters). May be null.	The last name or surname of the external end-user.
LicenseUserID	Unsigned integer (int). May be null.	The identifier of the external end-user in the LicenseUser table that this imported end-user links to. This is populated by the import process and does not need to be provided by the source connections.
UserName	Alpha-numeric text (maximum 400 characters). May be null.	The name of the external end-user.

Inventory Object: RelatedInstalledInstallerEvidence

RelatedInstalledInstallerEvidence objects are uploaded to the ImportedRelatedInstalledInstallerEvidence table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedRelatedInstalledInstallerEvidence table holds parent-child relationship between installer evidence.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ChildExternal ComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the installer evidence is installed on. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ChildExternal InstallerEvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ConfidenceLevel`	Unsigned integer (`int`). May be null.	Confidence level for each bundled installer evidence (as a percentage).
`IsCharged`	Boolean (0 or 1). Mandatory. Database key.	The identifier used in the source connection to determine the pricing relation between parent and child installer evidence (specifies if it is charged = 1 or free = 0). ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
ParentExternal ComputerID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the computer that the installer evidence is installed on. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
ParentExternal InstallerEvidenceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: RemoteUserToApplicationAccess

`RemoteUserToApplicationAccess` objects are uploaded to the `ImportedRemoteUserToApplicationAccess` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedRemoteUserToApplicationAccess` table stores the applications that remote users have access to

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AccessModeID`	Unsigned integer (`int`). Mandatory. Database key.	The access mode ID for the remote application access. **_Note:_** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalFileID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the file evidence. **_Note:_** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalInstallerEvidenceID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the installer evidence. **_Note:_** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`ExternalServerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The External Server ID for the remote server. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalUserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the end-user that has used the file evidence. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`LastUsedDate`	Date/time field. May be null.	The last time the remote application was used by the user.
`VDIGroupUUID`	A universally unique identifier. May be null.	The desktop group UUID from which the application is published

Inventory Object: Site

`Site` objects are uploaded to the `ImportedSite` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedSubnet` contains sites imported from Microsoft Active Directory

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`AutoPopulated`	Boolean (0 or 1). Default: 0.	Is the site auto populated at source?
`Enabled`	Boolean (0 or 1). Default: 1.	Is the site enabled?

Property	Attributes	Notes
Name	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The site's name.

Inventory Object: SiteSubnet

SiteSubnet objects are uploaded to the ImportedSiteSubnet table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedSiteSubnet contains sites and subnets imported from Microsoft Active Directory

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AutoPopulated	Boolean (0 or 1). Default: 0.	Is the subnet auto populated at source?
Enabled	Boolean (0 or 1). Default: 1.	Is the subnet enabled?
IPSubnet	Alpha-numeric text (maximum 64 characters). Mandatory. Database key.	The IP subnet.
IPSubnetBits	UNRECOGNIZED TYPEMandatory. Database key.	The IP subnet mask in CIDR notation.
SiteName	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The site's name.

Inventory Object: SoftwareLicense

SoftwareLicense objects are uploaded to the ImportedSoftwareLicense table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedSoftwareLicense table holds all of the licenses which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
EntitlementCount	Unsigned integer (int). May be null.	The number of entitlements for the license.
ExpiryDate	Date/time field. May be null.	The expiry date of a subscription license.

Property	Attributes	Notes
`ExternalLicenseID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the license. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`IsSubscription`	Boolean (0 or 1). Default: 0.	Indicates whether or not the license is a subscription license.
`LicenseName`	Alpha-numeric text (maximum 256 characters). May be null.	The name of the license.
`PartNo`	Alpha-numeric text (maximum 100 characters). May be null.	The publisher's part number for this license.
`SoftwareLicenseID`	Unsigned integer (`int`). May be null.	Identifier of the license in the `SoftwareLicense` table that this imported license links to. This is populated by the import process and does not need to be provided by the source connections.
`SoftwareLicenseTypeID`	Unsigned integer (`int`). May be null.	The license type ID of the license.

Inventory Object: SoftwareLicenseAllocation

`SoftwareLicenseAllocation` objects are uploaded to the `ImportedSoftwareLicenseAllocation` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedSoftwareLicenseAllocation` table holds the links between licenses and end-users which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ExternalLicenseID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the license. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ExternalUserID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the license. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: User

`User` objects are uploaded to the `ImportedUser` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedUser` table holds all of the end-users which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ComplianceDomainID`	Unsigned integer (`int`). May be null.	Identifier of the domain in the `ComplianceDomain` table that this end-user belongs to. This is populated by the import process and does not need to be provided by the source connections.

Property	Attributes	Notes
`ComplianceUserID`	Unsigned integer (`int`). May be null.	Identifier of the end-user in the `ComplianceUser` table that this imported user links to. This is populated by the import process and does not need to be provided by the source connections.
`CostCenter`	Alpha-numeric text (maximum 128 characters). May be null.	The cost center of the end-user, as reported in SAP. Does not necessarily map to a cost centre in the `GroupEx` table.
`Domain`	Alpha-numeric text (maximum 100 characters). May be null.	The domain of the end-user.
`Email`	Alpha-numeric text (maximum 200 characters). May be null.	The email address of the end-user.
`EmployeeNumber`	Alpha-numeric text (maximum 128 characters). May be null.	The employee number of the end-user.
`ExternalID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the end-user. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`FirstName`	Alpha-numeric text (maximum 128 characters). May be null.	The first name of the end-user.
`InventoryAgent`	Alpha-numeric text (maximum 64 characters). May be null.	The name of the person or tool that performed the last inventory. For imported spreadsheets, you may wish to include the name of the person preparing the data, in case there is subsequent follow-up required.

Property	Attributes	Notes
`IsBlacklisted`	Boolean (0 or 1). Default: 0.	This is populated by the import process and does not need to be provided by the source connections. The field is set to `True` if the end-user matches a record from the `UserNameBlacklist` table, meaning the account should not be included in compliance calculations.
`LastName`	Alpha-numeric text (maximum 128 characters). May be null.	The last name or surname of the end-user.
`MapUsingEmailAddress`	Boolean (0 or 1). Default: 0.	Indicates whether or not the user's email address should be used to try and map it to an existing `ComplianceUser` record.
`SAMAccountName`	Alpha-numeric text (maximum 64 characters). May be null.	The SAM account name of the end-user.
`UserName`	Alpha-numeric text (maximum 64 characters). May be null.	The account name of the end-user.

Inventory Object: VDI

`VDI` objects are uploaded to the `ImportedVDI` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedVDIUser` table stores the list of VDI devices, their master VM template and the VDI group the VDI device resides under.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ApplicationDelivery Only`	Boolean (0 or 1). May be null.	Determines whether the VDI device is used only to server applications.

Property	Attributes	Notes
`BrokerType`	Alpha-numeric text (maximum 64 characters). Mandatory. Database key.	The broker type of the VDI device. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ComputerName`	Alpha-numeric text (maximum 64 characters). May be null.	The computer name of the VDI.
`Domain`	Alpha-numeric text (maximum 100 characters). May be null.	The domain name of the VDI device.
`ExternalDeviceID`	Unsigned integer (`bigint`). May be null.	The identifier used in the source connection for the VDI device.
`IsPersistent`	Boolean (0 or 1). May be null.	Determine whether the VDI device is a persistent VDI device.
`SiteName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The site name of the VDI. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
`TemplateName`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The VDI template the VDI is cloned from. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`VDIGroupName`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The VDI group the VDI device belongs to. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through overwriting. It is therefore best practice to treat this field as mandatory.*
`VDIGroupUUID`	A universally unique identifier. May be null.	The group UUID the VDI device belongs to.

Inventory Object: VDITemplate

`VDITemplate` objects are uploaded to the `ImportedVDITemplate` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedVDITemplate` table stores the list of VDI templates.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`BrokerType`	Alpha-numeric text (maximum 64 characters). Mandatory. Database key.	The broker type of the VDI template. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`SiteName`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The site name of the VDI. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`TemplateName`	Alpha-numeric text (maximum 64 characters). Mandatory. Database key.	The template name of the VDI template. **Note:** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`VDITemplateExternalID`	Unsigned integer (`bigint`). May be null.	The ExternalID of the VDI template in the `ImportedComputer` table.

Inventory Object: VDIUser

VDIUser objects are uploaded to the ImportedVDIUser table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedVDIUser table stores the list of users that have been granted access to VDI groups.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
BrokerType	Alpha-numeric text (maximum 64 characters). May be null.	The broker type of the VDI for the end user.
ExternalUserID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the end-user that has access to the VDI. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
SiteName	Alpha-numeric text (maximum 256 characters). May be null.	The site name of the VDI.
VDIGroupName	Alpha-numeric text (maximum 100 characters). May be null.	The VDI group the end-user has access to.

Inventory Object: VMHostManagedBySoftware

VMHostManagedBySoftware objects are uploaded to the ImportedVMHostManagedBySoftware table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedVMHostManagedBySoftware table contains relationships between installer evidence of management software and VM hosts it manages.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ExternalComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer that the management software installer evidence is installed on.
`ExternalInstallerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for an installer evidence of management software.
`ExternalVMHostID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the VM host computer that is managed by a management software.
`RelationType`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	Identifier for the type of relation, to be matched against ImporterString column of `RelationType` table.

Inventory Object: VMPool

`VMPool` objects are uploaded to the `ImportedVMPool` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedVMPool` table holds all of the virtual machine pools which have been retrieved from the source connections and the number of processors and cores that are assigned to each pool.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`HostComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the computer which is hosting the pool. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`NumberOfCores`	Fractional number (`float`). May be null.	The number of cores available to this pool.
`NumberOfProcessors`	Fractional number (`float`). May be null.	The number of processors available to this pool.

Property	Attributes	Notes
`ObjectType`	Alpha-numeric text (maximum 256 characters). Mandatory. Database key.	The type of pool. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`ParentName`	Alpha-numeric text (maximum 100 characters). May be null.	The name of the parent pool. This is the PoolName property for the parent pool.
`ParentObjectType`	Alpha-numeric text (maximum 256 characters). May be null.	The type of pool of the parent.
`PoolFriendlyName`	Alpha-numeric text (maximum 256 characters). May be null.	The friendly name of the pool.
`PoolName`	Alpha-numeric text (maximum 100 characters). Mandatory. Database key.	The name of the pool. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Inventory Object: VirtualMachine

VirtualMachine objects are uploaded to the ImportedVirtualMachine table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The ImportedVirtualMachine table holds all of the virtual machines which have been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
AffinityEnabled	Boolean (0 or 1). Default: 0.	Set this to True if this VM is unable to move to different host computers.
CPUAffinity	Alpha-numeric text (maximum 256 characters). May be null.	Contains the CPU Affinity value for virtual machine(Host Logical Processors)
CPUUsage	Unsigned integer (int). May be null.	The maximum CPU usage of the virtual machine (MHz).
ComputerName	Alpha-numeric text (maximum 256 characters). May be null.	The computer name of the virtual machine.
CoreAffinity	Alpha-numeric text (maximum 256 characters). May be null.	Contains the Core Affinity value for virtual machine
FriendlyName	Alpha-numeric text (maximum 256 characters). May be null.	The friendly name of the virtual machine.
GuestFullName	Alpha-numeric text (maximum 256 characters). May be null.	Configured operating system for the guest.
HostComputerID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the virtual machine's host computer. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*

Property	Attributes	Notes
InventoryAgent	Alpha-numeric text (maximum 64 characters). May be null.	The name of the person or tool that performed the last inventory.
Manufacturer	Alpha-numeric text (maximum 128 characters). May be null.	The manufacturer of the virtual machine.
MemoryUsage	Unsigned integer (bigint). May be null.	The maximum memory usage of the virtual machine (bytes).
ModelNo	Alpha-numeric text (maximum 128 characters). May be null.	The model number of the virtual machine.
NumberOfHardDrives	Unsigned integer (int). May be null.	The number of hard drives in the virtual machine.
NumberOfNetworkCards	Unsigned integer (int). May be null.	The number of network cards in the virtual machine.
NumberOfProcessors	Unsigned integer (int). May be null.	The number of processors in the virtual machine.
PartitionID	Alpha-numeric text (maximum 100 characters). May be null.	Partition ID generated and used by the managing virtualization platform
PartitionNumber	Unsigned integer (int). May be null.	Number of this partition
PoolName	Alpha-numeric text (maximum 100 characters). May be null.	The name of the pool that the virtual machine belongs to.
PoolType	An ASCII string of alphanumeric characters and punctuation (length 100 characters). May be null.	The type of the pool that the virtual machine belongs to.
ProcessorType	Alpha-numeric text (maximum 256 characters). May be null.	The type of processor in the virtual machine.
TotalMemory	Unsigned integer (bigint). May be null.	The total RAM in the computer, in bytes.
UUID	Alpha-numeric text (maximum 256 characters). May be null.	The UUID of the virtual machine.

Property	Attributes	Notes
`VMComputerID`	Unsigned integer (`bigint`). Mandatory. Database key.	The identifier used in the source connection for the virtual machine's computer. ***Note:*** *Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
`VMEnabledStateID`	Unsigned integer (`int`). May be null.	The state of the machine (powered on, off, etc).
`VMLocation`	Alpha-numeric text (maximum 256 characters). May be null.	Location of the virtual machine on the file system.
`VMName`	Alpha-numeric text (maximum 256 characters). May be null.	The name of the virtual machine.
`VirtualMachineType`	An ASCII string of alphanumeric characters and punctuation (length 100 characters). May be null.	The type of virtual machine.

Inventory Object: WMIEvidence

`WMIEvidence` objects are uploaded to the `ImportedWMIEvidence` table in the operations (inventory) database. Multiple imports will merge updated data with existing records, and add new records as applicable.

The `ImportedWMIEvidence` table holds all of the WMI evidence which has been retrieved from the source connections.

Attributes are listed here in alphabetical order.

Property	Attributes	Notes
`ClassName`	Alpha-numeric text (maximum 50 characters). May be null.	The WMI class name of the WMI evidence.

Property	Attributes	Notes
ExternalEvidenceID	Unsigned integer (bigint). Mandatory. Database key.	The identifier used in the source connection for the WMI evidence. ***Note:** Strictly, this attribute may be null, because it forms part of a compound database key. However, null values may cause import errors (where this object does not get imported), and multiple records from the same connection having nulls may cause data loss through over-writing. It is therefore best practice to treat this field as mandatory.*
PropertyName	Alpha-numeric text (maximum 50 characters). May be null.	The WMI property name of the WMI evidence.
PropertyValue	Alpha-numeric text (maximum 256 characters). May be null.	The value of the property of the WMI evidence.

8

The Business Adapter Studio

The Business Adapter Studio allows you to create and edit business adapters. These are ways of connecting to data sources in your enterprise and extracting relevant data for import into FlexNet Manager Suite.

This section introduces both business adapters, and the Business Adapter Studio that you can use to custom-build them.

Introducing the Business Adapter Studio

What is a business adapter?

A business adapter is an XML file that:

- Defines a connection to a data source (which may be a database system within your enterprise infrastructure, or other things including a well-formed spreadsheet)
- Maps the columns from the data source to a standard set of objects and attributes that can be imported into the operations database for FlexNet Manager Suite.

Examples of business information that may be relevant to your software and hardware asset management include:

- Details of your organization structure (to form enterprise groups in FlexNet Manager Suite)
- Purchase orders (especially relating to software purchases, upgrades, and maintenance)
- Contract details

and the like.

How is a business adapter used?

Business adapters may be used in two modes:

- Connected mode where the adapter is run on your central application server with direct connection to your operations databases.

- Disconnected mode where the business adapter runs on an inventory beacon, and cannot directly access the operations databases. This mode requires tighter security, and regular uploads of archived business information are automatically uploaded to the application server, and processed in a separate stage that is not controlled by the business adapter.

In connected mode, a Windows scheduled task on the application server triggers the Business Importer to read the business adapter. In disconnected mode, running the adapter is separate from importing the results. Triggered by the inventory beacon on a daily schedule you specify, the business adapter is read by the Business Importer, which then

- Connects to the specified connection
- Gathers the data defined by the XML in the adapter
- Collects the results into an archive package on the inventory beacon in disconnected mode; or writes the data into staging tables in connected mode
- Immediately uploads the package to the operations database in disconnected mode; or processes the data from the staging tables into the operations databases in connected mode
- Repeats this process for each of the other currently enabled adapters awaiting execution.

Therefore in connected mode, the data is available in the web interface within a very short processing time; but disconnected mode takes a little longer. The uploaded packages are held in a staging directory until all previous imports from business adapters are completed, and then the new arrival is processed into the operations database. Thereafter the business information is available in the web interface.

How is a business adapter created and maintained?

Business adapters are edited in the Business Adapter Studio. In this tool, you can:

- Develop the adapter in a protected, test environment, starting with templates that help keep your adapter compliant with the requirements of the central operations databases
- In connected mode (on your application server), simulate running the adapter to test and trouble-shoot its development
- Move the complete adapter into production.

Separately for business adapters running in disconnected mode, in the interface for the inventory beacon, you can turn any production-ready business adapter on or off (enabled/disabled), and schedule the time of day when all your enabled business adapters are run. As already noted, in connected mode, you use a Windows scheduled task to control timing.

Prerequisites

In brief:

- **System requirements:** Included in the requirements for the inventory beacon (for disconnected mode). The release notes for the inventory beacon are available from the download center on the Flexera Software website. The URL for this download location was provided in the e-mail you received from Flexera Software order processing, confirming your purchased products. The same website also contains the release notes for FlexNet Manager Suite, which include requirements for the Business Adapter Studio on the application server if you are preparing business adapters to run in connected mode.

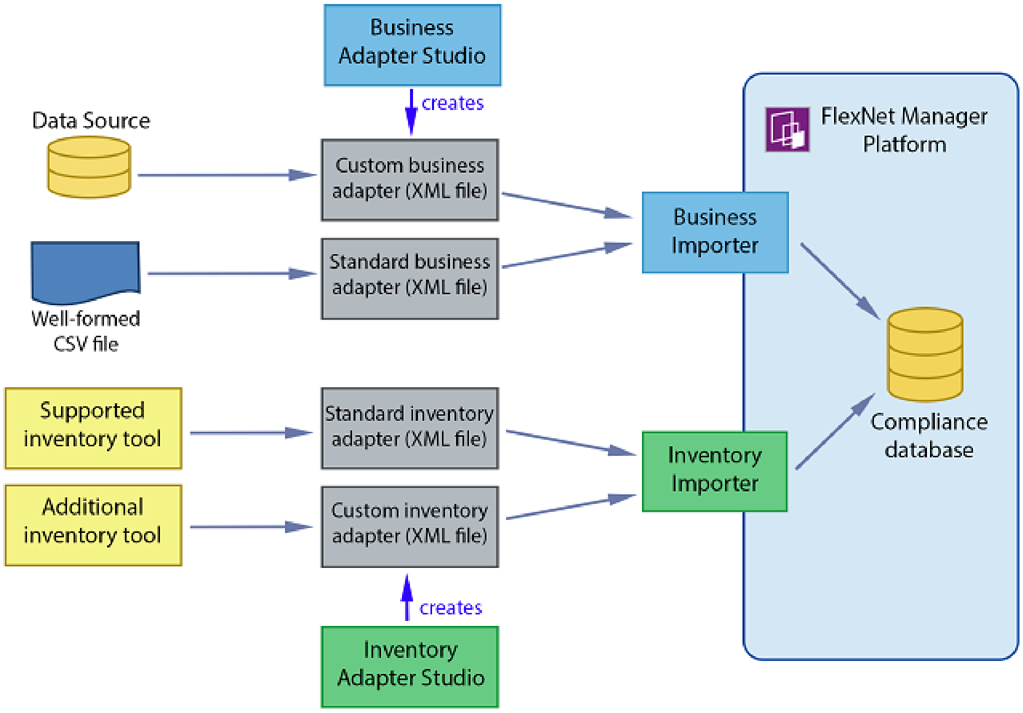
- **Installation:** The process is different for the two modes (and the two installation locations). The Business Adapter Studio for disconnected mode is installed with the inventory beacon. It is expected to run on the same computer as the inventory beacon, and makes use of other services that the beacon provides. By contrast, for connected mode, the Business Adapter Studio must be installed separately on your application server, and instructions are included in the installation documentation.

  ***Note:** If you self-install the Business Adapter Studio on your application server, you must upgrade your installation to the latest version to take advantage of new properties introduced in the latest data model.*

- **Skills:** Business Adapter Studio is intended for users comfortable with data models and mapping between them. It is an easy tool to use in that context, and provides guidance about available options. Templates are included that complete as much as possible of the definitions for you, and there are sample spreadsheets provided for those who prefer to standardize their datasets in that medium. You do not need SQL experience for disconnected mode adapters, as the Business Adapter Studio running on the inventory beacon does not allow for any custom SQL. In contrast, for connected mode, the Business Adapter Studio allows you to insert custom XML, but you should tackle this level of customization only if you are very confident that you will not cause disruption to your operational data (always use a test environment first!).

What is not suitable for a business adapter?

Business data does not include any inventory of hardware or software from your computer fleet. Inventory is imported during the inventory import process, for which a number of popular inventory tools are supported in a default implementation. You can also create inventory adapters to link non-standard inventory tools to the inventory import. You create inventory adapters using the separately available Inventory Adapter Studio, which is a separate tool from the Business Adapter Studio.



Overview: Development Process for Business Adapter

Business adapters import non-inventory data (such as purchases or enterprise structure) that helps to determine your compliance position.

There are two separate modes in which business adapters can operate:

- In connected mode, where they run on your central application server, and therefore have direct access to your central operations databases.
- In disconnected mode, where they cannot connect to the operations databases because they run on an *inventory beacon* that is remote from it. Here you have some restricted capabilities to increase security.

***Important:** In connected mode, data is injected directly into your operations database. You cannot see any evidence of the import in the **Business Data** tab of the **System** > **Data Inputs** page on your compliance console (this tab shows results only for imports from your inventory beacons).*

Both these modes are outlined in the same list below. If an item does not specifically mention connected or disconnected modes, then it is applicable to both.

To develop a business adapter (overview):

1. Launch Business Adapter Studio and add a framework for a new adapter (see To Start the Business Adapter Studio).
2. In connected mode (only), configure the adapter’s connection to the FlexNet Manager Suite database. This is where imported data will be written by business adapters running in connected mode. See Connecting to the Compliance Database (Connected Mode Only).
3. Configure the connection to the data source. This is where data will be imported from. See Connecting to a Data Source.
4. Confirm that you are querying the correct data from the data source. See Reviewing Data from the Source.
5. Load the list of properties from the data source, so that they can be mapped to objects in FlexNet Manager Suite. See Retrieving the List of Fields.
6. Link the objects in your source data to the objects that you want to update in FlexNet Manager Suite. See Choosing Target Database Items in FlexNet Manager Suite.
7. Define rules that manage updates and creation of these objects, based on the incoming data. See Defining Import Rules for a Database Item.
8. Define a mapping between the properties in the data source to those of the objects in FlexNet Manager Suite. See Defining Import Rules for Attributes/Properties.
9. In connected mode, you can simulate the data import to confirm it is working as expected. If necessary, you may use logging and tracing to debug any issues with the business adapter. Access all of these topics through Testing and Diagnosis for Your Business Adapter.
10. Save the adapter (Saving Business Adapters).

11. In connected mode, perform a real import from the data source into FlexNet Manager Suite (this calls the business importer to do the import). See Running an Import from the Business Adapter Studio.
12. Outside Business Adapter Studio, for connected mode only, configure a scheduled task to regularly run your new adapter. See Setting Up Regular Imports (Connected Mode).

Managing Business Adapters

You can create, save, modify, and test adapters from within Business Adapter Studio. Access the Business Adapter Studio itself through your inventory beacon in disconnected mode, or through the Windows Start menu on your central application server.

While business adapters can be entirely managed within the Business Adapter Studio, they may also be deleted in Windows Explorer. If you choose this approach, remember to modify any associated scheduled tasks as well.

To Start the Business Adapter Studio

For adapters that run on an inventory beacon, start the Business Adapter Studio from your inventory beacon interface. Alternatively, for those that will run on your central application server, start it from the Windows Start menu.

Disconnected mode is used whenever the business adapter runs on a separate computer that is not the operations server for an on-premises installation of FlexNet Manager Suite. A typical example is where the business adapter will run on an inventory beacon, perhaps because of network partitioning that separates the data gathering from your central server.

When the adapter runs on your central, on-premises server and has simultaneous access both to the business data and to the operations database for FlexNet Manager Suite, this is called connected mode. There are separate methods for starting Business Adapter Studio in connected and disconnected modes.

***Note:** The account running the FlexNet Beacon interface requires administrator privileges. In particular, when running the Business Adapter Studio, the account must have write privileges to the registry on the server where it is executing. If this privilege is not available, and you select the encryption option in the Business Adapter Studio, the product will fail with the error `The type initializer for 'Flexera.BusinessImport.BusinessImporterCryptgrapher' threw an exception`.*

To start the Business Adapter Studio:

1. In disconnected mode, where the finished adapter will run on an inventory beacon:
    a. Select the **Business Importer** tab in the user interface for the inventory beacon.
    b. Optionally, if you think that new templates and reference files may be available since you started the inventory beacon user interface (UI), you may click **Download Configuration**.

       As the configuration files don't change often, and are checked for currency each time that you start the inventory beacon UI, this is necessary only in special circumstances.
    c. Click one of the following buttons:
        - Click **New...** if you are starting development of a new business adapter.

- Click **Edit...** to modify one of your existing business adapters.

  Business Adapter Studio displays an initial dialog to collect details, and opens the appropriate business adapter in the editing environment.

2. In connected mode, where the business adapter will run on your on-premises operations server:

   a. From the Windows Start menu, open the **Flexera Software** program group.

   b. In that group, click **Business Adapter Studio**.

   Business Adapter Studio opens a blank window.

Creating a New Adapter

From the inventory beacon UI, you can start working on exactly one new business adapter at a time. Once the Business Adapter Studio is open, however, you can start other new adapters, and work on each one in its own tab.

When the Business Adapter Studio is already open:

1. Do either of the following:

- Click the New icon ( ) in the tool bar.
- From the **File** menu, click **New...**.

A shell for a new adapter is created in its own tab within Business Adapter Studio, and given a default name in the structure outline on the left (you can rename the adapter at any time).

Starting instead from the inventory beacon user interface:

2. In the user interface for the inventory beacon, select the **Business Importer** tab.

3. Click **New...**.

Business Adapter Studio displays an initial dialog to collect details.

4. Select the appropriate **Adapter template** from the option list.

The adapter templates correspond to the objects in the operations databases that you are allowed to import in disconnected mode (through an inventory beacon). Each type allows you to import a fixed set of attributes for that object, and sometimes a small set of links to other related objects in the database.

5. Give the business adapter a useful name (**Adapter name**) that will assist you with future maintenance. The adapter name will also be referenced by the business importer.

6. Choose how the finished business adapter will execute on its business connection to the third-party system in **Execute as**:

- Choose **Windows (current account)** if the connection will use the account that is then executing the FlexNet Beacon engine
- Choose **Windows (specific account)** if the Business Importer should use a different account to make the connection to the other system, or file share, and so on.

If you choose the latter, the **Username** and **Password** fields are enabled, where you can provide the credentials for the specific account.

7. Click **Save**.

   A shell for a new adapter is created in Business Adapter Studio, ready for you to identify the connection to be used to gather the information.

Editing an Existing Business Adapter

Different choices are available depending on whether the Business Adapter Studio is already open.

You may be reopening an adapter that you have been working on recently, or you may be updating a business adapter originally created with an earlier release of FlexNet Manager Suite. As certain objects and attributes may be deprecated over time, you may see various alerts.

Use this process when starting from the inventory beacon (when the Business Adapter Studio is not already open):

1. In the inventory beacon, select the **Business Importer** tab.
2. In the list of **Current scheduled imports**, select the row identifying the business adapter you want to edit.
3. Click **Edit...**, and the **Edit business connection** dialog appears. (For more information about completing this dialog, see Creating a New Adapter.)

Choose either of these options when the Business Adapter Studio is already open (in either mode, on the inventory beacon or the application server):

- Click the Open icon (📂) in the tool bar.
- From the **File** menu, click **Open...**.

If you open an old business adapter that contains deprecated content, a large warning dialog appears, and the status bar displays the list of deprecated objects or properties. Click on the status bar to display the list more conveniently. Deprecated objects and properties have a different icon in the tree list (on the left hand side), and also have a text explanation such as `(Deprecated property)` alongside the name.

Best practice is to check the adapter and delete deprecated objects and properties.

***Tip:** Business adapters containing deprecated objects and properties can still be executed, but the behavior may be unpredictable and you are at risk of a failed execution.*

Renaming a Business Adapter

You can name (or rename) a business adapter at any time during the development process.

The starting conditions, and the UI presentation, vary:

- In disconnected mode (when the business adapter operates on an inventory beacon), you gave the business adapter a name as you created it. This adapter name is shown as the top-most node in the structure tree on the left.

- In connected mode (when the business adapter is running on your operations server in an on-premises implementation), the business adapter received a default name as you created it. The adapter name is the second level of the structure tree. Consider renaming this as you start your editing process.

As the adapter name will be referenced by the business importer, you should ensure it has a useful name that will assist future maintenance.

To rename a business adapter:

1. In the structure tree on the left side of the user interface for Business Adapter Studio, locate the node for this business adapter (see comments above).
2. Right-click that business adapter node.
3. From the context menu, select **Rename**.
4. Overtype the current name with your preferred name for the adapter, finishing with the **Enter** key.

   Your change is saved in memory until you choose to save the adapter.

Saving Business Adapters

While saving is as you'd expect, there are a few options and a restriction.

🚫 ***Restriction:*** *On an inventory beacon in disconnected mode, you must not change the folder in which business adapters are saved.*

To save the business adapter you are working on now, do either of the following:

- From the **File** menu, choose **Save**.
- From the tool bar, click the Save icon (💾).

To save all the business adapters currently open in Business Adapter Studio:

- From the **File** menu, choose **Save All**.

💡 ***Tip:*** *In either of these processes when you are in connected mode, if a business adapter has not previously been saved and remains unnamed, you are offered the chance to name it while saving. The name you supply is shown in the tab for this business adapter, if you have multiple adapters open.*

To change the XML file name, or (in connected mode only) save to a new location:

- From the **File** menu, choose **Save As**.

💡 ***Tip:*** *If you are on your central application server and relocating an operational business adapter, but intend to continue its use from the new location, don’t forget to check any existing scheduled task that may reference its old name/location, and then remove the old file.*

Keep in mind that renaming the XML file is a separate thing from changing the operating name of the business adapter itself (for which, see Renaming a Business Adapter).

Closing Business Adapters (and the Business Adapter Studio)

Look in the **File** menu.

From the **File** menu of the Business Adapter Studio:

- Choose **Close** to close the business adapter you are currently editing (and continue using Business Adapter Studio).
- Choose **Close All** to close all open adapters.
- Choose **Exit** to close Business Adapter Studio, including closing any open adapters.

Defining Connections for a Business Adapter

Business adapters must connect to other business systems to extract information.

Every business adapter needs a connection defined to the external repository of business data, from which information will be read. This is its connection to the *source*.

Beyond that, connection requirements are different in connected mode and disconnected mode.

- In connected mode (where the business adapter is running on the application server), the business adapter also needs a second connection, to the operations databases (specifically the compliance database) where imported data will be written. This is its connection to the *target* database.
- In disconnected mode (where the business adapter is running on the inventory beacon), the business adapter has no access to the operations databases. Instead, business information is archived into packages and uploaded to the application server, where it is processed nightly and finally loaded into the operations databases (specifically the compliance database). This does not require any connection details. (If you have scaled up to a multi-server implementation, the upload is to the processing server.)

Use the same processes both for creating new connections, and for modifying connection details when you edit an existing adapter.

Connecting to a Data Source

You can prepare adapters for a wide variety of external data sources, and the details required depend on what kind of source is in use.

All the data source adapters start with these common details. Next you will select a different help page for details on completing this task, depending on the type of data source you are working with.

To initialize a data connection:

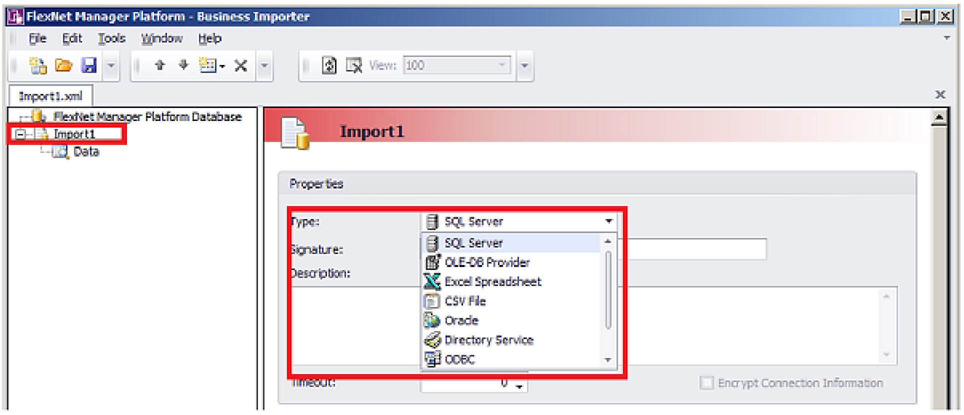
1. Ensure that the desired adapter is open in Business Adapter Studio.

2. In the structure tree on the left, select the node identifying your business adapter (in disconnected mode, this is the topmost node; in connected mode, it is at the second level).

   A page of properties for your business adapter is displayed.

3. From the **Type** drop-down list, select one of the available options. Your choice changes the lower part the page, and each option is documented below.

   Figure 6: Choosing the **Type** for the data source



4. In the **Signature** field, enter the identity to be recorded against the change records generated in FlexNet Manager Suite against data using this adapter. If you leave the field blank, the default signature is `[USER NAME] ([IMPORT NAME])`. You may use any free-form text, and you may include either or both of these variables:

   - `[IMPORT NAME]` — The name of the adapter
   - `[USER NAME]` — The name of the Windows account under which the business importer runs, in the form *`Domain\User`*.

5. Enter a free-form **Description** for this business adapter. This may contain notes about the data source, notes about the adapter, reminders, and limitations.

6. In the **Timeout** field, enter the number of seconds to wait before giving up on a read request on the source data. The following values have special meaning:

   - A value of `0` means there is no limit, and the business importer will wait indefinitely for the database read to finish.
   - A value of `-1` means that the default time-out determined by the source database server should be used.

7. Select the **Encrypt Connection String** check box to encrypt the connection string details stored in the XML file for this adapter.

8. Depending on your choice for the **Type** option (above), the remaining panel on the page displays different content. The available choices are:

`SQL Server`	Connect with a Microsoft SQL Server database (see Completing Connection Properties for Database Sources)

`OLE-DB Provider`	Use for any data source that provides an OLE-DB compliant interface (see CCompleting Connection Properties for Database Sources)
`Excel Spreadsheet`	See Completing Connection Properties for Excel Spreadsheets.
`CSV File`	Use for a file of comma-separated values (see Completing Connection Properties for CSV Files) 💡 ***Tip:*** *This type can also be used for importing general plain text files.*
`Oracle`	Use for an Oracle Database (see Completing Connection Properties for Database Sources)
`Directory Service`	Use for an LDAP directory service such as Microsoft Active Directory (see Completing Connection Properties for Directory Services)
`ODBC`	Use this for a data source that provides an ODBC compliant interface (see Completing Connection Properties for Database Sources)
`Web Service`	Use for a SOAP web service (see Completing Connection Properties for Web Services)
`XML`	Use for an XML file (see Completing Connection for XML Files).

Completing Connection Properties for Database Sources

The SQL Server, OLE-DB Provider, Oracle, and ODBC sources share common input controls in the bottom panel of the adapter properties page.

To complete connection properties for these database sources:

1. To complete the **Connection String** field, click the ellipsis button (**...**) at the right end of the field.

   The standard Microsoft Windows **Data Link Properties** dialog appears.

2. Complete the required details, and the connection string is created for you.

   a. In **Select or enter a server name**, choose or enter a fully qualified server name (or IP address) for the server on which the database is running.

   b. Choose the authentication method for the account under which the business importer will access the database. **Use Windows NT Integrated Security** is recommended for easier maintenance over the long term; or you may use SQL authentication by choosing **Use a specific user name and password**, and entering the account details.

   Important: *If you enter the account details, be certain to select **Allow saving password** so that the password can be brought into the adapter. Otherwise the password will be lost as soon as you click **OK**.*

   c. From the **Select a database on the server** drop-down list, choose the database.

   d. Click **Test Connection** to make sure that your specifications are correct (adjusting as necessary for success).

e. Click **OK** to write these connection details for this adapter into Business Adapter Studio.

3. If you choose to edit the string or need more information, the following table provides additional notes for each database type.

SQL Server	- If you selected Windows authentication, a typical connection string (all on one line) is of the form Integrated Security=SSPI;Persist Security Info=False;Initial Catalog=*SourceCatalogName*; Data Source=*SQLServerName* - For SQL authentication, a typical connection string is of the form Password=*SQLPassword*;Persist Security Info=True;User ID=*SQLAccount*; Initial Catalog=*SourceCatalogName*;Data Source=*SQLServerName*
OLE-DB	OLE-DB is a generic driver that can be used with any databases such as Microsoft Access, Ingres, Paradox, and others, provided that the corresponding OLE-DB driver has been installed and configured on the machine where the import is run. ***Note:*** *The business importer is a 32-bit application, and 32-bit OLE-DB connection strings must be used on 64-bit operating systems.* An example connection string for Microsoft Access: Provider=Microsoft.Jet.OLEDB.4.0;Data Source=*[Path and name of the .mdb file]*
Oracle	Oracle connections require the installation of an Oracle client provided by Oracle Corporation. The Oracle client installs the OLE-DB driver for Oracle. An example connection string: Password=*Password*;User ID=*User*;Data Source=*OracleDataSourceName*; Persist Security Info=True
ODBC	ODBC is a generic driver than can be used in conjunction with the Microsoft OLE-DB Driver for ODBC Drivers. The connection string varies according to the driver used. An example for a connection to an Excel file using a test DSN: DSN=test;DriverId=790;FIL=excel 8.0;MaxBufferSize=2048;PageTimeout=5;

4. Enter an SQL query in the **Query Text** field.

   This query runs against the data source, and return a grid of data that the business importer brings into the compliance database in FlexNet Manager Suite. Most of the rest of the Business Adapter Studio UI focuses on mapping the data returned by this query to the appropriate properties in the compliance database.

5. In the **Timeout** field, enter the number of seconds to wait before giving up a query from the data source. The following values have special meaning:

   - A value of `0` means there is no limit and the business importer will wait indefinitely for the query to finish.

- A value of `-1` means that the default time-out determined by the source database server should be used.

Completing Connection Properties for Excel Spreadsheets

Complete these settings when the source business data is in a well-formed Excel spreadsheet.

As well as making these settings in the Business Adapter Studio, consider the registry settings documented below.

The following properties can be set when importing from an Excel spreadsheet.

Property	Notes
File name	The full path to the Excel file to import. 💡 ***Tip:*** *Click the ellipsis button (**...**) at the right of the text box to use Windows Explorer to locate the file.*
Worksheet	The specific worksheet to import from within the spreadsheet. Only one worksheet can be imported using each adapter.
Auto-generate SQL Query	Selecting this check box causes Business Adapter Studio to automatically generate the SQL query for the worksheet (recommended). Alternatively, you may clear this check box and manually specify the query.
Query	The query to run against the Excel spreadsheet and extract data from the chosen worksheet.
Read "Intermixed" data columns as text	Selecting this check box causes the OLE-DB driver to resolve ambiguous columns as text. The driver uses the first several rows (default 8) to determine the data type of each column, and favors numeric when confused. A numeric setting causes the import to fail for any records containing text in such a column. Clear this check box to rely on the OLE-DB driver to determine the column type.
First row contains column names	Select this check box if the first row in the spreadsheet is a header row with the names of the columns, rather than a data row. Conversely, clear the check box if the first row contains values that should be imported.

You may also want to consider adjusting the following registry entries on the computer where the business adapter runs:

- In disconnected mode, on the inventory beacon
- In connected mode, possibly on the application server.

These registry entries are found under the following registry key:

- For 32-bit operating systems:
  `[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Jet\4.0\Engines\Excel]`
- For 64-bit operating systems:
  `[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\Jet\4.0\Engines\Excel]`

Entry	Notes
`TypeGuessRow`	The format for each column is automatically assigned, based on a sampling of 8 rows. This may generate issues in some scenarios. For instance, if the 8 first rows of specific column include only numeric values, the column will be considered as numeric when string values may exist in other rows below. Depending on the scenario, this may cause import errors or values may be discarded. One way to solve the problem is to change the number of rows considered by Excel. To modify this behavior, adjust the entry `[TypeGuessRow]`. This value defines the number of rows to read to determine the format of a column. A value of zero indicates the full Excel worksheet will be read; this value may impact performances.
`ImportMixedType`	Depending on the quality of the data and different scenarios that may occur, there may be mixed data types in the same column (for instance numeric and string). In this case, data should always be considered as a string. To ensure this occurs, set the `[ImportMixedType]` entry to `[Text]`. Make sure that you also select the **Read "Intermixed" data columns as text** field on the **Properties** page for the business adapter, as described above.

***Tip:** If your Excel file to import includes multiple worksheets, the Business Adapter Studio needs further assistance with your import. You can take either of the following approaches:*

- *Make a copy of the Excel file and remove all the worksheets except the one you wish to import.*
- *Leave your spreadsheet unchanged; and modify the Business Adapter Studio configuration to control how this import is processed.*

To make this configuration change:

1. *In the Business Adapter Studio, from the **Tools** menu, choose **Options**.*
2. *In the **Options** dialog, change the **Show advanced options** setting to `Yes`, and click **OK**.*
3. *In your adapter definition, set the option to use physical databases to true, and specify a name for your database staging table.*

This adds the following two attributes to your adapter definition in the XML file:

```
 <Import
        Name="FromMultiWorksheets"
        ...
        UsePhysicalTables="True"
        DataTableName="MyTableName"
        ...
/>
```

Completing Connection Properties for CSV Files

As well as for CSV files, you can use these settings for plain text file imports.

Importing data into the FlexNet Manager Suite database from CSV (Comma-Separated Values) files (or text files) is probably one of the most reliable and simple ways of loading data.

The following properties can be set when importing from a file of comma-separated values.

Property	Notes
File name	This is the full path to the CSV file to import. ***Tip:*** *Click the ellipsis button (**...**) at the right of the text box to use Windows Explorer to locate the file.*
Column delimiter	Choose the option that matches how the columns are delimited in the CSV file. ***Tip:*** *You may enter any printable character as a custom delimiter.* If you choose `Fixed Length`, you must specify the column width in a `schema.ini` file, prepared using the **Tools** > **ODBC Data Source Administrator** menu option.
First row contains column names	Select this check box if the first row in the CSV file is a header row with the names of the values, rather than a data row. Conversely, clear the check box if the first row contains data that should be imported.
Skip the first *nn* Row(s)	Specify a number of data rows to ignore when importing the CSV file. If the first row is flagged as column names, it skips this number of rows after the header row. This is useful for ignoring introductory comments, as may happen (for example) with a Microsoft License Statement (MLS).

Even though CSV imports are usually simple and reliable, there are a number of advanced options for configuring your system to import from CSV files:

- There are registry settings you can set to improve the success of the import process (see below).
- In addition, if you set the **Column delimiter** to `Fixed Length` or want to specify any special treatment of columns in the CSV file, you need to create a `schema.ini` file in the same folder as the CSV file. The business importer will extract column information from the `schema.ini` file when importing data from the CVS file.

Important:
If your imported CSV file uses a delimiter other than the one specified in the Microsoft registry entry (even if the separator is a simple tab character), you must use a schema.ini file to over-ride the registry setting. If you neither change the registry nor use a schema.ini, and use a different delimiter, the import will fail. The registry setting is located at `HKLM\SOFTWARE\Wow6432Node\Microsoft\Jet\4.0\Engines\Text\Format`.

The following registry keys (on the computer where the business adapter runs) may be set for 32-bit systems in:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Jet\4.0\Engines\Text]
```

and for 64-bit systems in:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Wow6432Node\Microsoft\Jet\4.0\Engines\Text]
```

Setting	Comments
`MaxScanRows`	The format for each column is automatically assigned, based on a sampling of 25 rows. This may generate issues in some case scenarios. For instance, if the 25 first rows of specific column include only numeric values, the column will be considered as numeric when string values may exist in other rows below. Depending on the scenario, an error will be generated or values will be discarded. Also any data surrounded by the text delimiter (a double quote [“], will be considered as text. This setting defines the number of rows read to determine the format of a column. A value of zero indicates the full text file will be read; this value may impact performances.
`Format`	Set the delimiter for each field value (replacing the default value of a comma). Any delimit character is allowed, except for double quotation marks (“). A blank space may be used as the delimit character. If for some reason you cannot change the registry setting on this server, you can over-ride the registry setting with a line in a `schema.ini` file.

Using Schema.ini

Placing a `schema.ini` file in the source directory with the CSV file can control the import process.

Column names, data types, character sets, and data conversions may be specified for the business importer using a `schema.ini` file. This file contains the definition of the columns for any text files in the current directory, and overwrites all other settings, including Microsoft registry settings. Using the `schema.ini` file approach is useful, for example, when you need to define fixed length fields, or specify a custom delimter.

For example, if you need to use a delimiter different than the one specified in `HKLM\SOFTWARE\Wow6432Node\Microsoft\Jet\4.0\Engines\Text\Format` (or the equivalent key for 32-bit systems), but for any reason you cannot update that registry setting, you may over-ride the registry with a setting in `schema.ini`. For example, suppose that the registry setting is `CSVDelimited`, but your imported file uses a `Tab` character as the delimiter. Until you create an appropriate `schema.ini`, the import will fail, typically by crushing all your imported columns into one column in the Business Adapter Studio. To over-ride the registry setting for a particular import, create a `schema.ini` containing a line such as the following:

```
Format=TabDelimited
```

Microsoft Windows offers an easy way to generate a default `schema.ini` file based on the existing text files in a directory.

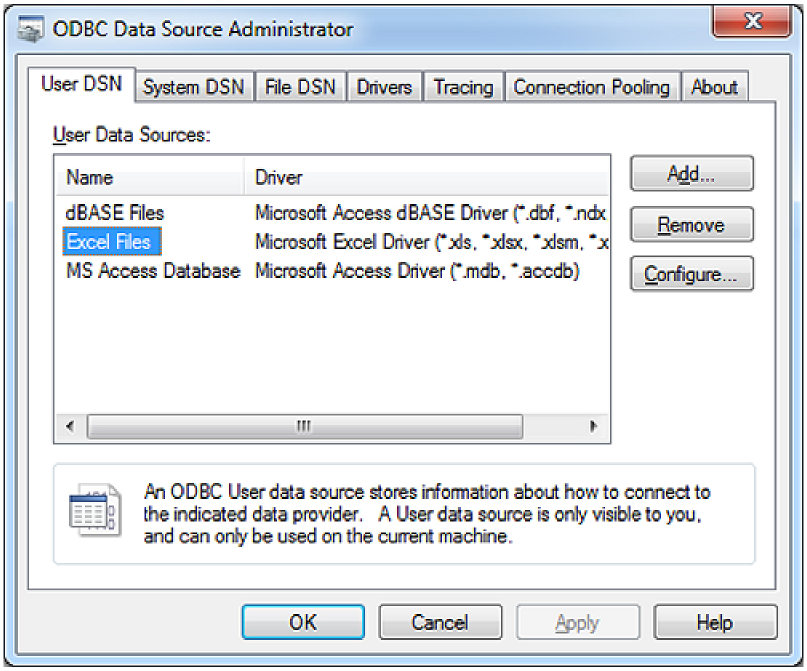
To generate and adjust the **`schema.ini`** ***file:***

1. To initiate the process, do one of the following:

    - On a 32-bit machine, access the Windows Control Panel and select **ODBC** from the icons in the control panel.
    - On a 64-bit machine, run the following command: `C:\Windows\SysWOW64\Odbcad32.exe`.

    The **ODBC Data Source Administrator** properties are displayed.

    Figure 7: The ODBC Data Source Administrator screen



Name	Driver
dBASE Files	Microsoft Access dBASE Driver (*.dbf, *.ndx
Excel Files	Microsoft Excel Driver (*.xls, *.xlsx, *.xlsm, *.x
MS Access Database	Microsoft Access Driver (*.mdb, *.accdb)

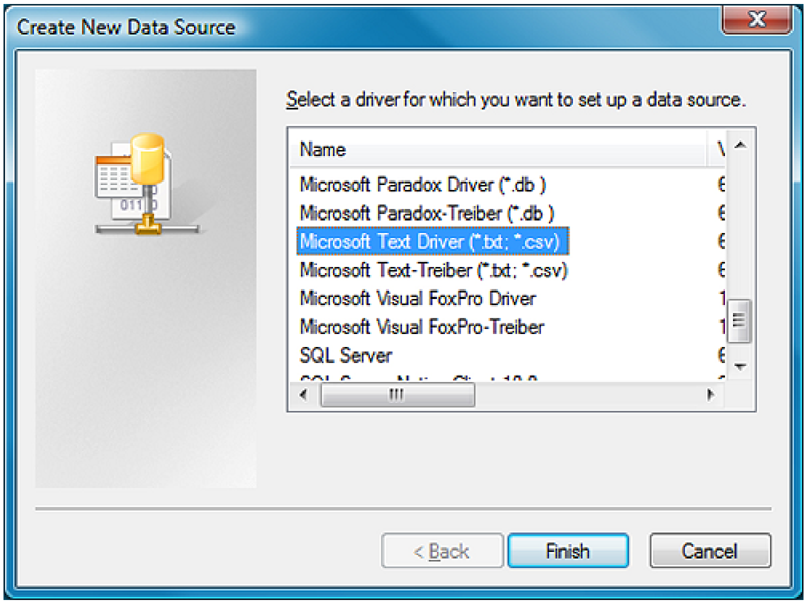
An ODBC User data source stores information about how to connect to the indicated data provider. A User data source is only visible to you, and can only be used on the current machine.

Note: *This tool is primarily used to create and manage ODBC data sources. However, it is used here simply to create a default* `schema.ini` *file.*

2. Click **Add...**.

    The **Create New Data Source** dialog is displayed.

Figure 8: Pick the driver matching your data source



Create New Data Source

Select a driver for which you want to set up a data source.

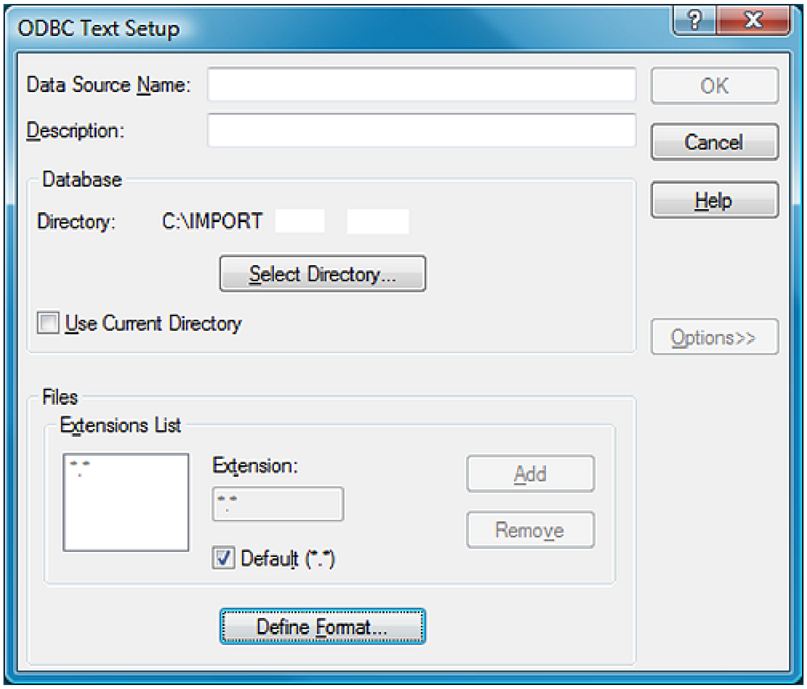
Name
Microsoft Paradox Driver (*.db)
Microsoft Paradox-Treiber (*.db)
Microsoft Text Driver (*.txt; *.csv)
Microsoft Text-Treiber (*.txt; *.csv)
Microsoft Visual FoxPro Driver
Microsoft Visual FoxPro-Treiber
SQL Server

3. For CSV files or text files, select the **Microsoft Text Driver**.

4. Click **Finish**.

   The **ODBC Text Setup** dialog is displayed.

Figure 9: Locate the CSV (or text) file



ODBC Text Setup

Data Source Name:

Description:

Database

Directory: C:\IMPORT

□ Use Current Directory

Files

Extensions List

.

Extension: *.*

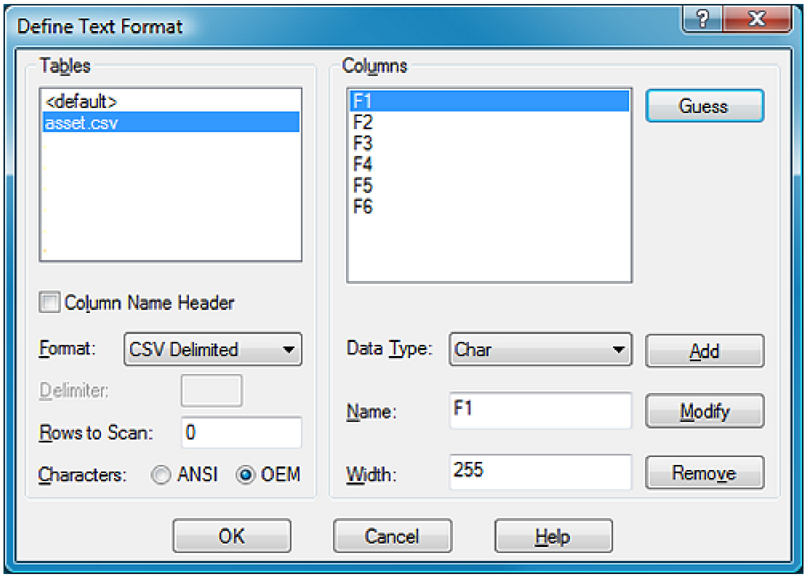
☑ Default (*.*)

5. Click **Select Directory...** and browse to identify and select the CSV (or text) file that you want to use to import data.

6. Click **Define Format...**.

The **Define Text Format** dialog is displayed.

Figure 10: Define the format of the text file



Tables

- <default>
- asset.csv

Columns

- F1
- F2
- F3
- F4
- F5
- F6

☐ Column Name Header

Format: CSV Delimited

Delimiter:

Rows to Scan: 0

Characters: ○ ANSI ● OEM

Data Type: Char

Name: F1

Width: 255

7. Use this dialog to identify the columns of data in your text file, and the data type of each column.

*Tip: Click **Guess** to allow the program to analyze the text file and provide default table and column details. You can then modify any incorrect details.*

8. When you have finished defining the contents of the text file, click **OK** to return to the **ODBC Text Setup** dialog.

9. Click **Cancel**. The data source is not set up, but a new **schema.ini** file is created in the same folder as the text file. The `schema.ini` contains a definition of the tables and columns of the text file.

10. You can now edit the `schema.ini` file as desired, using a text editor such as `notepad.exe` or `wordpad.exe`.

***Tip:** For further information about configuring a `schema.ini` file, see http://msdn.microsoft.com/en-us/library/ms709353(VS.85).aspx.*

Example for a CSV File Import

The `asset.csv` file located in the `temp` directory contains the following values:

```
Assetname, AssetSerialNumber,AssetPrice
   "First Computer", "SerialNumber1", 1000
   "Second Computer", "SerialNumber2", 2000
   "Third Computer", "SerialNumber3", 3000
```

The corresponding XML file used to load the assets in the repository would be:

```
<ImportName="ASSET"
       Type="CSV"
       ConnectionString="Provider=Microsoft.Jet.OLEDB.4.0;Data
    Source=c:\temp;Extended
    Properties='text;HDR=Yes;FMT=CSVDelimited'"
       Query="select * from [asset.csv]">
   <LogName="NewLog"Output="file"Loglevel="debug"filename="[IMPORT
    NAME].log.txt"
      </Log>
   <ObjectName="asset"Type="asset"Output="assetoutid"Update="True"Create="True">
       <Property
           Type="shortdescription"
           Name="Description"
           Value="AssetName"
           ValueType="FieldValue"
           UseForMatching="false">
       </Property>
       <Property
           Type="serialnumber"
           Name="Serial Number"
           Value="AssetSerialNumber"
           ValueType="FieldValue"
           UseForMatching="true">
       </Property>
       <Property
           Type="purchaseprice"
           Name="Purchase Price"
           Value="AssetPrice"
           ValueType="FixedValue"
           UseForMatching="false">
       </Property>
   </Object>
   </Import>
```

Completing Connection Properties for Directory Services

You can import a number of properties from your directory service, most commonly from Microsoft Active Directory.

The following properties can be set when importing from a directory service.

Property	Notes
Login	The account with which to connect to the directory service. ***Note:*** *Credentials are not required if the account is already a member of the target domain.*

Property	Notes
Password	The password (if required) for the account connecting to the directory service.
LDAP PATH	The path to the LDAP directory entry. This is an empty string by default. The value of the path varies depending on the provider used.
Properties to load	Comma-separated list of properties to load from the LDAP directory.
Filter	Define a filter to restrict the number of rows returned from the specified properties. The filter is defined using the LDAP syntax, as customized by the vendor for the directory service. For example, Active Directory (ADSI) queries have the following requirements: • The string must be in parenthesis • Expressions can use the relational operators `<`, `<=`, `=`, `>=`, `>` and the compound operators `&` and `|`. For example, the following filter returns all objects of category `user` and class `person` with a non-blank email address: `(&amp;(objectCategory=user)(objectClass=person)(mail=*))`
Referal chasing	Defines how to handle referrals in the directory system. Possible values are: • `All` — Chase referrals of both subordinate and external types • `External` — (default value) Chase only external referrals • `None` — Never chase the referred-to server • `Subordonate` — Chase only referrals that are to a subordinate naming context in the directory tree.
Search scope	Sets the scope of the search. Possible values are: • `Base` — Limits the search to the base object, and only one object is returned • `One Level` — Search the immediate child objects of the base object, excluding the base object • `SubTree` — (default value) Search the whole subtree, including the base object and all its child objects.
Page size	An integer value (default 10,000) to set the number of records returned per page in a paged search.
Server page time limit	An integer value to limit the number of seconds that the server will search for an page result. The default value (`-1`) means to wait indefinitely.

Property	Notes
Server time limit	Limits the number of seconds that the server spends on an entire search (including all pages). The default value of `-1` means that the server-determined default of 120 seconds will be enforced.
Size limit	An integer value to set the maximum number of objects the server will return in a search. The default value is `0`, which uses the server-determined default size of 1000 entries.
Client timeout	An integer value to set the maximum number of seconds that the client waits for the server to return results. The default value is `-1` which means to wait indefinitely.

Completing Connection Properties for Web Services

These additional details may be needed for connection to web services.

You need a detailed understanding of the web service that the business importer will connect to, using your adapter.
The following properties can be set when importing from a web service.

Properties	Notes
URL	This is HTTP URL of the web service.
Login	Account name with which to connect to the web service. ***Note:*** *Some web services do not require authentication, in which case you do not need to specify account and password.*
Password	The password (if required) for the account connecting to the web service.

<table>
<tr><th>Properties</th><th>Notes</th></tr>
<tr><td><b>Web service function or SOAP message</b></td><td>
Set to one of:

- The function name to call in the web service
- The full SOAP request text.

Function call example: `GetAllPurchaseOrders` results in the following SOAP request:

```
<?xmlversion="1.0"encoding="utf-8"?>
<soap:Envelopexmlns:xsi="http://www.w3.org/2001/
XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/
XMLSchema"xmlns:soap="http://schemas.xmlsoap.org/soap/
envelope/">
<soap:Body>
<GetAllPurchaseOrdersxmlns=\"http://tempuri.org/" />
</soap:Body>
</soap:Envelope>
```

Alternatively, if the SOAP request requires specific syntax or parameters, you can enter the full SOAP request. For example:

```
Query="<?xml version="1.0" encoding="utf-8"?>
 <soap12:Envelope xmlns:xsi="http://www.w3.org/2001/
XMLSchema-instance"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:soap12="http://www.w3.org/2003/05/soap-envelope">
<soap12:Body>
<GetAllPurchaseOrders xmlns="http://tempuri.org/" />
</soap12:Body>
</soap12:Envelope>"
```
</td></tr>
<tr><td><b>SOAP element</b></td><td>
A string containing the name of the element to be read in the Web Service response. When the importer receives a response from the server, the full SOAP message is received, and the business importer may not know which of several XML elements contains the data to import. The business importer attempts to find elements in the following order (and reads data from the first one of these found):

- The element you name in this field.
- An element with a name made of the calling function name followed by the string “`Result`”. In the example shown above, this would be `GetAllPurchaseOrderResult`.
- The `<soap12:Body>` XML element.
</td></tr>
</table>

Properties	Notes
SOAP header values	A string containing the values to be added to the Web Service request header. The values must be formatted as follows: `Name1=Value1;Name2=Value2;`... For example: `SOAPAction="http://MyServer/WebService/GetAllPurchaseOrders"`
Timeout	The number of seconds to wait before giving up on a a query from the data source. A value of `0` means there is no limit and the adapter will wait indefinitely for the query to finish. A value of `-1` means that the server-determined default time out should be used.

Completing Connection for XML Files

All you need is the path. And, of course, a well-formed XML file.

The following property can be set when importing from an XML file.

Properties	Notes
File name	The full path to the XML file to import. 💡 ***Tip:*** *Click the ellipsis button (**...**) at the right of the text box to use Windows Explorer to locate the file.*

Connecting to the Compliance Database (Connected Mode Only)

When you run your own application server, you can build business adapters that connected directly to your compliance database.

The connection to the compliance database is most conveniently made when Business Adapter Studio is installed on the same server as FlexNet Manager Suite (in this case you do not need to know any connection details). When the installations are on separate computers, it is helpful if the development computer has network access to the compliance database. If not, you can work offline without an active connection to the compliance database, but the following limitations apply:

- You cannot load existing custom properties
- You cannot see values in lookup tables
- You cannot simulate data imports for testing, nor trigger real imports
- You cannot access the history of attempted data imports.

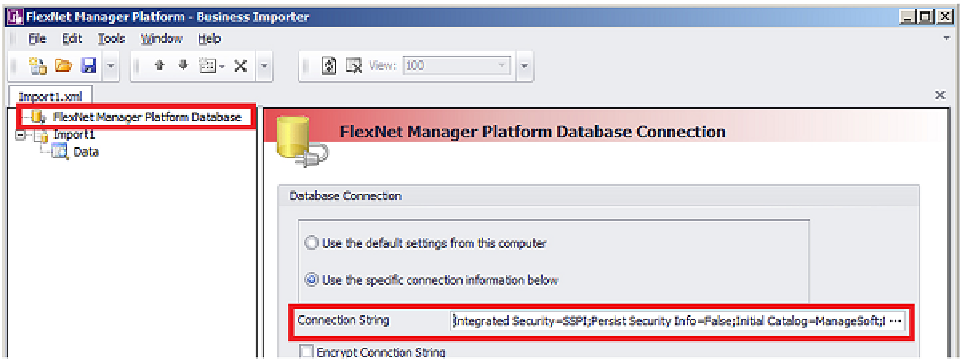
To connect to the compliance database (connected mode only):

1. Ensure that the desired business adapter is open in Business Adapter Studio.
2. In the structure tree on the left, select the top node (**FlexNet Manager Suite Database**).

   A page for connection details is displayed.
3. Select one of the following options:
   - **Use the default settings from this computer** — Select this option only when Business Adapter Studio is running on the same server as FlexNet Manager Suite. This option reads the connection details for the local compliance database from the registry key `SOFTWARE\ManageSoft Corp\ManageSoft\Reporter\CurrentVersion\DatabaseConnectionString`. If you have chosen this option, your definition is complete.
   - **Use the specific connection information below** — Select this option when Business Adapter Studio is running remotely from the compliance database (but still in connected mode), or when you are configuring an adapter for an instance of business importer that runs remotely from the compliance database (but still in connected mode). This option requires you to complete the remaining steps.

   Important: *Do NOT attempt to use this setting for business adapters that run on inventory beacons in disconnected mode.*

   Figure 11: Defining the connection string to the compliance database

   
   FlexNet Manager Platform - Business Importer
File
Edit
Tools
Window
Help
View: 100
Import1.xml
FlexNet Manager Platform Database
Import1
Data
FlexNet Manager Platform Database Connection
Database Connection

   ○ Use the default settings from this computer

   ● Use the specific connection information below

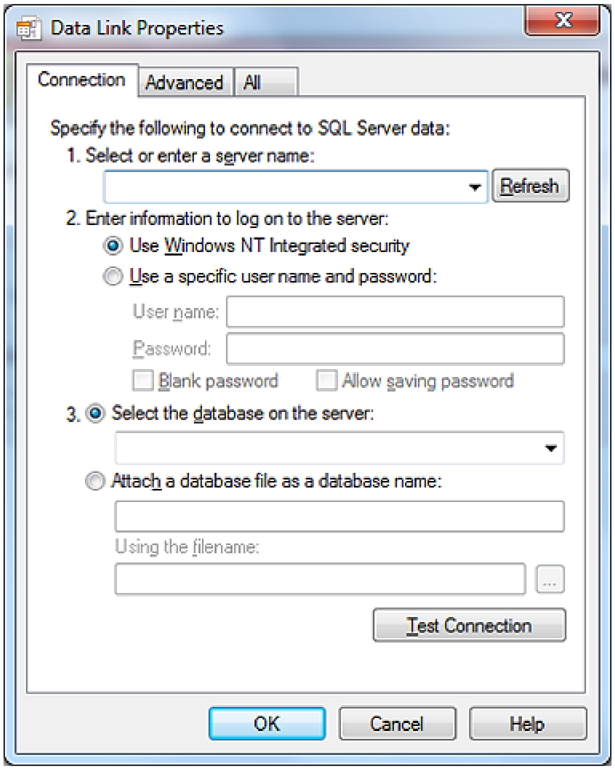
   Connection String: Integrated Security=SSPI;Persist Security Info=False;Initial Catalog=ManageSoft;I ···

   □ Encrypt Connction String
4. To complete the **Connection String** field, click the ellipsis button (**...**) at the right end of the field.

   The standard Microsoft Windows **Data Link Properties** dialog appears.

   Tip: *Although using the **Data Link Properties** dialog is strongly recommended, it is possible to manually edit the connection string when required.*

Figure 12: Specify connection to the compliance database



Data Link Properties

Specify the following to connect to SQL Server data:

1. Select or enter a server name:

2. Enter information to log on to the server:

● Use Windows NT Integrated security

○ Use a specific user name and password:

User name:

Password:

□ Blank password □ Allow saving password

3. ● Select the database on the server:

○ Attach a database file as a database name:

Using the filename:

5. Complete the details in the **Data Link Properties** dialog:

a. In **Select or enter a server name**, choose or enter a fully qualified server name (or IP address) for the server on which the database is running.

b. Choose the authentication method for the account under which the business importer will access the database. **Use Windows NT Integrated Security** is recommended for easier maintenance over the long term; or you may use SQL authentication by choosing **Use a specific user name and password**, and entering the account details.

***Important:** If you enter the account details, be certain to select **Allow saving password** so that the password can be brought into the adapter. Otherwise the password will be lost as soon as you click **OK**.*

c. From the **Select a database on the server** drop-down list, choose the database.

d. Click **Test Connection** to make sure that your specifications are correct (adjusting as necessary for success).

e. Click **OK** to write these connection details for this adapter into Business Adapter Studio.

If you selected Windows authentication, a typical connection string is of the form `Integrated Security=SSPI;Persist Security Info=False;Initial Catalog=ManageSoft;Data Source=`*`SQLServerName`*

For SQL authentication, a typical connection string is of the form `Password=`*`SQLPassword`*`;Persist Security Info=True;User ID=`*`SQLAccount`*`;Initial Catalog=ManageSoft;Data Source=`*`SQLServerName`*

***Tip:** A period (.) entered as the `Data Source` in the connection string uses the database connection on the current server where the business importer is running.*

6. Select the **Encrypt Connection String** check box to encrypt the connection string details stored in the XML file for this adapter.

7. Save the adapter.

Reviewing Data from the Source

You can validate the returned data, with no effect on the source data or future imports.

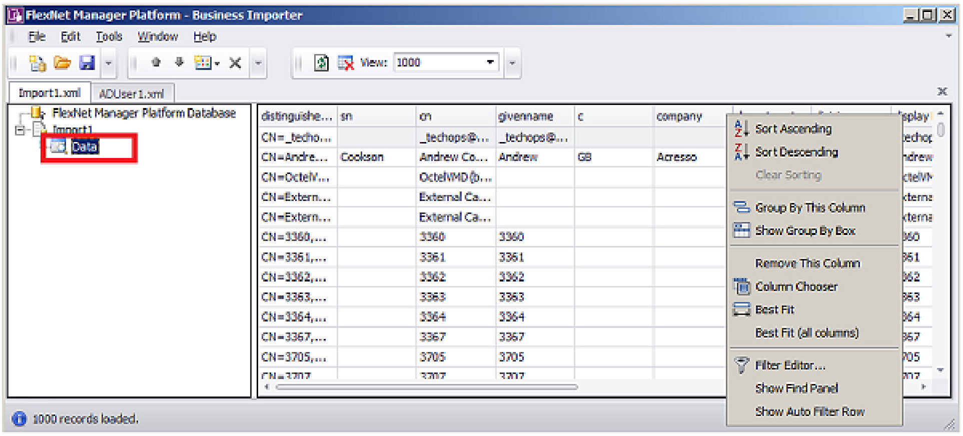
Once the data source connection has been configured, the next step is to preview the data returned from the query. This confirms that you have configured the connection properly and are retrieving the expected data.

To review the returned data:

1. Click on the **Data** node in the structure tree on the left.

   The main panel displays the data returned from the data source.

   Figure 13: The data grid offers many options for organizing the list



distinguishe...	sn	cn	givenname	c	company	splay
CN=_techo...		_techops@...	_techops@...			techop
CN=Andre...	Cookson	Andrew Co...	Andrew	GB	Acresso	ndrew
CN=OctelV...		OctelVMD (b...				ctelVM
CN=Extern...		External Ca...				xterna
CN=Extern...		External Ca...				xterna
CN=3360,...		3360	3360			360
CN=3361,...		3361	3361			361
CN=3362,...		3362	3362			362
CN=3363,...		3363	3363			363
CN=3364,...		3364	3364			364
CN=3367,...		3367	3367			367
CN=3705,...		3705	3705			705
CN=3707		3707	3707			707

2. Right-click on the column header to organize the data as you require.

***Note:** Operations on this list have no impact on the data source or data import. This list simply helps you confirm that you are gathering the correct data from the source.*

Linking Data Imports to FlexNet Manager Suite

With the source data connection specified and checked, it's time to map the incoming source data to the destination fields within the operations databases (specifically the compliance database).

Mapping the source data to the destination database includes these steps:

1. Retrieving the list of fields from the data source (see Retrieving the List of Fields).
2. Choosing the target objects in the compliance database to which the data applies, and the order in which they should be populated in view of their interdependencies (see Choosing Target Database Items in FlexNet Manager Suite).
3. Defining the import rules to be applied to each imported item, for handling updates and object creation (see Defining Import Rules for a Database Item for database objects, and Defining Import Rules for Attributes/Properties for their individual attributes or properties).
4. Linking the source data fields, one by one, to the attributes (or properties) of the database objects in the target compliance database. For linking to objects, see Defining Import Rules for a Database Item. For their properties, see Defining Import Rules for Attributes/Properties.

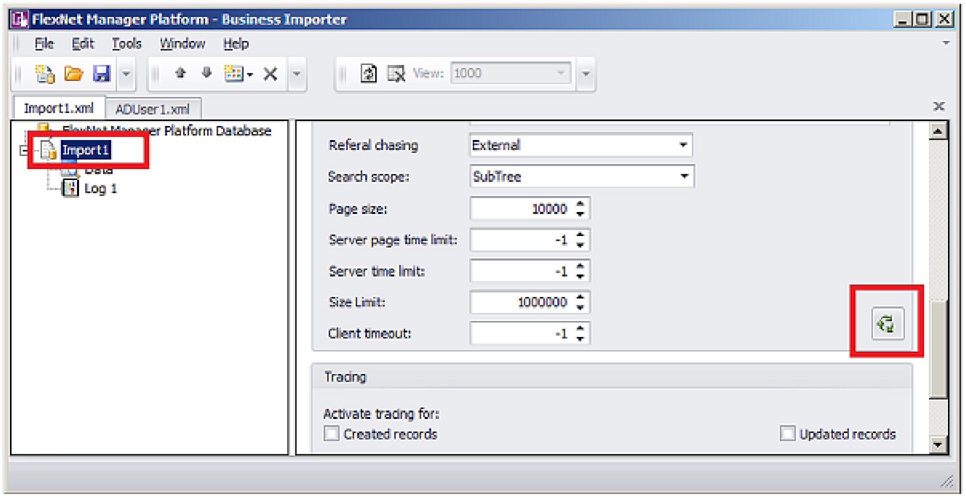
Retrieving the List of Fields

Once confident that the correct information is returned from the data source, you may retrieve the field list from the data source. This step is required before you can start mapping data fields from the data source to objects in FlexNet Manager Suite.

To retrieve the list of fields:

1. From the structure tree on the left, select the name of this adapter (representing the XML file).
2. In the data page, click the retrieval button (♻) on the right side.

Figure 14: The retrieval button fetches the field list into memory



Referal chasing: External
Search scope: SubTree
Page size: 10000
Server page time limit: -1
Server time limit: -1
Size Limit: 1000000
Client timeout: -1

Activate trading for:
□ Created records
□ Updated records

The field list is fetched into memory. If there are problems, an error dialog appears; otherwise a success message appears in the status bar at the bottom of the user interface. The field list in memory is available for the next step, linking the imported data fields to the compliance database.

Updating Business Adapter Templates and Data Model

You can manually ensure an update of the local copy of the data model and templates used for business adapters (this is especially useful if you are adding custom properties).

The templates for business adapters, along with the sample spreadsheet files and the data model permissible for business adapters running in disconnected mode, are automatically updated daily (on the same schedule as inventory rules are downloaded to the inventory beacon). In special circumstances, you may need these updated more immediately: for example, if you have just created a custom property on the application server, and want that custom property reflected in your business adapter, you can trigger an immediate download (when you don't want to wait through the rest of the 24 hour cycle).

Tip: *The data model is updated before each download, so that it includes the latest data structure including custom properties.*

It's better to update the templates and schema *before* adding the modified database object to your business adapter.

To manually update the data model and adapter templates:

1. Ensure that the Business Adapter Studio interface is closed.

   This permits the update of all downloaded files, and ensures that the new files are read when the Business Adapter Studio is reopened.

2. In the inventory beacon interface, select the **Business Importer** tab.
3. Click **Download Templates**.
4. Wait 2-3 minutes for the generation and download of all the data.
5. Still on the **Business Importer** tab, do one of the following:
   - Click **New...** to start a new business adapter using the latest templates and data structures
   - Select your preferred business adapter from the **Current scheduled imports**, and click **Edit...** to reopen the Business Adapter Studio and resume editing.

   Tip: *New properties are available only as you add the parent database object to your adapter. For example, suppose you already have a* `Vendor` *object in your business adapter, and you interrupt development to add a custom property to the* `Vendor`*. After completing the download process documented here, you need to delete your previously-entered* `Vendor` *object, and replace it with a new* `Vendor` *object so that you can access the custom property.*

Choosing Target Database Items in FlexNet Manager Suite

The business adapter you are working on is open in the Business Adapter Studio.

Tip: *If you are including custom properties in your business adapter that runs on an inventory beacon (in disconnected mode), make sure that, first:*

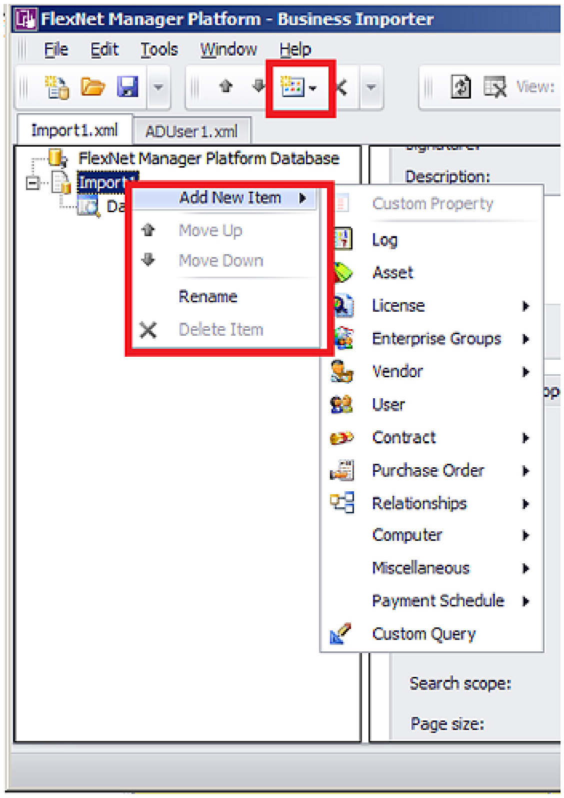
- *The custom property has been defined on the application server*
- *You have downloaded the latest templates and data schema that includes your custom properties. For details, see Updating Business Adapter Templates and Data Model.*

To select database items:

1. Do either of the following:
   - Click the New Item button (▾) on the tool bar
   - Right-click the adapter node in the structure tree, and from the context menu select **Add New Item**.

   A context menu appears listing items from the compliance database. Many of these menu entries open sub-menus. (Menu entries vary in connected and disconnected modes.)

   Figure 15: Choosing the target item in the compliance database



2. Select an item from the compliance database from the menu, working in logical order:

- Select objects before any relationships they appear in.
- Select objects before any other objects that refer to them. For example, if you have new vendor data and new purchase orders, ensure that the vendor object appears in the list before the purchase order object, as purchase orders refer to vendors.

As you select an item, a new node is added to the structure tree under the adapter.

3. Repeat for all the compliance database objects needed.
4. If necessary, adjust the order of compliance database items by right-clicking an item and choosing **Move Up** or **Move Down** from the context menu. Remember that objects must receive imported data before they can be referenced by data imported to any other object.

Tip: *Expand a database item in the structure view to see the object's properties.*

Creating Import Rules

Import rules control creation and update of database items (in response to imported data) at two levels: object and attribute.

Once you have selected an item (object, relationship, or query) in the compliance database, you can establish the import rules for that item, including the source from your external data that should be loaded here. Import rules are available at two levels:

- The database objects themselves (such as vendor, purchase order, payment schedule), for which see Defining Import Rules for a Database Item
- The individual properties (or attributes) of those objects (such as name, telephone number, and so on), for which see Defining Import Rules for Attributes/Properties.

Defining Import Rules for a Database Item

Import rules may be set separately for objects and attributes. This topic covers the higher-level objects/items.

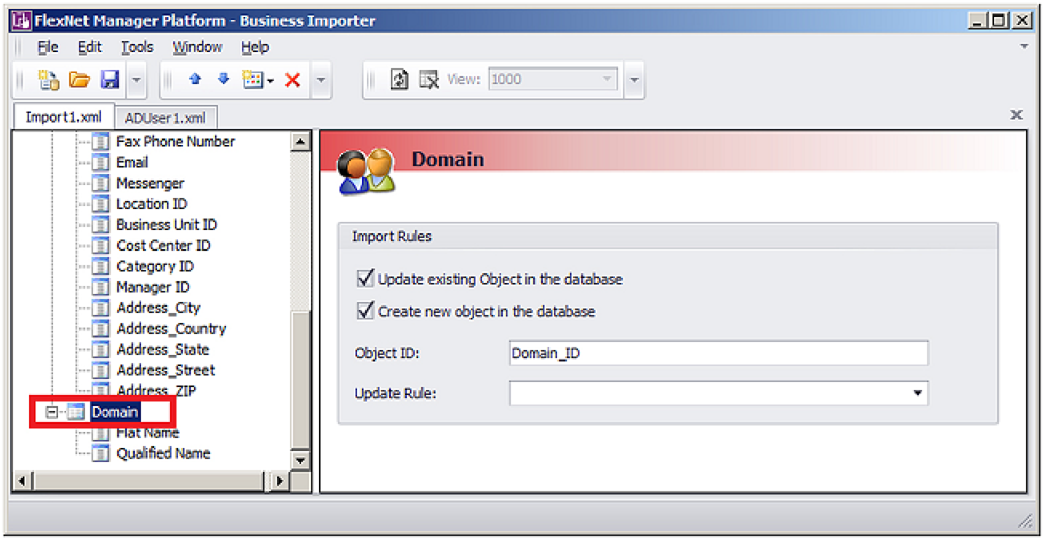
Your business adapter is open in Business Adapter Studio.

To specify import rules for database objects:

1. Select a compliance database item (object, relationship, or query) in the structure tree on the left side.

   The main page displays the import rules for that item.

Figure 16: The import rules for an object in the compliance database



Import Rules

☑ Update existing Object in the database

☑ Create new object in the database

Object ID: Domain_ID

Update Rule:

2. Complete the settings for the available fields:

Option	Description
Update existing Object in the database	The business importer always attempts to find a matching record in the compliance database for each imported record. When a matching record is found: • If this check box is selected (the default, and recommended), updates of the matching record may proceed according to the detailed settings you define later • If this check box is clear, existing compliance database objects will not be updated by this import. This setting may be useful if you wish to use this imported data to construct information that updates a different object (for example, construct information for a manager to update a user record).
Create new object in the database	When the business importer cannot find a matching record already in the compliance database: • If this check box is selected (the default, and recommended), a new database object will be created for the imported record • If this check box is clear, a new record will not be created for this new data in this import. You may wish to use this imported data to construct information that updates a different object (for example, construct information for a manager to update a user record).

Option	Description
Object ID	A unique ID for the data being imported in relation to this object. This ID appears in your finished XML file, and relates only to your import process: it is completely independent of the object’s identification field in the compliance database. You may use this ID to differentiate between similar imported items, making your finished XML file easier to read and maintain. For example, if you are importing a spreadsheet of computer assets, one column might identify the leasing contract, and another identify the maintenance contract. This import requires (in addition to the asset record) the creation/update of two contract records, which you can usefully identify with this ID field (such as `LeaseContractID` and `MaintenanceContractID`).

Option	Description
Update Rule	For database *objects* (not relationships or queries), there are only two choices: • Leave this blank to have duplicate records in the source data silently ignored • Select `Reject duplicate records` to have duplicate records recorded in the log file. If, instead, you have selected a *relationship* between database objects, the available values depend on which relationship is selected. These choices control how the Business Importer should handle relationships already existing in the database that are not supported by evidence included in the current import through this adapter. • **Link Contract - Asset** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach unfound assets from the considered contracts` — Removes asset links from contracts where assets were not found in the incoming data ◦ `Detach unfound contracts from considered assets` — Removes contract links from assets where contracts were not found in the incoming data ◦ `Detach all unfound links between the considered assets and contracts` — Removes all links not provided in the incoming data. • **Link Contract - License** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach unfound licenses from the considered contracts` — Removes license links from contracts where licenses were not found in the incoming data ◦ `Detach unfound contracts from the considered licenses` — Removes contract links from licenses where contracts were not found in the incoming data ◦ `Detach all unfound links between the considered licenses and contracts` — Removes all links not provided in the incoming data. • **Link Purchase Order Line - License** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach all unfound licenses from the considered PO lines` — Removes license links from purchase order lines, where licenses were not found in the incoming data ◦ `Detach all unfound PO lines from the considered licenses` — Removes purchase order line links from licenses, where purchase order lines were not found in the incoming data

Option	Description
	◦ `Detach all unfound links between the considered licenses and PO lines` — Removes all links not provided in the incoming data. • **Link Purchase Order Line - Asset** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach all unfound assets from the considered PO lines` — Removes asset links from purchase order lines, where assets were not found in the incoming data ◦ `Detach all unfound PO lines from the considered assets` — Removes purchase order line links from assets where purchase orders were not found in the incoming data ◦ `Detach all unfound links between the considered assets and PO lines` — Removes all links not provided in the incoming data. • **Link Payment Schedule - Asset** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach unfound assets from the considered payment schedules` — Removes asset links from payment schedules where assets were not found in the incoming data ◦ `Detach unfound payment schedules from considered assets` — Removes payment schedule links from assets where payment schedules were not found in the incoming data ◦ `Detach all unfound links between the considered assets and payment schedules` — Removes all links not provided in the incoming data. • **Link Payment Schedule - License** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach unfound licenses from the considered payment schedules` — Removes license links from payment schedules where licenses were not found in the incoming data ◦ `Detach unfound payment schedules from considered licenses` — Removes payment schedule links from licenses where payment schedules were not found in the incoming data

Option	Description
	◦ `Detach all unfound links between the considered licenses and payment schedules` — Removes all links not provided in the incoming data. • **Link Users - Contracts** ◦ `Add new links, leave the existing ones untouched.` — (default) Never delete any existing relationships ◦ `Detach unfound users from considered contracts` — Removes user links from contracts where users were not found in the incoming data ◦ `Detach unfound contracts from the considered users` — Removes contract links from users, where contracts were not found in the incoming data ◦ `Detach all unfound links between the considered contracts and users` — Removes all links not provided in the incoming data. • **Software Allocation** (covers individual allocations made on licenses that may influence consumption calculated for linked software applications) ◦ `Add new links, leave the existing ones untouched` — (default) Never delete any allocations already existing in the database ◦ `Detach unfound software allocations from the considered computers` — Removes license allocation links from computers included in the import, where application installations linked to the same license were not found in the incoming data ◦ `Detach unfound computers from considered software allocations` — Removes license allocations (mentioned in the import) from those previously-linked computers that were not also found individually listed in the incoming data ◦ `Detach all unfound links between the considered computers and software allocations` — All computers and license allocations mentioned in the imports have their existing records in the database checked; and any links in the database that are not also repeated in the incoming data are removed from the database. ◦ `Reject duplicate records` — Duplicate records of allocations are recorded in the log file, rather than being silently ignored.

Defining Import Rules for Attributes/Properties

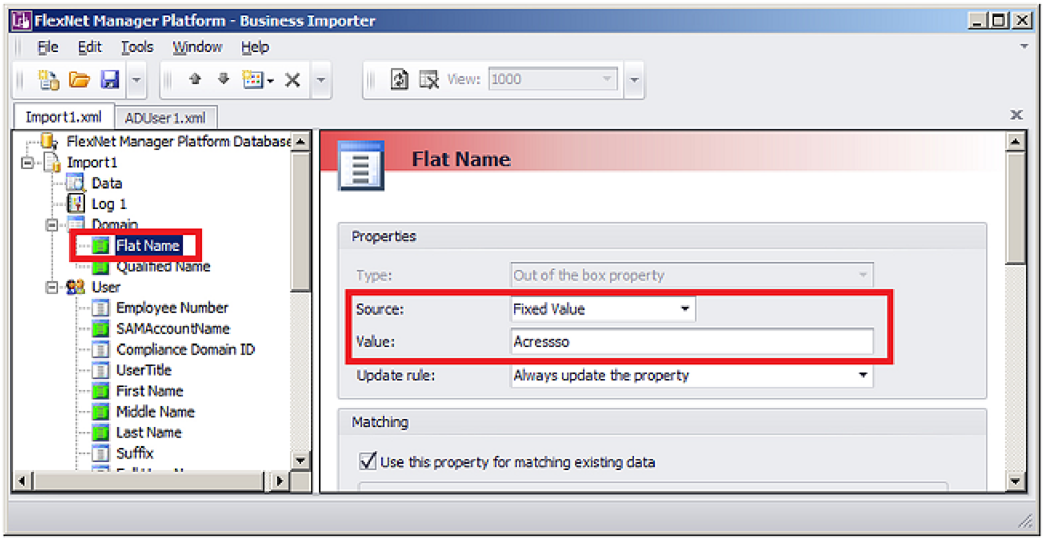
When you have set the import rules for an item in the compliance database/>, you may set fine-grain import rules for handling imports to the individual properties of each of those objects.

To define rules for property imports:

1. Expand the database object in the structure tree, and select the desired property of your chosen item.

   The main page shows the available settings for this import rule. Settings are divided into groups.

   Figure 17: Import rule for a *property* of compliance database/> object



Type: Out of the box property

Source: Fixed Value

Value: Acressso

Update rule: Always update the property

☑ Use this property for matching existing data

2. Complete the settings for the fields available in the **Properties** section of the page:

Type

A read-only display of the type of the property in the compliance database. Possible values are:

- `Custom property` — A custom property defined and displayed in the UI for FlexNet Manager Suite
- `Out of the box property` — A factory-supplied property.

Source

Taken together with the **Value** field, these define the source for the data to insert in this database property. In this name-value pair, this **Source** field specifies how the **Value** is to be interpreted. Available values are:

- `Field Value` — (default) The **Value** contains one of:
  - A column name in the source data
  - An ID from an item higher in the structure tree for this adapter (the output value of this item will be inserted in the database for this property).
- `Fixed Value`— A value that is specified in the **Value** field.
- `SQL Value` — The result of an SQL query. The **Value** field must contain a SQL fragment which will evaluate to a value. The SQL fragment may include columns from the data source.

Value	The value associated with the preceding **Source** field. Content depends on the setting for **Source** (see details above).
Update rule	Specifies what impact newly imported data is to have on information already in the compliance database/>. Possible values are: • `Always update the property` — any incoming value (including blank) replaces any existing value • `Never update the property` — any *existing* value (including blank) is preserved, regardless of any incoming value • `Update only if the value is empty` — if there is no existing value, the imported value is inserted; but the imported value is ignored if there is any existing value already in the database for this property • `Never replace an existing value with blank` — if there is a (non-blank) value in the incoming data, it replaces any existing value; but if the incoming data stream has a blank for this property, any previously existing value in the database is preserved.

3. If this property in the imported data forms part of the database key used to match existing records, select **Use this property for matching existing data**. Some database records have multi-part keys. Clear this check box when the data element does not form part of the database key in the compliance database, but is simple data. When this check box is enabled (the default), the following fields can be set.

If null value is found	Select one of the following values from the drop-down list: • `Discard the record` — The entire record is discarded when this property is empty. • `Do not use this property for searching` — When this property is empty, it is ignored in matching for database keys. This requires that you have defined multiple properties for matching. If not (and this is the only key-matching property), this record will not match any existing data. • `Search for null value` — The property is used for searching, and matches records with a null or empty value.

Property pattern

In connected mode, this setting works in conjunction with **Matching mode** and **Value pattern**. It is relevant only when **Matching mode** is `Like` (and is otherwise ignored). For `Like` matches on key field data, this setting is a pattern to be matched in the *existing target compliance database/>*.

The rules for specifying a pattern match are:

- The wild card character is the percent sign (%).
- A literal value must be enclosed in square brackets, as `[`*`value`*`]`.
- The way of combining the wild card and literal value depends on the setting for **Source** (in the **Properties** group, above). For example, to create a `Like` match that expressed the concept of 'contains *`value`*', write the pattern in the following ways:
    - If **Source** is `Fixed Value`, write: `%[`*`value`*`]%`
    - If **Source** is `SQL Value` or `Field Value`, write: `'%' + [value] + '%'`

In disconnected mode, on your inventory beacon, this setting is disabled, and is always interpreted as `[`*`value`*`]%`.

Matching mode

The type of matching to perform. This setting works in conjunction with **Property pattern** and **Value pattern**. Possible values are:

- `Equal` — The value of the existing compliance database/> property must exactly match the incoming value in the imported data
- `Like` — Enables matching with the use of wild cards on either side of the test, with the compliance database/> side expressed in **Property pattern** and the incoming data side expressed in **Value pattern**.

Value pattern

This setting works in conjunction with **Matching mode** and **Property pattern**. It is relevant only when **Matching mode** is `Like` (and is otherwise ignored). For `Like` matches on key field data, this setting is a pattern to be matched in the *data imported from the external source*.

The rules for expressing the pattern to match depend on the setting for **Source**. See the details for **Property pattern**, above.

4. Where the imported data from the external source needs transformation before being inserted into the compliance database/>, complete the settings in the **Data Transformation** section of the page for each modified property. The following settings are available, and are processed in the order shown in the user interface: that is, data may be extracted using a regular expression, and the result then subject to search and replace, and so on.

Regular expression

Specify an expression that may be used to extract a subset of the value from the external source data. For example, to extract a flat domain name from an Active Directory record, you could write: `(?&lt;=OU=).*?(?=,)`

See also **Options** below.

Find
Replace by

These two settings specify a range of substitutions that are possible per incoming property. Use these guidelines:

- Separate multiple values in both fields with your choice of comma (`,`) or hash / pound sign (#). Use the same separator consistently for all values per property.
- Spaces are significant, and are included in the processing.
- Include the same number of elements to find and as replacements. Any excess in either field is ignored.

For example:

- **Find**: `Microsoft Corp.,Microsoft Corporation,Adobe Inc.`
- **Replace by**: `Microsoft,Microsoft,Adobe`
- Results are:

Incoming external data	*Value written to database*
`Microsoft Corp.`	`Microsoft`
`Microsoft Corporation`	`Microsoft`
`Adobe Inc.`	`Adobe`
`Adobe Systems Incorporated`	`Adobe Systems Incorporated`

Split values on

May be used only for the `groupcn` property of an enterprise group. When the incoming data expresses the group membership as a complete path, you can specify a separator character on which the string will be split into separate values. For example, if the full location path is provided as a single property containing: `USA/Boston/100 North Washington` this can be split on the slash character to form the following structure in the compliance database/>:

Tip: *If new records are created in the compliance database/> as a result of this import, the required parent-child links between these split elements are inserted automatically.*

To determine the ordering of the split fields, see **Read Order** below.

Read Order

Works with **Split value on** to determine the ordering of the split values extracted from a string identifying an enterprise group. The possible values are:

- `Forward` — (default) The left-most element is taken as the parent, with generations of children proceeding left-to-right
- `Reverse` — The left-most element is taken as the lowest-level leaf node; the generations of children proceed from right-to-left.

Options	Specifies options for the regular expression (at the top of the page). Possible values are: • `CultureInvariant` — Specifies a standard convention for determining upper- and lower-case characters used in case-insensitive matching (particularly useful for matching against system resources such as account names and passwords) • `ECMAScript` — Specifies ESCMA script compliant behavior is enabled for the expression • `IgnoreCase` — Specifies case insensitive matching • `IgnorePatternWhitespace` — Specifies that unescaped white space is excluded from the pattern • `Multi Line` — Specifies multiline mode • `RightToLeft` — Specifies that the search moves from right to left instead of left to right • `SingleLine` — Specifies single-line mode.

5. If required, check or modify the settings contained in the **Advanced Properties** section of the page. The following values are available.

Column Name	A read-only display of the column name for this property in the compliance database/> in FlexNet Manager Suite.
Data Type	A read-only display of the data type of this property in the compliance database/> in FlexNet Manager Suite.
Length	A read-only display of the length of this property in the compliance database/> in FlexNet Manager Suite.
If value is missing	Determines the behavior of the business importer in cases where the column for this property is entirely missing from the source data. When you are designing your own adapter, a missing column probably means that something has gone grossly wrong, and your import should fail, in order to draw your attention to the problem. The other values are more useful for some factory-supplied adapters for spreadsheet data, where there is less control over the columns in the source data. Possible values are: • `Do nothing (the import will fail)` — (default) Leave this value selected for most adapters, as a failed import will alert you to a problem in the source data • `Remove the property from the import` — The import will proceed, but (silently) no values will be recorded for this property • `Remove the object from the import` — The import will proceed, but (silently) no instances of the parent object (of which this property is an attribute) will be created or updated.

Format	Leave this drop-down list blank if the format of dates and times in the imported data file is the same as the local setting on the application server running FlexNet Manager Suite. If the formats are different, choose an option from the list that defines the format used in the input data file.
Use the following query to match existing computers	This field only displays for assets. Specific types of assets in FlexNet Manager Suite (for example workstations, servers), can be attached to a computer. When the Business Importer creates these types of assets in the FlexNet Manager Suite database, it performs a lookup against computer records that are not already attached to an asset. It tries to match assets to computers with the same serial numbers. If a match is found, the computer is linked to the asset. Computers set to a status of `Ignored` are not included in the matching process. Set this field in one of the following ways: • Leave the field blank to use the default computer matching behavior. • Type a single space to disable computer matching. No computer matching will take place. • Enter an SQL statement to customize the computer matching behaviour. When entering an SQL statement, the following keywords can be used: • `[TemporaryTableName]` - The name of the temporary or physical table used by the import. • `[OutputFIeld]` - The name of the field containing the Asset ID values for existing records or new records created. • `[ImportID]` - The ID of the record in the ECMImportLog_Import table processing the import • `[ImportObjectID]` - The ID of the record in the ECMImportLog_Object table processing the computer object. If you build specific logic to perform the computer matching, the list of newly created Asset IDs can be retrieved with the following query: `“Select [OutputField] from [TemporaryTableName] where created =1”` The SQL procedure can also return details of the number of computers affected. This number is logged in the ECMImportLOG_Object table.

6. As you make your changes on this page, your specification is saved in memory. When you are ready, click the Save button in the tool bar, or choose one of the saving options from the **File** menu.

Creating Custom SQL

Because you are responsible for your own database, you have the freedom to add custom SQL that modifies your compliance database during the import of business data.

At any stage in your adapter, which runs from top to bottom down the structure tree, you can insert some custom SQL to modify (or make log entries for) the data that has (so far) been written into the compliance database in FlexNet Manager Suite. You may include:

- SQL statements
- Stored procedures.

Any custom SQL is run as part of the same transaction as the import of the external data.

To create custom SQL (connected mode only):

1. Right-click your adapter's name in the structure tree.
2. In the context menu, select **Add New Item**, and from the submenu select **Custom Query**.
3. To give your query a meaningful name (making it easier to read and maintain in the finished adapter XML file):
    a. Right click the new **Custom Query** entry in the structure tree
    b. Select **Rename** from the context menu
    c. Provide a new name.
4. Enter your SQL statement into the **Query Text** field.

    Tip: *You may include the keyword `[LOG_IMPORT_ID]` to return the current value of the `ImportID` column in the `ECMImportLog_Summary` table.*

    For example:

    - To run a stored procedure called *MyStoredProcedure* (optionally with parameters), enter

    ```
    EXEC MyStoredProcedure Parameter1,...
    ```

    - To post an entry in the log for a custom object (which will not otherwise be logged), enter

    ```
    Insert into ECMImportLog_Object([ImportID], [ObjectName], [StartDate],
                                    [EndDate], [ObjectType], [Status]) values
    ([LOG_IMPORT_ID],
                                    'My Custom Object', getdate(),
                                    getdate(),'Custom', 1)
    ```

5. In the **Timeout** field, set the number of seconds that the business importer should wait before giving up waiting for a response to the custom SQL statement. The following values have special meaning:
    - `-1` means use the default time out for SQL Server
    - `0` means there is no limit and the business importer will wait indefinitely for the query to finish.

6. If you wish to write a custom message in the log file as part of this custom SQL, select the **Send the internal log ID as a parameter** check box. When checked, the `@FinImporterLogID` parameter value is automatically injected to the stored procedure as it is executed. The value of this parameter is the current record ID from the `FinImporterLog` table (automatically created).

Adding Custom Properties

Business adapters that run in connected mode (that is, on your central application server) can create custom properties in your compliance database on the fly.

FlexNet Manager Suite allows the addition of custom properties to existing objects in the compliance database. You can do this using the web interface. However, since it is very likely that the need for custom properties becomes apparent when integrating external data sources, you can also specify custom properties as a part of building a business adapter, as long as this adapter runs in connected mode on your operations server. The first time that the business importer runs this business adapter, the new custom property is created. On subsequent imports, data can be added to the custom property in the same way as for all other properties (the adapter does not have to be modified to remove the creation of the custom property).

Tip: *Remember that you must create the custom property before you can populate it with data — meaning that the database object with the custom property attached must be high in the structure tree.*

Note: *Any business adapter that creates custom properties can be run only on the application server. Once custom properties are created (through either means), you can also populate those properties with values through another business adapter running in disconnected mode on the inventory beacon.*

To add a custom property:

1. In the structure tree on the left of the Business Adapter Studio, right-click the compliance database object for which you want to create a custom property.
2. From the context menu, select **Add New Item**.
3. From the submenu, select **Custom Property**.
4. To give your custom property the name that will be created in the FlexNet Manager Suite compliance database:
    a. Right-click the new entry **Custom Property *n*** in the structure view.
    b. Select **Rename**.
    c. Type the new name, and press `Return`.

The details in the main data page are the same for this custom property as for all other properties (see Defining Import Rules for Attributes/Properties).

Triggering Immediate Update of the BAS Data Model

The data model exposed to the Business Adapter Studio installed on your inventory beacon(s) is updated by a scheduled task (`Regenerate Business Import config`) that runs overnight (by default, at 4am central server time). Therefore, if you add custom properties to FlexNet Manager Suite, you normally need to wait until next day before you can create a business adapter that loads data into your new custom field.

Alternatively, you can use the following process to trigger an immediate update to the data model for the Business Adapter Studio. This allows you to continue development from custom properties straight on to a custom business adapter that populates those properties.

To update the data model now:

1. On the batch server, open a Command Window.
2. Navigate to:

   ```
   InstallDir\DotNet\bin\
   ```

   The default value is

   ```
   C:\Program Files (x86)\Flexera Software\FlexNet Manager Platform\DotNet\bin\
   ```

3. Execute the following command:

   ```
   BatchProcessTaskConsole.exe run BusinessAdapterConfig
   ```

   This launches the task that generates the updated data model for the Business Adapter Studio. To check when it is finished, run:

   ```
   BatchProcessTaskConsole.exe list-tasks
   ```

   While the task is running, `BusinessAdapterConfig` is visible in the task list, and it disappears within a few minutes, when the task is successful. The updated data model is then automatically collected by all inventory beacons when they "phone home" for updates. By default, this happens every 15 minutes, but the interval is configured in the web interface under **Discovery & Inventory** > **Settings**, under the **Beacon settings** section. Thereafter, restarting the Business Adapter Studio forces it to reload the data model.

4. After the propagation time, restart the Business Adapter Studio on your chosen inventory beacon. If you are running the Business Adapter Studio in connected mode on your central server, simply exit and restart. If you are running the Business Adapter Studio in disconnected mode on an inventory beacon, use this process::

   a. If the Business Adapter Studio is already open on your inventory beacon, you must exit and restart the entire FlexNet Beacon interface.

   b. In the FlexNet Beacon interface, navigate to the **Business Importer** page.

   c. Edit an existing import, or create a new one, and click **Edit adapter...**.

      Your newly-created custom properties are included in the list of available properties with a distinctive icon.

Testing and Diagnosis for Your Business Adapter

In connected mode, before running any import (even to a test database, let alone a production environment), you can run a simulation that will show the projected results of the business importer running your new adaptor.

In connected mode, you will also want to create log files for your imports, and possibly run tracing. All these topics are included in this section.

Testing and diagnosis options are limited for business adapters running in disconnected mode on your inventory beacon. After running the adapter against the source database, you can inspect the archive package that will be uploaded to the central application server. This package is saved in `Program Data\Flexera Software\Beacon\IntermediateData\`, and is a zip archive containing the following:

- A file DDI.xml that represents the business adapter (without its connection strings), so that you can see the steps than run in your adapter
- A manifest that includes a result code from running your adapter, and any error messages
- An XML file of the collected data.

On the inventory beacon, you may also examine the log file for the beacon engine, which includes results of uploading the intermediate package. This is saved in `%ProgramData%\Flexera Software\Compliance\BeaconEngine`. You may search in the log file for the name of your business adapter to find steps relating to it.

Note: *There is no specific presentation in the compliance console (the web UI) of the results of importing your business adapter data. Look for collected information displayed in appropriate lists after the import is completed. Of course, the impact on your compliance position that results from this imported business information is shown only after the next inventory import and reconciliation.*

Specifying a Log File

Log files help you monitor the operations of your business adapter.

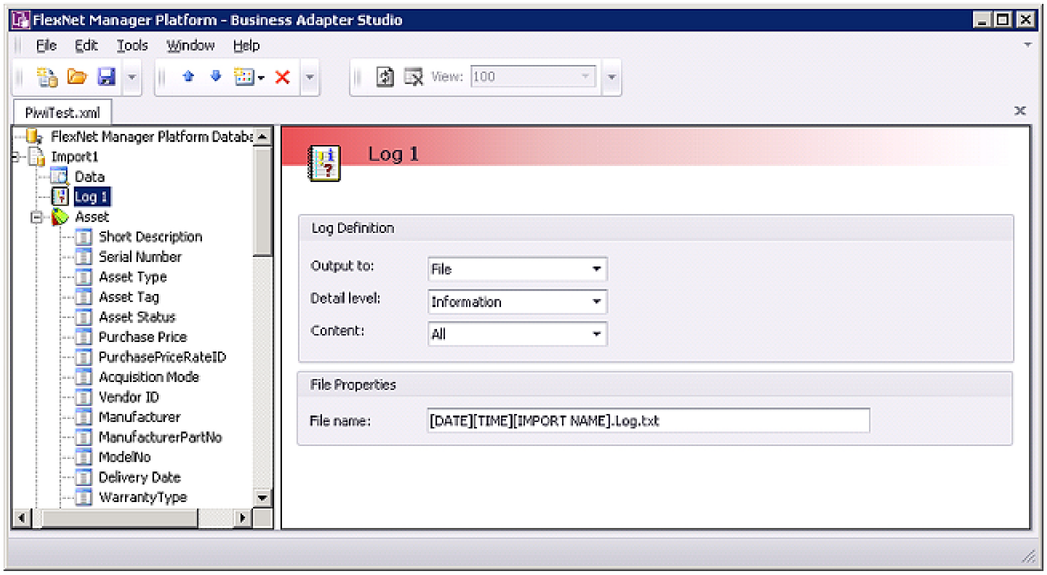
You can specify a log file that is used for all imports using this business adapter. The log that you specify is updated automatically by the business importer, overwriting the previous log file on each occasion.

To specify the log file details:

1. Right-click on the adapter name in the structure tree.
2. From the context menu, select **Add New Item**, and from the submenu select **Log**.

   A page of log file settings appears, populated with default values.

Figure 19: The default values for a log file



Log Definition

Output to: File

Detail level: Information

Content: All

File Properties

File name: [DATE][TIME][IMPORT NAME].Log.txt

3. Adjust the following **Log Definition** settings to your requirements.

Setting	Notes
Output to	The type of log output to generate. Possible values are: • `Console` — Output appears on the console of the test computer during development of the business adapter. It is likely to be less useful when the production version of the business adapter is running on the inventory beacon or the application server. • `File` — Output will be saved to a text-based log file. When you select this option, additional fields appear at the bottom of the page to specify the file details. • `Database` — In connected mode only (not available on the inventory beacon), the log is written into the compliance database, in the following tables (available only in Microsoft SQL Server Management Studio, and not in the user interface for FlexNet Manager Suite): ◦ `ECMImportLog_Detail` — A record is written here for every database record that has tracing turned on (see Tracing) when the record is rejected, created, updated or deleted. ◦ `ECMImportLog_Object` — A record is written here for each compliance database standard object that is created or updated during an import. Custom objects are not logged automatically, although you can cause a log entry to be added for a custom object (see Creating Custom SQL). ◦ `ECMImportLog_Summary` — A record is written here each time the business importer is started, either for a data import or for a simulation during testing. The record includes a `Status` result of `0` for a task not completed (error), and `1` for success. • `Tcp/IP socket` — Output is written to a TCP/IP socket. When you select this option, additional fields appear at the bottom of the page to specify the TCP/IP details.

Setting	Notes
Detail level	The depth of logging to provide. Choosing a given level of logging includes information for all higher levels in this ordered list: • `Silent` — (highest value) No details are recorded for individual database objects, although a record of the overall import/simulation still appears in the summary table (for database logging). • `Critical` • `Errors` • `Warnings` • `Information` • `Debug` — (lowest value) The most detailed logging information is written.
Content	Master control for what is written to the log. The settings are: • `Detail` — Writes information for each object to the log according to the level specified in the **Detail level** setting (above) • `Summary` — At the end of the import, writes a summary for each affected object. • `All` — Combination of the `Summary` and `Detail` levels.

4. If you selected **Output to** `File`, specify the name of the log file in the **File name** setting.

    - If you clear this field, the default file name is `MBI.log.txt`.
    - You may include UNC path definitions, or relative paths starting from the directory where the business importer executable is running.
    - When no file path is specified, the default is a subfolder `Log`, below the `business importer` folder.

    Remember that a log file with the same name is overwritten at each import. You may wish to use the following placeholder variables to create a unique file name for each pass at least during test and development (log files with unique names are not automatically cleaned up, and you assume that responsibility):

    - `[DATE]` — the date the import was started (formatted as *`yyyymmdd`*)
    - `[TIME]` — the time the import was started (formatted as *`hhmmss`*)
    - `[IMPORT NAME]` — the name of the adapter used for this import, taken from the name set for the adapter in the structure tree of the Business Adapter Studio.

5. If you selected **Output to** `Tcp/IP Socket`, specify the settings in the **TCP/IP Socket Properties** section that appears:

- **Server** — The server name where the listener is installed. For the same computer on which the business importer is running, use `localhost`.
- **Port number** — The port where the listener is waiting.

Tracing

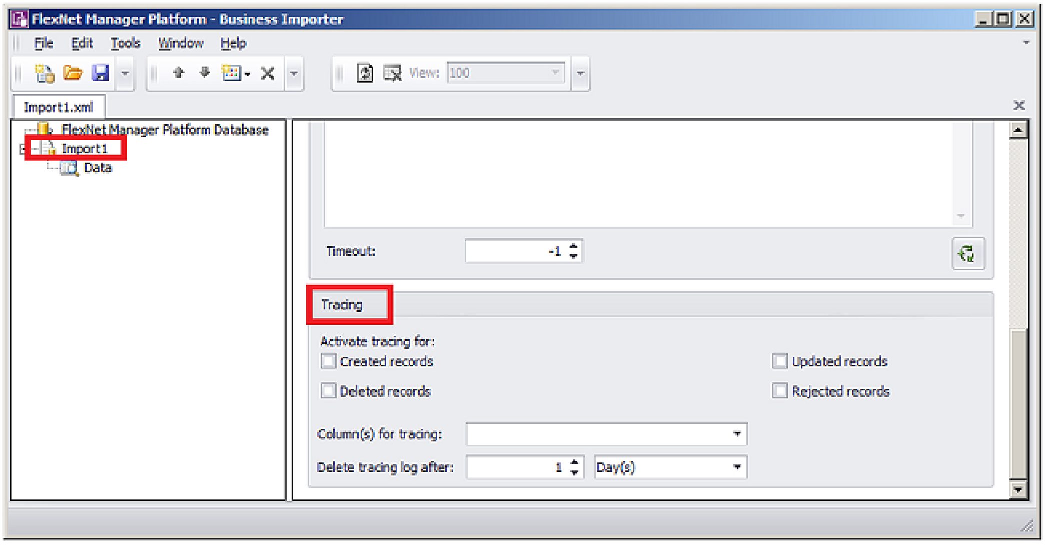
Tracing is available only for those business adapters running in connected mode (that is, on your central application server).

Tracing adds another stream of information, additional to logging outputs, to make debugging easier. It is controlled from the adapter node in the structure tree. Tracing outputs are written to the `ECMImportLog_Detail` table in the compliance database under FlexNet Manager Suite, regardless of the logging output type that you selected. You can inspect the rows of this table in Microsoft SQL Server Management Studio.

To configure tracing (connected mode only):

1. Select the adaptor node in the structure tree, and scroll down the settings page to see the **Tracing** group.

   Figure 20: Tracing settings are at the bottom of the settings page for the adapter


FlexNet Manager Platform - Business Importer
File
Edit
Tools
Window
Help
View: 100
Import1.xml
FlexNet Manager Platform Database
Import1
Data

Timeout: -1

Tracing

Activate tracing for:

□ Created records
□ Updated records
□ Deleted records
□ Rejected records

Column(s) for tracing:

Delete tracing log after: 1 Day(s)

2. Adjust the following settings for tracing:

Setting	Notes
Activate tracing for	Select as many of the following check boxes as needed for the tracing you require for debugging your adapter. Note that if no check boxes in this group are selected, no tracing records are created. You may create a tracing entry each time that any record in the compliance database is created, updated, or deleted; or when a record in the source data is rejected. **Rejected records** are incoming data assessed for import but not accepted. A common reason for rejection is that a column (such as a serial number) has been specified for database matching, but that column is blank for a particular record.

Setting	Notes
Column(s) for tracing	By default, tracing identifies affected records only by their count number within the flow of incoming data from the external source. As this is not a convenient aid to debugging, you may also pick one or more columns from the incoming data to help identify the tracing records. For example, if you selected a column called `Serial No` from this drop-down list of the available columns in the data source, and the computer with serial number 19283645 was rejected, the tracing would identify `Record 238, Serial No 19283645` This is more convenient for identifying the offending record. Best practice is to use an identifying column that contains unique values and is always populated. You may either: • Select a single column name (in the external data source) from this drop-down list • Directly enter multiple column names in the field, enclosing each in square brackets and separating the bracketed values with a comma.

Simulating an Import of a Business Adapter

When you run a simulation, Business Adapter Studio processes all of the data as if an import were taking place, and lists the number of records that would have been processed and the number of records that would be rejected.

This means that you can review the results of the simulated import, and, if necessary, refine the connection settings before doing an actual import and changing the FlexNet Manager Suite data.

A simulation does not load data into the object records in the compliance database in FlexNet Manager Suite, but it does update the history tables for every object that would have been affected were the import actually performed, to record that a simulation has taken place. These history records are visible in the **History** tabs of each object's property sheet.

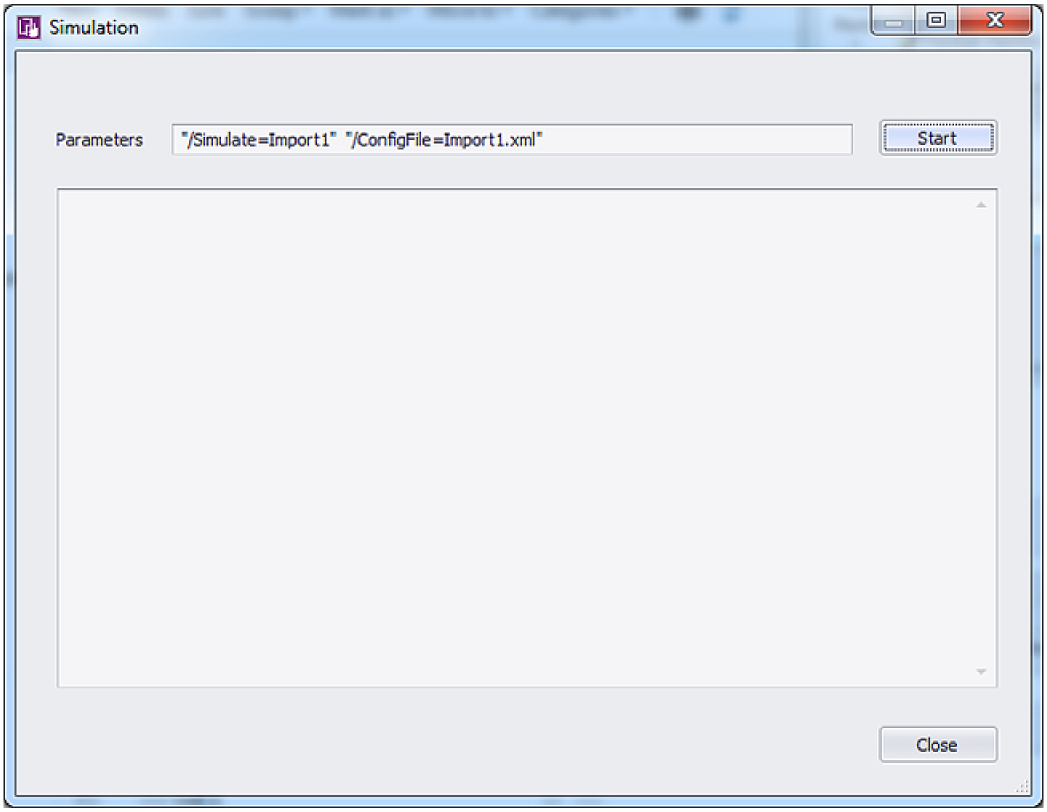
Once you are satisfied with the results of a simulated import, you can perform a real import. Even after performing a simulation, it is best practice to run the first import on a test database rather than in your production environment.

To simulate a data import:

1. Ensure you have selected the tab for the adapter you wish to test.
2. Select the **Tools** > **Simulate** menu options.

   The **Simulate** page is displayed. Do not change the default parameters.

Figure 21: Run a simulation to check that the import file can be processed without affecting the FlexNet Manager Suite data

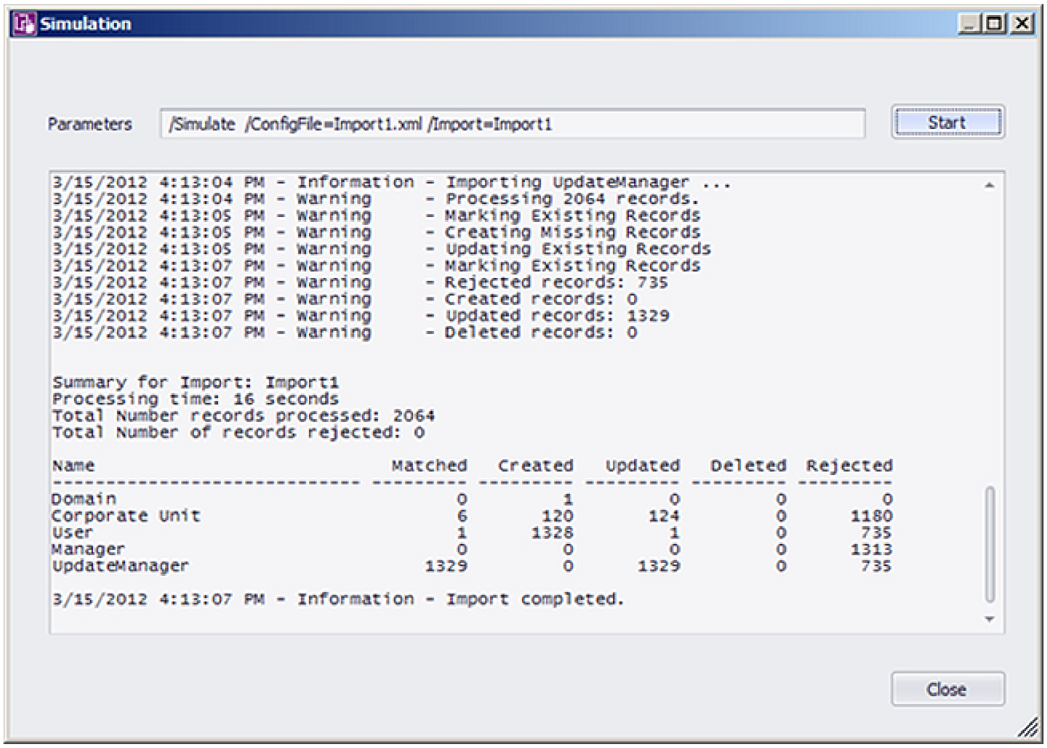


"/Simulate=Import1" "/ConfigFile=Import1.xml"

3. Click **Start**.

   The simulated import is processed, and progress messages display on the window. When the import is complete, a summary of the records that could be processed in the simulation is displayed.

Figure 22: Review the results of the simulated process



Parameters /Simulate /ConfigFile=Import1.xml /Import=Import1

```
3/15/2012 4:13:04 PM - Information - Importing UpdateManager ...
3/15/2012 4:13:04 PM - Warning     - Processing 2064 records.
3/15/2012 4:13:05 PM - Warning     - Marking Existing Records
3/15/2012 4:13:05 PM - Warning     - Creating Missing Records
3/15/2012 4:13:05 PM - Warning     - Updating Existing Records
3/15/2012 4:13:07 PM - Warning     - Marking Existing Records
3/15/2012 4:13:07 PM - Warning     - Rejected records: 735
3/15/2012 4:13:07 PM - Warning     - Created records: 0
3/15/2012 4:13:07 PM - Warning     - Updated records: 1329
3/15/2012 4:13:07 PM - Warning     - Deleted records: 0


Summary for Import: Import1
Processing time: 16 seconds
Total Number records processed: 2064
Total Number of records rejected: 0

Name                           Matched   Created   Updated   Deleted  Rejected
---------------------------- --------- --------- --------- --------- ---------
Domain                               0         1         0         0         0
Corporate Unit                       6       120       124         0      1180
User                                 1      1328         1         0       735
Manager                              0         0         0         0      1313
UpdateManager                     1329         0      1329         0       735

3/15/2012 4:13:07 PM - Information - Import completed.
```

4. Review the results. Check for any records rejected, and whether the correct number of records were processed as expected.

Tip: The most common reason for an incoming record to be rejected is that it lacks a value in a field that has been nominated for matching with existing records in the compliance database.

5. When you have finished reviewing the results, click **Close**.

Comparing Result of Simulated Imports

Once you have run several simulations, you may want to compare the overall results.

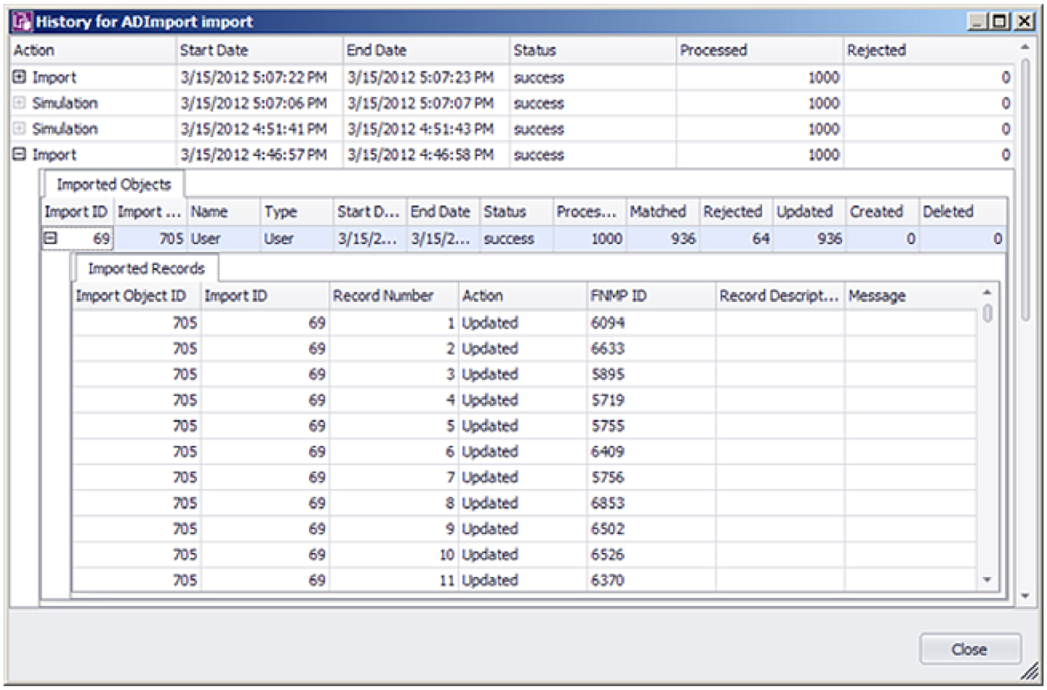
A history of simulations is available, combined with the history of data imports.

To compare import results (simulations only):

1. With the tab selected for the correct adapter, select the **Tools** > **View History** menu options.

   The **History for ...** page is displayed.

Figure 23: A list of past imports and simulations is displayed



History for ADImport import

Action	Start Date	End Date	Status	Processed	Rejected
⊞ Import	3/15/2012 5:07:22 PM	3/15/2012 5:07:23 PM	success	1000	0
⊞ Simulation	3/15/2012 5:07:06 PM	3/15/2012 5:07:07 PM	success	1000	0
⊞ Simulation	3/15/2012 4:51:41 PM	3/15/2012 4:51:43 PM	success	1000	0
⊟ Import	3/15/2012 4:46:57 PM	3/15/2012 4:46:58 PM	success	1000	0

Imported Objects

Import ID	Import ...	Name	Type	Start D...	End Date	Status	Proces...	Matched	Rejected	Updated	Created	Deleted
⊟ 69	705	User	User	3/15/2...	3/15/2...	success	1000	936	64	936	0	0

Imported Records

Import Object ID	Import ID	Record Number	Action	FNMP ID	Record Descript...	Message
705	69	1	Updated	6094		
705	69	2	Updated	6633		
705	69	3	Updated	5895		
705	69	4	Updated	5719		
705	69	5	Updated	5755		
705	69	6	Updated	6409		
705	69	7	Updated	5756		
705	69	8	Updated	6853		
705	69	9	Updated	6502		
705	69	10	Updated	6526		
705	69	11	Updated	6370		

2. To view details of the records imported (or simulated) during one of the actions listed on the page, expand the icon to the left of the import action.

   Details of each record imported or updated (or the simulation of that action) are displayed.

3. When you have finished reviewing the history, click **Close** to close the window.
4. If the results are as expected, your connection is ready for you to perform a real import. If the results are not as expected, you may need to modify the configuration for this adapter. See Linking Data Imports to FlexNet Manager Suite for more guidance.

Troubleshooting Business Adapters

Here are some possible issues and causes. Please advise any other cases that should appear here in future.

Issue	Notes
Imported data does not appear in custom views	There may be dependencies between different data fields. For example, if you are importing details about purchase orders than include prices, each price must have a corresponding rate (currency) identified. Without this correspondence, the numeric values are blanked out of the custom view. (For example, in the product schema, see `UnitPrice` and `UnitPriceRateID` in the `PurchaseOrderDetail` table.)
Monetary values appear without any currency units	The rate ID for this value is missing from your imported data.

Importing Data With Your Business Adapter

You have tested and debugged your business adapter. You have run a simulation and checked the imported values are as expected. Now you are ready to import data into your operations databases.

You may:

- Perform a single import for an adapter running in connected mode, where that import is controlled by the Business Adapter Studio
- Examine the history of imports you have run from the Business Adapter Studio, in connected mode
- Schedule regular imports for operations, which do not require the Business Adapter Studio
- Trigger a special, additional import from within the web interface, independent of the Business Adapter Studio.

Running an Import from the Business Adapter Studio

When you have simulated your import and you are satisfied with the results, you can perform a real import.

Important:
When you import data, you make live changes to the FlexNet Manager Suite database. Incorrect settings may result in important data being deleted or modified. You should always test your import in a test environment or pre-production environment before importing into the live data.

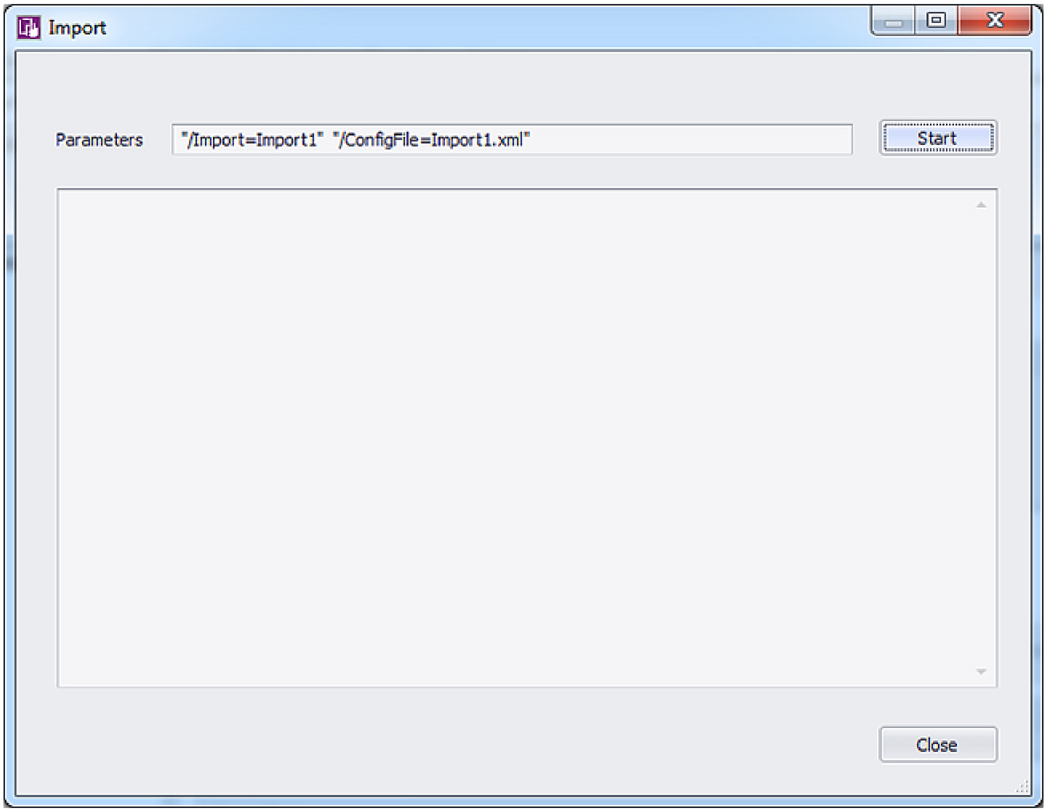
Important:
Always perform a full backup of the FlexNet Manager Suite database before performing an import. This will allow you to rollback the database to its original state if the imported data is corrupted or configuration of the import data is incorrect.

To trigger a data import through the Business Adapter Studio:

1. Make sure you have simulated the import and have confirmed that the import will perform the required tasks.
2. Back up the FlexNet Manager Suite database.
3. With the tab for the correct adapter selected, select the **Tools** > **Import** menu options.

   The **Import** page is displayed.

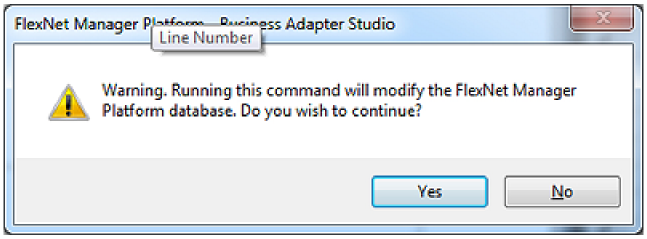
Figure 24: Check the import parameters and then start the import



4. Click **Start**.

   A warning message is displayed.

   Figure 25: Confirm that you want to perform an import

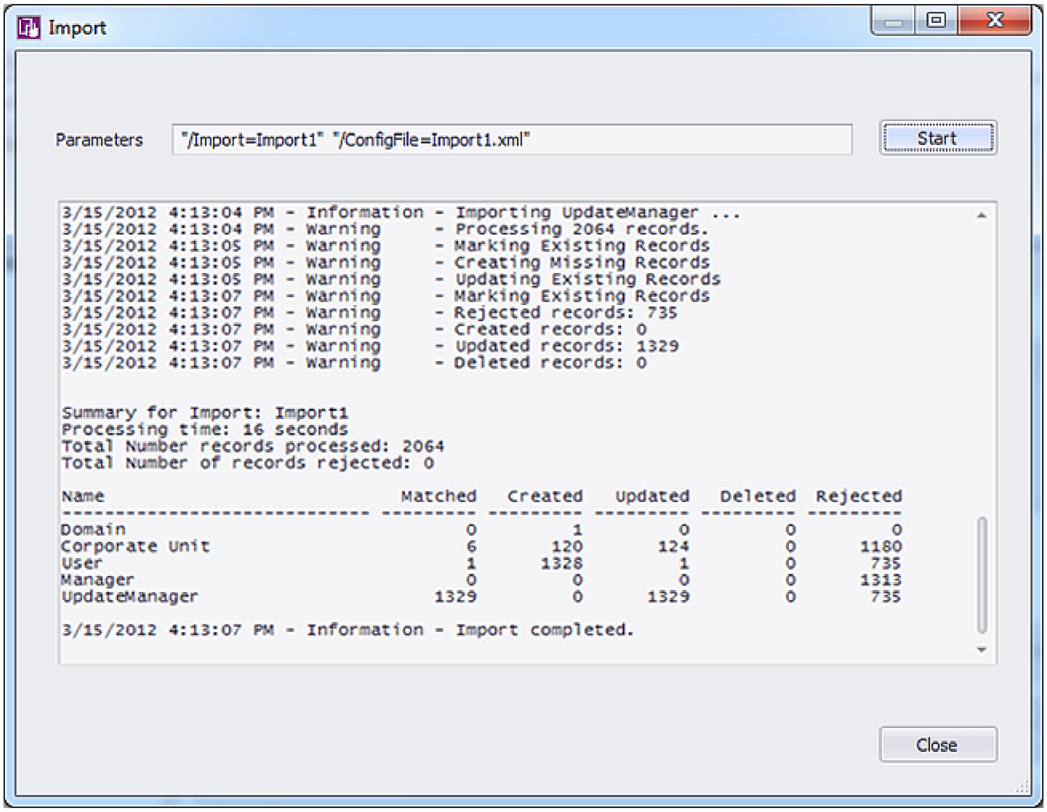


Warning. Running this command will modify the FlexNet Manager Platform database. Do you wish to continue?

5. Click **Yes** to confirm that you want to perform an import. (Alternatively, click **No** if you want to cancel the import.)

   The import is processed, and progress messages display on the window. When the import is complete, a summary of the records processed is displayed.

Figure 26: Review the results of the import process



Parameters "/Import=Import1" "/ConfigFile=Import1.xml"

```
3/15/2012 4:13:04 PM - Information - Importing UpdateManager ...
3/15/2012 4:13:04 PM - Warning     - Processing 2064 records.
3/15/2012 4:13:05 PM - Warning     - Marking Existing Records
3/15/2012 4:13:05 PM - Warning     - Creating Missing Records
3/15/2012 4:13:05 PM - Warning     - Updating Existing Records
3/15/2012 4:13:07 PM - Warning     - Marking Existing Records
3/15/2012 4:13:07 PM - Warning     - Rejected records: 735
3/15/2012 4:13:07 PM - Warning     - Created records: 0
3/15/2012 4:13:07 PM - Warning     - Updated records: 1329
3/15/2012 4:13:07 PM - Warning     - Deleted records: 0


Summary for Import: Import1
Processing time: 16 seconds
Total Number records processed: 2064
Total Number of records rejected: 0

Name                             Matched   Created   Updated   Deleted  Rejected
------------------------------ --------- --------- --------- --------- ---------
Domain                                 0         1         0         0         0
Corporate Unit                         6       120       124         0      1180
User                                   1      1328         1         0       735
Manager                                0         0         0         0      1313
UpdateManager                       1329         0      1329         0       735

3/15/2012 4:13:07 PM - Information - Import completed.
```

6. Review the results. Check for any records rejected, and whether the correct number of records were processed as expected.

7. When you have finished reviewing the results, click **Close**.

Tip: *If you expect to run this data import process more than once, it is best practise to set up a scheduled task to run the import on a regular basis. Use the Windows Scheduled Tasks system tool to create a scheduled task.*

To Review Past Imports in Business Adapter Studio

You can only review the history of those imports triggered in Business Adapter Studio. For regular imports, consider logging.

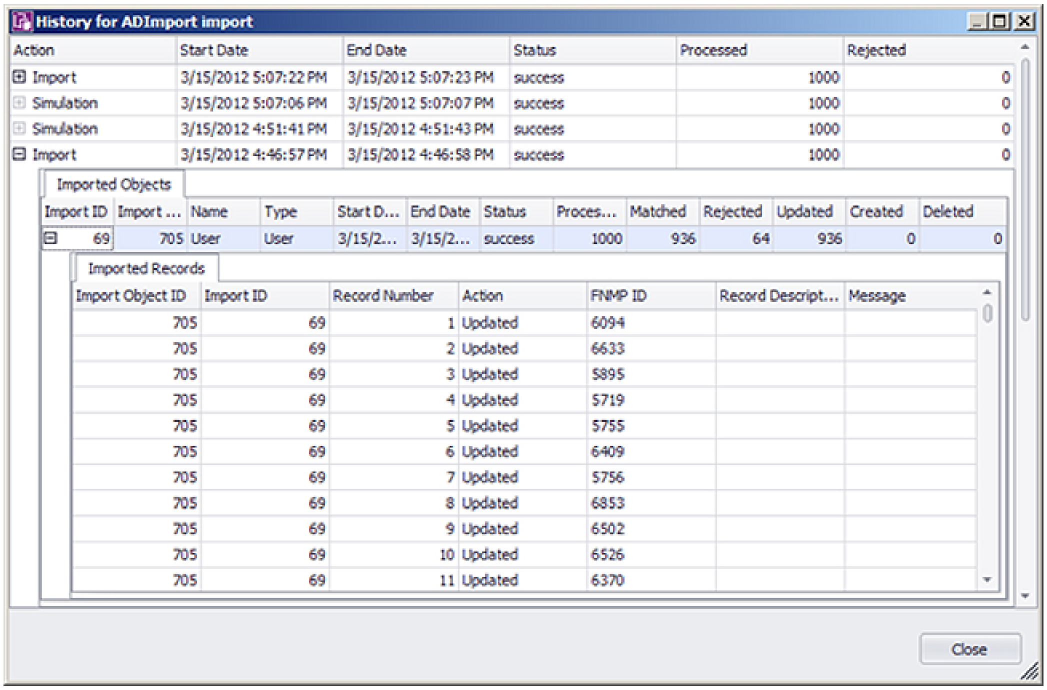
If you have run multiple imports of business information through Business Adapter Studio, you can review the history of your results.

To review previous imports through the Business Adapter Studio:

1. With the appropriate tab displaying your adapter, select the **Tools** > **View History** menu options.

   The **History for** ***`adapterName`*** page is displayed.

Figure 27: A list of past imports and simulation imports is displayed



History for ADImport import

Action	Start Date	End Date	Status	Processed	Rejected
⊞ Import	3/15/2012 5:07:22 PM	3/15/2012 5:07:23 PM	success	1000	0
⊞ Simulation	3/15/2012 5:07:06 PM	3/15/2012 5:07:07 PM	success	1000	0
⊞ Simulation	3/15/2012 4:51:41 PM	3/15/2012 4:51:43 PM	success	1000	0
⊟ Import	3/15/2012 4:46:57 PM	3/15/2012 4:46:58 PM	success	1000	0

Imported Objects

Import ID	Import ...	Name	Type	Start D...	End Date	Status	Proces...	Matched	Rejected	Updated	Created	Deleted
⊟ 69	705	User	User	3/15/2...	3/15/2...	success	1000	936	64	936	0	0

Imported Records

Import Object ID	Import ID	Record Number	Action	FNMP ID	Record Descript...	Message
705	69	1	Updated	6094		
705	69	2	Updated	6633		
705	69	3	Updated	5895		
705	69	4	Updated	5719		
705	69	5	Updated	5755		
705	69	6	Updated	6409		
705	69	7	Updated	5756		
705	69	8	Updated	6853		
705	69	9	Updated	6502		
705	69	10	Updated	6526		
705	69	11	Updated	6370		

2. To view details of the records imported (or simulated) during one of the actions listed on the page, expand the icon to the left of the import action.

   Details of each record imported or updated (or the simulation of that action) are displayed.

3. When you have finished reviewing the history, click **Close** to close the window.

Setting Up Regular Imports (Connected Mode)

On your central application server, create scheduled tasks to run regular business imports in connected mode.

Many external data sources require regular imports to the compliance database to pick up later additions and modifications to the source data. For example, imports from your purchasing system must be repeated on a regular schedule to pick up new purchases that modify your overall license compliance.

To repeat the import using your new business adapter on a regular basis, create a standard Windows scheduled task on the application server.

Tip: *If you need to move your business adapter file from a development environment into your production environment, remember that you may need to modify the connection strings to suit.*

The default command line for your scheduled task has the following form:

```
InstallationPath\mgsbi.exe /Import=AdapterName /ConfigFile=XMLFileName
```

where the placeholders represent:

InstallationPath

The location where the business importer executable is installed on the compliance server. By default this is `C:\Program Files\ManagerSoft\DotNet\bin`.

`AdapterName`

The name displayed for your adapter in the structure tree of the Business Adapter Studio. For information about naming your adapter, see Renaming a Business Adapter (This name is also visible as the `Name` attribute for the `<Import>` element in the saved XML file.) Remember that if the adapter name includes spaces, you must enclose it in double quotation marks.

`XMLFileName`

The name under which you saved your XML file (see Saving Business Adapters). Once again, if the file name includes spaces, enclose it in double quotation marks.

Tip: *If you do not specify an XML file name, the default file `MGSBI.xml` is searched for the adapter.*

9

FlexNet Report Designer

FlexNet Report Designer, powered by Cognos, allows you to build custom reports based on weekly snapshots of your licensing and installation data.

More About FlexNet Report Designer

Data for reports is automatically copied from the compliance database to the data warehouse database once a week, by default at 6am (central server time) on Sunday mornings. You can adjust the schedule with the `Data warehouse export` scheduled task. Because this scheduled task calls the batch scheduler for FlexNet Manager Suite, this task waits until other running tasks are completed. For more information, see Server-Side Scheduled Tasks.

The system preserves the 12 most recent weekly snapshots. As well, the last snapshot taken within a month is preserved as a monthly snapshot, and the 36 most recent monthly snapshots are preserved. (The other weekly snapshots taken earlier each month are automatically culled as they are outside the 12 most recent.)

***Tip:** Snapshots have been collected since the 2014 R1 release.*

Log files for FlexNet Report Designer (powered by Cognos) are available in *`ReportDesignerInstallLocation`*`\c10_64\logs`. The default value is `C:\Program Files\ReportDesigner\c10_64\logs`.

If the default number of operators in each Cognos role is not sufficient for your needs, please contact your Flexera Software Consultant to request additional quantities at no additional cost.

Before attempting to access FlexNet Report Designer, make sure that you have added the operator accounts to the appropriate role:

1. Navigate to the system menu (⚙▼ in the top right corner), and choose **Accounts**.
2. In the **Roles** tab, expand the **Business reporting portal** section.
3. Select the appropriate privileges from the drop-down list (such as `Analytics User`).
4. Give the role an appropriate name and description, and click **Create**.
5. Switch to the **All Accounts** tab, and create or select your account, and assign it to the new role.

Data Models for FlexNet Report Designer

Two separate packages are supplied with FlexNet Manager Suite for use in FlexNet Report Designer:

- **FlexNet Manager Platform Reports and Dashboard** contains a model of operational data. This model allows you to report on some data stored in the data warehouse database (suggested name: FNMSDataWarehouse), combined with data from the operational compliance database (suggested name: FNMSCompliance). This makes it a powerful model for custom reporting on operational data.

- **FlexNet Manager Platform Data Warehouse (analysis)** contains a dimensional model that allows greater flexibility for increased online analytical processing (OLAP). This data comes from the data warehouse database (suggested name: FNMSDataWarehouse), and some report-time specialized queries that calculate trending data sets and the like.

The models consist of the following elements:

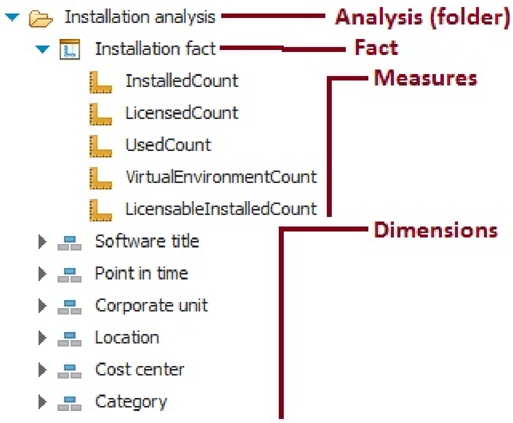
- *Folder* — Both models provide folders that conveniently group related material together. In the dimensional model, each folder is called an *analysis*, including **Installation analysis** for reports about software inventory within your enterprise; and **Consumption analysis** for reports about license positions. The operational model provides a more sophisticated folder structure to group related database objects.

- *Fact* — In the dimensional model, the first child of each analysis folder is the central fact around which the related data dimensions and measures are organized. For example, the **Installation analysis** contains the **Installation fact**; and similarly, the **Consumption analysis** starts with the **Consumption fact**. The operational model does not include the fact element.

- *Dimension* — In the dimensional model, each dimension gives a related data set that you can use to analyze the central fact. For example, it's obvious that when you report on your **Installation fact**, you need to analyze in terms of individual software applications; so that there is a **Software title** dimension available. The operational model includes dimensions from which you can select the operational data for your report.

- *Measure* — Each measure contains a specific value derived (in general) from one or more fields in one of the source databases. In the dimensional model, some measures are attached directly to the fact. For example, the **Installation fact** has an **Installed (max qty)** measure that you can include in your reports. Measures also relate to other dimensions, but here they are referred to as *attributes*, and you generally choose from individual *values* of the attribute, rather than selecting the entire attribute. For example, the **Software title** dimension expands into a hierarchy of the **Publisher**, **Product**, and **Application** measures; but for creating reports, you generally select one of the publisher's names, and so on.

Figure 28: Elements in the dimensional data model



The dimensional data model is covered in the following sections.

Data Warehouse (Analysis) Model

FlexNet Manager Platform Data Warehouse (analysis) dimensional model centers around two related facts for analysis:

- **Installation fact**
- **Consumption fact**.

Because these facts are so closely related, they share several dimensions in common. These shared dimensions are grouped separately in this document, and described only once.

Installation Analysis

The **Installation analysis** is a folder which contains:

- The **Installation fact** (see Installation Fact: Measures)
- A **Software title** dimension that is unique to the **Installation analysis** (see Software Title Dimension)
- Several common dimensions shared with the **Consumption analysis** (see Point in Time Dimension and Enterprise Group Dimensions).

Together these dimensions and associated measures/attributes allow you to analyze software installation numbers over time in your enterprise.

Installation Fact: Measures

The **Installation fact** allows tracking of software installations over time. The **Installation fact** supports the following measures. These general comments apply to all measures:

- For each measure, the figure shown is the maximum value found in all data snapshots included in your reporting period.

- All values are filtered by the access rights of the current operator (or report user). Access rights are managed through roles to which the operator is assigned, using enterprise groups of various kinds as filters. For example, if operator Sam is denied access to data from your North American location (and its children), then a report entry for license consumption in your Chicago office always shows zero when viewed by Sam, regardless of how many licenses are really consumed in Chicago.
- Since you may build a report using any combination of enterprise groups, the totals described for the following measures may be segmented across those groups, as expected. This subtotalling and segmentation effect is omitted from the following descriptions for simplicity.

Table 8: Measures for the Installation fact (alphabetical listing)

Measure	Notes
Installed (max qty)	The total number of application installations, as filtered by your chosen dimensions and identified in the most recent compliance calculation before the snapshot. *Related management view:* **License Compliance** > **Installed Applications**. *Database reference:* This is always a calculated value, not stored in the operations databases;, but is the count of records for the matching application in the `InstalledSoftwareData` table. *Data warehouse reference:* `InstallationData` table, `InstalledCount` column.
Installed on VMs (max qty)	The subset of the total application installations that are on devices identified as virtual machines. This is not relevant to license consumption, since these installations may be covered by special rights, or by exemptions, or in other ways so that they do not consume from a license. *Related management view:* No direct equivalent. *Database reference:* This is always a calculated value, not stored in the operations databases. The `InstalledSoftwareData` table records for the appropriate `SoftwareTitleID` (application) provide values for all relevant `ComplianceComputerID` (computers where the software is installed), as a foreign key to the `ComplianceComputer` table. The value is the count of these records where `ComplianceComputerTypeID = 3` (virtual device). *Data warehouse reference:* `InstallationData` table, `VirtualEnvironmentCount` column.

Measure	Notes
Licensable installations (max qty)	The subset of the total application installations that appear to be licensable (regardless of whether or not they are currently consuming from a license). *Related management view:* In application properties, on the **Devices** tab, you can add the **Licensable** column, and filter for `Yes`. The results returned gives the equivalent count for the chosen application. *Database reference:* This is always a calculated value, not stored in the operations databases. The `SoftwareTitle` table must have a `IsLicensable` value of `true`, and for everything except Oracle Instances, it is the count of installations found, as all of these must be accounted for in the compliance calculations. (It does not take account of device role exceptions and the like, as these depend on the license rather than the application.) In the case of Oracle Instances, there is an additional check that counts only those which are used as requiring licenses. *Data warehouse reference:* `InstallationData` table, `LicensableInstalledCount` column.
Licensed (max qty)	The subset of the total application installations that have been covered by a license (and are consuming license entitlements) in the most recent compliance calculation before the snapshot. *Related management view:* **License Compliance** > **Installed Applications**, filtered by application name and **Licensed** = `Yes`. *Database reference:* This is always a calculated value, not stored in the operations databases; but is the count of records for the matching application in the `InstalledSoftwareData` table that have the `IsLicensed` column set to `true`. *Data warehouse reference:* `InstallationData` table, `LicensedCount` column.
Used (max qty)	The subset of the total application installations that appear to be in use as at the most recent compliance calculation before the snapshot. *Related management view:* **License Compliance** > **Installed Applications**, filtered by application name and with **Usage** column displayed (this gives the count). *Database reference:* This is always a calculated value, not stored in the operations databases; but is the count of records for the matching application in the `InstalledSoftwareData` table that have the `IsUsed` column set to `true`. *Data warehouse reference:* `InstallationData` table, `UsedCount` column.

Software Title Dimension

As part of the **Installation analysis**, the **Software title** dimension allows you to drill down to an individual application (or 'software title') as part of analyzing software installed throughout your enterprise.

The **Software title** dimension expands into a three-level hierarchy that gives you access to (in order):

- **Publisher**
- **Product**
- **Software Title Name** (or, as seen within FlexNet Manager Suite, the application name).

You may report on any level. For example, if you choose only a publisher, your report includes all products and applications from that publisher.

Table 9: Attributes for the Software title dimension, Publisher level

Attribute	Notes
Publisher	The name of the company that publishes this application (and product). *Related management view:* For each application, the publisher is linked through the **General** tab of the application properties. However, the publisher must exist first for linking, and these records are maintained in the **Procurement > All Vendors** view. The publisher for each application is widely available in application listings, such as **License Compliance > All Applications**. *Database reference:* The master list of all vendors (including both publishers and resellers) is maintained in the `Vendor` table. Once linked to an application, minimal detail about the publisher is replicated in the `SoftwareTitlePublisher` table, where this value is visible as `PublisherName`. This table is referenced through the `SoftwareTitleProduct` table, which is in turn referenced by the `SoftwareTitle` (application) table. *Data warehouse reference:* `PublisherName` column in the `SoftwareTitleData` table.

Table 10: Attributes for the Software title dimension, Product level

Attribute	Notes
Product	The common name for a family of applications, independent of version or edition details. This must be unique for any given publisher. *Related management view:* For each application, the **Product** name is displayed in the **General** tab of application properties (and when you manually create an application record, you can link the product value there). All applications that share a common value in that **Product** field are deemed to be distinct versions/editions of the same product. The product name is widely available in application listings, such as **License Compliance > All Applications** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Product names are maintained in the `SoftwareTitleProduct` table. *Data warehouse reference:* `ProductName` column in the `SoftwareTitleData` table.

Table 11: Attributes for the Software title dimension, Software Title (or application) level (alphabetical listing)

Attributes	Notes
Application	The name of the application. *Related management view:* For each application, the **Name** is displayed in the **General** tab of application properties (and when you manually create an application record, you can edit the application name there). The application name appears in all application listings, such as **License Compliance > All Applications**. *Database reference:* Available in the `SoftwareTitle` table, `FullName` column. *Data warehouse reference:* `SoftwareTitleName` column in the `SoftwareTitleData` table.
Application status	Shows the current status for the application, from values such as `Authorized`, `Ignored`, `Deferred`. and others. *Related management view:* For each application, the **Status** is displayed in the **General** tab of application properties (and when you manually create an application record, you can edit the status there). The application **Status** is widely available in application listings, such as **License Compliance > All Applications**. *Database reference:* Status values (for all applications) are saved in the `SoftwareTitleAction` table. The `SoftwareTitle` table references the appropriate value through the `SoftwareTitleActionID` column. *Data warehouse reference:* `Action` column in the `SoftwareTitleData` table.

Attributes	Notes
Classification	The classification applied to this application, such as `Commercial` or `Malware`. *Related management view:* For each application, the **Classification** is displayed in the **General** tab of application properties (and when you manually create an application record, you can edit the classification there). The application classification is widely available in application listings, such as **License Compliance > All Applications**. *Database reference:* Classifications (for all applications) are saved in the `SoftwareTitleClassification` table. The `SoftwareTitle` table references the appropriate value through the `SoftwareTitleClassificationID` column. *Data warehouse reference:* `Classification` column in the `SoftwareTitleData` table.
Edition	The edition of this application. Editions describe different levels of product functionality, such as Standard and Pro. *Related management view:* For each application, the **Edition** is displayed in the **General** tab of application properties (and when you manually create an application record, you can edit the edition there). The application edition is widely available in application listings, such as **License Compliance > All Applications**. *Database reference:* All editions (for all applications) are saved in the `SoftwareTitleEdition` table. The `SoftwareTitle` table references the appropriate value through the `SoftwareTitleEditionID` column. *Data warehouse reference:* `EditionName` column in the `SoftwareTitleData` table.
Is licensed	A Boolean that indicates whether the application is linked to any license. *Related management view:* For each application, the **Licenses** tab of application properties lists the license(s) to which this application is linked. You can also attach or detach licenses to/from the application on that tab. The **Licensed** column is widely available in application listings, such as **License Compliance > All Applications**. *Database reference:* The `SoftwareTitleLicense` table links applications to licenses. If the `SoftwareTitleID` for the chosen application appears in this table (at snapshot time), then **Is licensed** reports `Yes`. *Data warehouse reference:* `IsLicensed` column in the `SoftwareTitleData` table.

Attributes	Notes
Version	The version (or release number) of this application. *Related management view:* For each application, the **Version** is displayed in the **General** tab of application properties (and when you manually create an application record, you can edit the version there). The application version is widely available in application listings, such as **License Compliance** > **All Applications**. *Database reference:* All versions (for all applications) are saved in the `SoftwareTitleVersion` table. The `SoftwareTitle` table references the appropriate value through the `SoftwareTitleVersionID` column. *Data warehouse reference:* `VersionName` column in the `SoftwareTitleData` table.

Consumption Analysis

The **Consumption analysis** is a folder which contains:

- The **Consumption fact** (see Consumption Fact: Measures)
- A **Software license** dimension that is unique to the **Consumption analysis** (see Software License Dimension)
- Several common dimensions shared with the **Installation analysis** (see Point in Time Dimension and Enterprise Group Dimensions).

Together these dimensions and associated measures/attributes allow you to analyze license consumption numbers over time in your enterprise.

Consumption Fact: Measures

The **Consumption fact** allows tracking the results of license consumption calculations over time. It supports the measures listed below. These general comments apply to all measures:

- For each measure, the figure shown is the maximum value found in all data snapshots included in your reporting period.
- All values are filtered by the access rights of the current operator (or report user). Access rights are managed through roles to which the operator is assigned, using enterprise groups of various kinds as filters. For example, if operator Sam is denied access to data from your North American location (and its children), then a report entry for license consumption in your Chicago office always shows zero when viewed by Sam, regardless of how many licenses are really consumed in Chicago.
- Since you may build a report using any combination of enterprise groups, the totals described for the following measures may be segmented across those groups, as expected. This subtotalling and segmentation effect is omitted from the following descriptions for simplicity.

Table 12: Measures for the Consumption fact (alphabetical listing)

Measure	Notes
Allocated (max qty)	The number of installations (or users, depending on license type) that have specifically received allocations from the license in question. Allocations are essentially a manual linking of the installation/user with the license, to the exclusion of all other licenses, and may be made individually on the **Consumption** tab of the license properties. While they remain a 1:1 association, they can also be processed in bulk on the **Apply Allocations and Exemptions** page. *Related management view:* See either the **Consumption** tab of the license properties, or the **License Compliance > Apply Allocations and Exemptions** page. *Database reference:* The allocation count matches the number of entries in the `SoftwareLicenseAllocation` table that have both: • A `SoftwareLicenseID` that links to the correct software license, and • A value of `1`, `2`, or `3` for the `SoftwareLicenseAllocationStatusID` (this is a key to the text reasons given in the `SoftwareLicenseAllocationStatus` table, and these values mean that an allocation of some kind has been granted). *Data warehouse reference:* `AssignmentData` table, `AssignedCount` column.
Consumed (max qty)	The consumption count for each license, as filtered by your chosen dimensions and identified in the last exported compliance calculation for each point in time. This is the final consumption calculation for each license, taking into account all beneficial aspects like items covered by other product use rights, device exemptions and the like. *Related management view:* The license properties **Compliance** tab displays the **Consumed** count. Also visible in many license listings, such as **License Compliance > All Licenses**. *Database reference:* The total consumption for each license in the most recent compliance calculation is stored in the `SoftwareLicense` table, `NumberInstalled` column. *Data warehouse reference:* `ConsumptionData` table, `ConsumedCount` column.

Measure	Notes
Covered by downgrade right (max qty)	The number of license entitlements consumed under a downgrade right (that is, the consumption occurred against a license for a later version or higher edition, but which included a downgrade right). *Related management view:* This collective total is not available in management views. *Database reference:* Downgrade count is the number of installations where the installed software title is a lower version or edition than the software title of the license. This involves linking from the `InstalledSoftwareData` table, through the `SoftwareLicenseID` to identify the license, and through the `SoftwareTitleID` to the `SoftwareTitle` table, where the `SoftwareTitleVersionID` and `SoftwareTitleEditionID` provide keys to the reference tables of versions and editions respectively. *Data warehouse reference:* `ConsumptionData` table, `DowngradeCount` column.
Covered by rights on VMs and hosts (max qty)	The number of virtual machines that are linked to the selected license, but that are not consuming any entitlements because they are covered by special product use rights. *Related management view:* For an individual license, look at the **Consumption** tab of license properties. Filter for **Inventory device type** of `Virtual machine`, and check the **Consumed** value (shows zero for any virtual device linked to this license but not consuming at the last license compliance calculation), and check for an **Exemption reason** such as `Covered by virtual application access`. *Database reference:* The `SoftwareLicensePointsConsumedData` table stores the count of entitlements consumed (in `LicensesConsumed`) for each license (identified by the `SoftwareLicenseID`). This is the count of records for a given `SoftwareLicenseID` for which the `LicensesConsumed` value is `0` *and* the `ComplianceComputerTypeID` in the associated `ComplianceComputer` record is `3` (for virtual machine). *Data warehouse reference:* `ConsumptionData` table, `VMNonConsumedCount` column.

Measure	Notes
Covered by second use right (max qty)	The number of license entitlements that were *not* consumed because the related consumption was covered by the second use right on the license. *Related management view:* This collective total is not available in management views. For an individual license, open the license properties, and review the **Consumption** tab. A device contributing to this count shows `0` in the **Consumed** column, and an **Exemption reason** of `Second use`. *Database reference:* This is always a calculated value, not stored in the operations databases; but is the count of records in the `SoftwareLicenseSecondUseMapping` table that have the `SoftwareLicenseID` column set to the ID of this license in the `SoftwareLicense` table. *Data warehouse reference:* `ConsumptionData` table, `SecondUseCount` column.
Exempted (max qty)	The number of installations linked to the license that do not consume a license entitlement because they have an exemption. Exemptions may take either of two forms: • An exemption for an individual inventory device linked to the license can be made on the **Consumption** tab of the license properties (these manual exemptions may also be made in bulk using the **Apply Allocations and Exemptions** page) • An exemption may be made automatically during license consumption calculations when the inventory device has been assigned a role (such as `Test`) that matches an exemption reason declared in the **Use rights & rules** tab of the license properties. *Related management view:* See either the **Consumption** tab of the license properties, or the **License Compliance > Apply Allocations and Exemptions** page. *Database reference:* The exemption count matches the number of entries in the `SoftwareLicenseAllocation` table that have both: • A `SoftwareLicenseID` that links to the correct software license, and • A non-null value of `SoftwareLicenseExemptionReasonID` (this is a key to the text reasons given in the `SoftwareLicenseExemptionReason` table, and any valid value means that an exemption of some kind has been granted). *Data warehouse reference:* `ExemptCount` column in the `ConsumptionData` table.

Measure	Notes
Installed (max qty)	The number of installed software records that are linked to the license in question. This is unlikely to be the total number of installations of the same application. *Related management view:* For an individual license, look at the **Applications** tab of the license properties, and add the **Installed** column from the column chooser. There is no management view that shows this value for many licenses at a time. (Keep in mind that this is *not* the **Installed** count on an applications listing such as **Installed Applications**, because that figure is not filtered by license.) *Database reference:* The `InstalledSoftwareData` table records installations and links to licenses through the `SoftwareLicenseID` property. *Data warehouse reference:* `InstalledCount` column in the `ConsumptionData` table.
Last purchase date	The most recent purchase date of all the purchases linked to the selected license. *Related management view:* For an individual license, you can check the result on the **Purchases** tab of the license properties, adding the **Purchase date** to the table from the column chooser, and sorting on the dates to see the latest one. *Database reference:* Not saved as a distinct value in the operations databases. The `EntitlementTransaction` table links individual purchases (through the `PurchaseOrderDetailID`) to licenses (through the `SoftwareLicenseID`). Each purchase then links to the `PurchaseOrder` table through its `PurchaseOrderID`, and this table records the `PurchaseOrderDate` for all the purchases that form part of the same purchase order. *Data warehouse reference:* `LastPurchaseDate` column in the `PurchaseData` table.

Measure	Notes
Licensed cores (max)	The number of processor cores that are covered by a license, totaled for all inventory devices linked to this license at the appropriate license consumption calculation. *Related management view:* In the properties for an individual license, check the **Consumption** tab and add the **Cores** column from the column chooser. This shows the number of cores licensed for each device attached to this license. (Remember that the core count for individual devices may be missing from inventory, depending on the inventory tool used; and that you can manually correct the value in the **Hardware** tab of the inventory device properties.) No management view of multiple licenses shows the total cores licensed. *Database reference:* Individual core counts per device are saved in the `SoftwareLicenseCoresConsumedData` table, with the total per license summed for all records that have the appropriate `SoftwareLicenseID`. *Data warehouse reference:* `LicensedCores` column in the `ConsumptionData` table.
Linked VMs (max qty)	The number of devices linked to this license that are virtual machines. This includes virtual machines which are not consuming entitlements because they are covered by other product use rights, exemptions, and the like. *Related management view:* This collective total is not available in management views. *Database reference:* Installations recorded in the `InstalledSoftwareData` are linked through the `ComplianceComputerID` column to the `ComplianceComputer`. Of these linked records in `ComplianceComputer`, the number with `ComplianceComputerTypeID=3` gives the count of VMs (this is a foreign key to the `ComplianceComputerType` table, where `3 = Virtual Machine`). *Data warehouse reference:* `VirtualEnvironmentCount` column in the `ConsumptionData` table.

Measure	Notes
Purchased (max qty)	The total number of license entitlements owned by the enterprise (or enterprise group) for the given license, being the sum of the **Licensed from PO** and **Extra entitlements** values stored in the properties of the license. This is the number of entitlements you are entitled to consume for this license. (Where individual purchases have been associated with particular enterprise groups, these facts are reflected in the subtotals for relevant groups.) *Related management view:* See the **Compliance** tab of the individual license properties, or review a license listing such as the **License Compliance > All Licenses** page. *Database reference:* The `EntitlementTransaction` table links individual purchases (through the `PurchaseOrderDetailID`) to licenses (through the `SoftwareLicenseID`). The `PurchasedCount` in the data warehouse is the sum of the `LicenseQuantity` fields for all records in the `PurchaseOrderDetail` table that are thus linked to the relevant license (filtered for appropriate enterprise groups, where the purchases have values for `LocationID`, `BusinessUnitID`, `CostCenterID`, or `CategoryID`). Any **Extra entitlements** (which are saved in the `NumberPurchased` field of the `SoftwareLicense` table) are added to the subtotal for the enterprise group identified in the license (if any), or rolled into the total for the enterprise, as appropriate. *Data warehouse reference:* `PurchasedCount` column in the `PurchaseData` table.
Shortfall/Availability (max)	The calculated difference between **Total licensed** and **Consumed** (visible in the **Compliance** tab of license properties). Positive values show entitlements still available, and negative values show that consumption exceeds purchases (a purchasing shortfall). *Related management view:* For each license, see the **Shortfall/Availability** figure in the **Compliance** tab of the license properties. Also available in license listings such as **License Compliance > All Licenses**. *Database reference:* This figure is not saved in the operations databases. *Data warehouse reference:* `CompliancePosition` column. Not stored, but calculated on demand as `PurchaseData.PurchaseCount` less `ConsumptionData.ConsumedCount`.

Measure	Notes
Total purchase price (max)	The total of all recorded costs for all the purchases linked to the particular license. (This may be unrelated to the costs of licenses consumed.) *Related management view:* The total price for each individual purchase is visible in the **All Purchases** page (and in the **Financial** tab of the properties of each purchase, where details can be recorded). There is no management view that shows the rolled-up total of all the purchases linked to a specific license. *Database reference:* The `EntitlementTransaction` table links individual purchases (through the `PurchaseOrderDetailID`) to licenses (through the `SoftwareLicenseID`). The `Total purchase price` is the sum of the `TotalPrice` fields for all records in the `PurchaseOrderDetail` table that are thus linked to the relevant license. *Data warehouse reference:* `PurchasedCost` column in the `PurchaseData` table.
Used (max qty)	Out of the installation records linked to the particular license, this is the subset for which there are usage records that meet the current criteria for software usage (by default, an application must have been used at least once in the last 3 months, with the settings adjustable on the **Usage** tab of the application properties). *Related management view:* You can inspect which devices/users are known to have used the licensed software on the **Consumption** tab of the license properties. As well, license views such as **License Compliance** > **All Licenses** offer the **Used** count for the installations linked to each license. *Database reference:* This is the count of records in the `InstalledSoftwareUsageData` table that have the `SoftwareLicenseID` matching the current license. *Data warehouse reference:* `UsedCount` column in the `ConsumptionData` table.

Software License Dimension

As part of the **Consumption analysis**, the **Software license** dimension allows you to drill down to an individual license for a specific product, as part of analyzing license consumption throughout your enterprise.

The **Software license** dimension expands into a four-level hierarchy that gives you access to (in order):

- **Publisher**
- **License Type**
- **Product Name**
- **License Name**.

Table 13: Attributes for the Software license dimension, Publisher level

Attribute	Notes
Publisher	The name of the company that publishes this application (and product). *Related management view:* For each application, the publisher is linked through the **General** tab of the application properties. However, the publisher must exist first for linking, and these records are maintained in the **Procurement > All Vendors** view. The publisher cited in each license is widely available in license listings, such as **License Compliance > All Licenses**. *Database reference:* The master list of all vendors (including both publishers and resellers) is maintained in the `Vendor` table. Once linked to an application, minimal detail about the publisher is replicated in the `SoftwareTitlePublisher` table, where this value is visible as `PublisherName`. This table is referenced through the `SoftwareTitleProduct` table, which is in turn referenced by the `SoftwareTitle` (application) table. *Data warehouse reference:* `PublisherName` column in the `SoftwareLicenseData` table.

Table 14: Attributes for the Software license dimension, License type level

Attribute	Notes
License type	The type of each license (as defined in FlexNet Manager Suite). Used here as a grouping mechanism, so that you must first choose the license type to drill down any further. *Related management view:* For each license, the **License type** appears in the **Identification** tab of the license properties. **License type** is also widely available in license listings, such as **License Compliance > All Licenses**. *Database reference:* License types are saved in the `SoftwareLicenseType` table. From there they are referenced by the `SoftwareLicense` table through the `LicenseTypeID` value. *Data warehouse reference:* `LicenseType` column in the `SoftwareLicenseData` table.

Table 15: Attributes for the Software license dimension, Product name level

Attribute	Notes
Product	The common name for a family of applications, independent of version or edition details. This must be unique for any given publisher. *Related management view:* For each license, the **Product** name is displayed in the **Applications** tab of license properties (and you can link other applications there, each of which displays its own **Product** value). Keep in mind, too, that a license may be linked to applications from more than one product. The **Product (primary)** name is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Product names are maintained in the `SoftwareTitleProduct` table. *Data warehouse reference:* `ProductName` column in the `SoftwareLicenseData` table.

Table 16: Attributes for the Software license dimension, License name level (alphabetical listing)

Attributes	Notes
Compliance status	Indicates whether or not use of software under this license complies with the license terms and conditions (and some related values). *Related management view:* For individual licenses, the **Compliance status** value is displayed in the **Compliance** tab of the license properties. The **Compliance status** column is widely available in license listings, such as **License Compliance > All Licenses**. *Database reference:* Values are stored in the `SoftwareLicenseComplianceStatus` static table. Individual license records link to this using the `SoftwareLicenseComplianceStatusID` property. *Data warehouse reference:* `ComplianceStatus` column in the `SoftwareLicenseData` table.

Attributes	Notes
Duration	The localized form of the possible license duration values, for which the English defaults are: • `Perpetual` (a license that is not time-limited) • `Subscription` (a license that must be renewed by regular payments, usually annually) • `Time limited` (a license that will expire, and typically cannot be renewed, such as a time-limited evaluation license). *Related management view:* For individual licenses, the **Duration** value is displayed in the **Identification** tab of the license properties. The **Duration** column is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Duration default values (and numeric keys) are stored in the `SoftwareLicenseDuration` table. Individual license records link to this through the `SoftwareLicenseDurationID` property. *Data warehouse reference:* `Duration` column in the `SoftwareLicenseData` table.
Estimated unit price	An approximate cost for a single entitlement purchased for this license. If the **Override unit price** has been set on the **Purchases** tab of the license properties, this is the value used. Otherwise, the unit price (**Total price** divided by **Effective quantity**) is taken from the most recent purchase linked to the license. *Related management view:* For an individual purchase, the unit price is listed in the **Financial** tab of the purchase properties, as **Quantity X at unit price:**. The **Unit price (*`currency`*)** column is widely available in listings of purchases (although you sometimes you must add it to the listing from the column chooser). *Database reference:* See the `PurchaseOrderDetail` table, `UnitPrice` column. *Data warehouse reference:* `EstimatedUnitPrice` column in the `SoftwareLicenseData` table.

Attributes	Notes
Expiry date	For subscription (or other time-limited) licenses, this is the date when the current license expires. Any value is ignored when `SoftwareLicenseDurationID = 3` (that is, for a perpetual license.) A null value in this field also means that the license is perpetual, since it does not have an expiry date. *Related management view:* For individual licenses, the **Expiry date** value is displayed in the **Identification** tab of the license properties. The **Expiry date** column is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* See the `SoftwareLicense` table, `ExpiryDate` column. *Data warehouse reference:* `ExpiryDate` column in the `SoftwareLicenseData` table.
Grants downgrade right	A Boolean that indicates whether this license offers downgrade rights. ***Tip:*** *There is no corresponding reporting on the upgrade right. This is because when the upgrade right is available, FlexNet Manager Suite automatically updates the primary application on the license to the most recent version. This means, in effect, that every license with the upgrade right has already been upgraded to the max.* *Related management view:* For license types that support downgrade rights, there is a **Downgrade rights** section in the **Use rights & rules** tab of the license properties that gives details. There is no equivalent of this Boolean in management views within FlexNet Manager Suite. *Database reference:* Saved in the `SoftwareLicenseProduct` table, in the `DowngradeEnabled` column. You may also need to check `InheritDowngradeFromContract`, and if necessary follow the `InheritDowngradeFromContractID` to find the setting inherited from that contract. *Data warehouse reference:* `GrantsDowngrade` column in the `SoftwareLicenseData` table.
Grants rights on VMs and hosts	A Boolean that indicates whether the license provides specific rights for virtual machines or their hosts. *Related management view:* For individual licenses, when the **Use rights & rules** tab includes a section on **Right of second use**, the setting **No special virtualization rights** sets this Boolean to `0` (false). The remaining three settings on that section set this Boolean to `1` (true). *Database reference:* See `SoftwareLicense` table, `CoverInstallsOnVirtualMachines` column. *Data warehouse reference:* `GrantsVirtualEnvironment` column in the `SoftwareLicenseData` table.

Attributes	Notes
Grants second use right	A Boolean that indicates whether this license offers second use rights. Only supported for license types where **License type supports second use right** is `1` (true). *Related management view:* For license types that support second use rights, there is a **Right of second use** section in the **Use rights & rules** tab of the license properties that gives details. There is no equivalent of this Boolean in management views within FlexNet Manager Suite. *Database reference:* Saved in the `SoftwareLicense` table, in two columns: • `SecondUsageWorkLaptop` is a Boolean that authorizes second use on a work laptop linked through the user to a desktop with a relevant installation • `SecondUsageAtHome` is a Boolean that authorizes a user with a work installation of the software to use a second copy at home (where, obviously, inventory is not collected). Alternatively, check the `SecondUsageInheritFromContract` Boolean, and if that is true, follow the link in the `SecondUsageInheritFromContractID` column to find the settings inherited from the contract. *Data warehouse reference:* `GrantsSecondUse` column in the `SoftwareLicenseData` table.
License	The full name of this license. *Related management view:* For each license, the **Name** is displayed (end editable) in the **Identification** tab of license properties. The **Name** is displayed in every license listing, such as **License Compliance > All Licenses**. *Database reference:* Saved in the `SoftwareLicense` table, in the `Name` column. *Data warehouse reference:* `LicenseName` column in the `SoftwareLicenseData` table.
License edition	The edition of this license. While this is strictly an attribute of the license, a common convention is to allow automatic updating to reflect the edition of the latest application version linked to the license. *Related management view:* For each license, the **Edition** is displayed (end editable) in the **Identification** tab of license properties. The **Edition** is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Saved in the `SoftwareLicense` table, in the `Edition` column. *Data warehouse reference:* `LicenseEdition` column in the `SoftwareLicenseData` table.

Attributes	Notes
License status	Where this license was (at snapshot time) in the license life-cycle: whether `Purchased`, `Received`, `In stock`, `Active`, or `Retired`. 💡 ***Tip:*** *Do not confuse this value with* ***Compliance status****.* *Related management view:* For each license, there is a **Status** drop-down list available in the **Identification** tab of the license properties. The **Status** column is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Status values are preserved in the `LicenseStatus` static table. Individual license records link to this using the `LicenseStatusID` property. *Data warehouse reference:* `LicenseStatus` column in the `SoftwareLicenseData` table.
License type supports second use right	A Boolean that indicates whether the current license type is capable of supporting the right of second use. *Related management view:* For individual licenses, the **Use rights & rules** tab includes a section on **Right of second use** when this value is true, and otherwise omits the section entirely. There is no equivalent available in management views. *Database reference:* No equivalent value stored in the compliance database (the value is calculated on the fly as the snapshot is saved to the data warehouse database (suggested name: FNMSDataWarehouse). *Data warehouse reference:* `UseInSecondUseRights` column in the `SoftwareLicenseData` table.
License version	The version of this license. Note that this version number applies strictly to the license, and so may have been used in custom ways in your enterprise; but a common convention is to make the license version reflect the version of the application initially licensed here (although these versions may change through upgrade and downgrade rights). Another convention is to allow automatic updating to reflect the latest application version linked to the license. *Related management view:* For each license, the **Version** is displayed (end editable) in the **Identification** tab of license properties. The **Version** is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Saved in the `SoftwareLicense` table, in the `Version` column. *Data warehouse reference:* `LicenseVersion` column in the `SoftwareLicenseData` table.

Attributes	Notes
Subject to true-up	A Boolean that indicates whether this is a true up license. A true up license cannot go into breach, with any over-consumption in a period being adjusted through the regular (usually annual) true up process. *Related management view:* For each license, there is a **Subject to true up** check box available in the **Identification** tab of the license properties. The **Subject to true up** column is widely available in license listings, such as **License Compliance > All Licenses** (although sometimes you must add it to the listing from the column chooser). *Database reference:* Saved in the `SoftwareLicense` table, in the `TrueUp` column. *Data warehouse reference:* `IsTrueUp` column in the `SoftwareLicenseData` table.

Common Dimensions

This section documents dimensions that are common to both the **Installation** analysis and the **Consumption** analysis. These include:

- The **Point in time** dimension, which sets the reporting period for your custom reports, and determines how many saved data snapshots are included in them
- Four dimensions covering the four types of enterprise group (**Corporate unit**, **Location**, **Cost center** and **Category**) that allow you to segment the reported figures across your enterprise, using the corporate structure you have established in FlexNet Manager Suite
- Four near-duplicate dimensions (**Corporate unit (Software license)**, **Location (Software license)**, **Cost center (Software license)** and **Category (Software license)**), which, although they are unique to the **Consumption** analysis, are included in this section because their attributes and values exactly duplicate the previous four. The distinct purpose of these additional dimensions is to allow reporting on the *ownership* of software licenses, as distinct from the *consumption* of software licenses using the previously-mentioned four dimensions. Thus you could, for example, use custom reports to track down licenses assigned to (owned by) the Marketing department, but accidentally being consumed by the Sales team.

Point in Time Dimension

The **Point in time** dimension expands into a tree hierarchy with three levels:

- **Year**
- **Month** within a year
- **Day**, which is really the full date/time value when the snapshot was recorded in the data warehouse database.

You can, of course, pick any period (such as a year) to prepare your report, and then within the published report drill through to smaller time intervals, down to the individual data snapshot. Snapshots are recorded weekly by default.

This dimension has no equivalent in the management views within FlexNet Manager Suite, and does not reflect data stored in the compliance database.

Table 17: Attributes for the Point in time dimension

Attributes	Notes
Year	The year in which a snapshot was captured. *Data warehouse reference:* `SnapshotData` table, in the `SnapshotYear` column.
Month	The month in which a snapshot was captured. *Data warehouse reference:* `SnapshotData` table, in the `SnapshotMonth` column.
Month-year	A convenience caption for reporting that combines the numeric month and year values. For example, August 2016 is represented as `8 - 2016`. *Data warehouse reference:* `SnapshotData` table, combining the `SnapshotMonth` and `SnapshotYear` columns.
Day	The day (number within the month) on which the snapshot was captured. *Data warehouse reference:* `SnapshotData` table, in the `SnapshotDay` column.
Date	The full date/time value when the snapshot was stored (for example, `2016-09-03 14:40:00.000`). The date is represented in the extended format defined in ISO 8601:2004 (that is, `YYY-MM-DD`) and the time is in 24-hour format listing hours, minutes, seconds, and milliseconds. The time zone is not included, but all timestamps are recorded using the time setting on your central application server. *Data warehouse reference:* `SnapshotData` table, in the `SnapshotDate` column.

Enterprise Group Dimensions

There are four kinds of enterprise group in FlexNet Manager Suite:

- **Corporate unit**
- **Location**
- **Cost center**
- **Category**.

Each of these four kinds is available as a dimension for your custom reports, present in common in both the **Installation analysis** and the **Consumption analysis**. This allows you to segment either application installation numbers or license consumption numbers across various kinds of enterprise groups, as best fits your corporate approach to group management.

Tip: *Keep in mind that the numbers quoted for each enterprise group are "rolled up totals": that is, they are the total for all the children of this group, plus any local value for the group itself. For example, consider this simplified location hierarchy (each row being the only child of the one above) with the local installation counts of a particular application as shown. Each location then shows the rolled-up total installation values given in the third column:*

cation	*Local installations*	*Rolled-up total shown*
North America HQ	*12*	*55*
North-west Region Office	*10*	*43*
Chicago Office	*33*	*33*

In reality, the rolling up of totals is more complex, since any high-level enterprise group is likely to have many peer children, each of which has many peer children, and so on down through the tree.

In the case of the **Consumption analysis** (only), as well as the basic enterprise groups that you may use to analyze consumption across different groups, there is a second set of the same groups with a slightly different naming convention:

- **Corporate unit (from license)**
- **Location (from license)**
- **Cost center (from license)**
- **Category (from license)**.

These identify the same kinds of groups, but in this case as an attribute of the license itself, identifying any relationship between the license and enterprise groups established on the **Ownership** tab of the license properties.

The presence of enterprises groups in these two ways, both tracking the *ownership* of the license and separately segmenting the *consumption* of the same license, allow you to probe scenarios such as licenses that you thought were assigned to one group being consumed elsewhere (which means the license was *over*-assigned to the first group, and has spare capacity).

Each of the enterprise group dimensions expands to show a tree hierarchy with maximum depth of 10 levels of child groups of the same kind. Each level is identified in the group's label, such as **Location - level 3**.

At each level, each corporate group has only a single attribute available:

Table 18: Attribute for the enterprise group dimensions, at each of the 10 levels

Attribute	Notes
`Enterprise group` **name**	The name of each Corporate unit, Location, Cost center, or Category, as displayed in the label (in place of the *`Enterprise group`* placeholder). *Related management view:* The name of each enterprise group is available wherever groups are included in management views within FlexNet Manager Suite. The details are maintained in the listing for each enterprise group (available through **Enterprise >** ***`Group type`***), where you may expand the hierarchy to any focus point, and either click the **+** icon to add a new child, or click the edit (pencil) icon to modify the name of an existing group. *Database reference:* The `GroupEx` table, in the `GroupCN` column. *Data warehouse reference:* In the appropriately named table: • `LocationData` • `CorporateUnitData` • `CostCenterData` • `CategoryData` find the name for the group at the appropriate level in `Level`*`X`*`Name`, where *X* has a value from 1 to 10.

10

Authentication

User authentication is a critical component of the security structure in your organization. Many security-conscious organizations are moving beyond traditional user name and password authentication within each tool they use, to a standard "single sign-on" approach. This chapter describes the authentication technologies and configuration requirements that can be used with FlexNet Manager Suite to integrate with a single sign-on infrastructure.

Single Sign-On Support with SAML

To enable single sign-on using an Identity Provider, FlexNet Manager Suite includes support for Security Assertion Markup Language (SAML) 2.0 technology, and will integrate with any Identity Providers that are compliant with SAML 2.0.

Tip: *The terminology for SAML describes the two sides of the relationship with the following terms:*

- *The service that controls operator login for authentication is called an Identity Provider. Any Identity Provider that complies with SAML 2.0 is supported. Examples include:*
    - *Okta ()*
    - *G Suite ()*
    - *SalesForce ().*
- *The software that the operator can access after login (in this case, FlexNet Manager Suite) is called a service provider (SP).*

Using Single Sign-on

When single sign-on has been configured appropriately, an attempt to log in to FlexNet Manager Suite will be redirected to the Identity Provider (IdP), where the login is supported. You may also log in to FlexNet Manager Suite directly from the Identity Provider, provided that this has been configured with the appropriate link to FlexNet Manager Suite.

When logging out, you can choose to close the FlexNet Manager Suite session, without affecting the session on the Identity Provider (or any other service provider); or may be able to initiate a complete logout from the

Identity Provider. Note that a complete logout requires the Identity Provider to support this function, and is configured on the Identity Provider.

Configuring Single Sign-on (Overview)

Authentication services for SAML 2.0 are provided through use of the third-party tool Kentor.AuthServices. This tool requires you to configure FlexNet Manager Suite to meet the requirements of your chosen Identity Provider. The major steps are as follows:

1. Plan your single sign-on strategy:
    - Identify your Identity Provider, one which supports your preferred configuration
    - Will you support single sign-on initiated by the Identity Provider?
    - Will you or your Identity Provider require signed and/or encrypted SAML assertions?
    - Do you require support for single log-out?
2. Configure FlexNet Manager Suite as a service provider by giving it an entity ID, saved in its `web.config` file.
3. Determine whether your implementation requires that FlexNet Manager Suite use a digital certificate to support signing and encryption of the SAML assertions exchanged with the Identity Provider; and if so, provide the certificate and configure both the service provider and the Identity Provider to support it. Configuration for the service provider is again within its `web.config` file.
4. Configure the service provider (FlexNet Manager Suite) with the details needed for communication with the selected Identity Provider. You may do this either by:
    - Configuring it to read values from the metadata XML file maintained by the Identity Provider (recommended)
    - Recording the full details of configuration in its own `web.config` file (when the Identity Provider does not provide access to a metadata file).

    All changes to the `web.config` file are covered in Configuring FlexNet Manager Suite as a SAML Service Provider.
5. Configuring your chosen Identity Provider to recognize FlexNet Manager Suite. For details, see Configuring Your Identity Provider to Recognize FlexNet Manager Suite.

Configuring FlexNet Manager Suite as a SAML Service Provider

To set up authentication using any SAML 2.0 tool. you need to make changes to:

- The `web.config` file for FlexNet Manager Suite
- The `web.config` file for FlexNet Report Designer, if that is in use in your implementation
- Microsoft Internet Information Services on affected servers
- The Identity Provider.

***Note:** When SAML 2.0 is enabled, all operators of FlexNet Manager Suite must log in using the same configured Identity Provider. It is not possible to operate in a mixed mode where some operators use Windows Integrated Authentication and others use a single sign-on Identity Provider.*

To configure use of a single sign-on tool using SAML 2.0:

1. In a flat text editor, open the `web.config` file for the web application server of FlexNet Manager Suite.

   By default, this is located on your web application server (or, in a single-server implementation, your application server) in `<drive>:\\Program Files (x86)\Flexera Software\FlexNet Manager Platform\WebUI`.

2. Identify the `authenticationType` attribute in the `signOn` element, and update the value to `Saml`.

   Original:

   ```
   <signOn authenticationType="Default" allowSelfSigned="true"
   ```

   Updated:

   ```
   <signOn authenticationType="Saml" allowSelfSigned="true"
   ```

   ***Tip:** You can also customize the property of operators used to authenticate access to FlexNet Manager Suite. For more information, see Customizing Operator Login Data Type.*

3. Optionally, update the `createUnknownOperator` Boolean attribute of the `signOn` element.

   - When `createUnknownOperator=true`, and a user successfully logs into your Identity Provider who is not already a known operator in FlexNet Manager Suite, the operator is automatically created in FlexNet Manager Suite as a time-saving measure. However, the new operator is not assigned to any roles in FlexNet Manager Suite, and is therefore presented with the `Sign In Failure` page. To permit access, a known administrator must assign the appropriate role(s) for the new operator.
   - When `createUnknownOperator=false`, and a user successfully logs into your Identity Provider who is not already a known operator in FlexNet Manager Suite, the user is presented with the `Sign In Failure` page. To permit access, a known administrator must first create an operator account for this user, and then assign the appropriate role(s) for the new operator.

     ***Tip:** The `serviceUri`, `accountUri`, and `managerUri` fields are not required for SAML authentication.*

   In summary, the user experience is identical in both cases, and both have the same secure outcomes (access is denied); but there is a little less work for the administrator in the first case.

4. Continue searching through the `web.config` file, and update the Kentor.AuthServices element with the SAML 2.0 details, as follows.

   The Kentor.AuthServices element stores details about the service provider (FlexNet Manager Suite). It has two child elements that cover the Identity Provider and the optional Identity Provider Certificates. Each section is described in turn in the following tables. More details about the attributes described below are available from: http://msdn.microsoft.com/en-us/library/system.security.cryptography.x509certificates.storename.aspx

Configuration information for FlexNet Manager Suite as the Service Provider

Edit these attributes in the Kentor.AuthServices element.

Attribute	Description
`entityId`	A mandatory URI that uniquely identifies FlexNet Manager Suite as the service provider. This must remain fixed for the lifetime of the SAML configuration. ***Tip:*** *If Secure Socket Layer (SSL) is in use, all URLs must use the HTTPS protocol.* Because the URI is used only as an identifier, it does not need to be a real URL that resolves to web resources.
`returnUrl`	When the Identity Provider can initiate a single sign-on (because the operator logs in on the Identity Provider's web page and invokes FlexNet Manager Suite), this URL is mandatory. It provides the address to which the Identity Provider redirects a successful operator who selects the appropriate link to FlexNet Manager Suite as service provider. ***Important:*** *To enable single sign-on initiated by the Identity Provider, ensure that `allowUnsolicitedAuthnResponse=true` (see next table).* ***Tip:*** *If Secure Socket Layer (SSL) is in use, all URLs must use the HTTPS protocol.*

Attribute	Description
`authenticateRequestSigningBehavior`	An optional field that supports the following values: - `Never`: The service provider will never sign any SAML assertions. In this case, a certificate is not required. Ensure that the Identity Provider is configured to accept unsigned assertions. - `Always`: The service provider will always sign all SAML assertions. A certificate is mandatory. If the Identity Provider is configured to accept only signed assertions, the public key for the certificate must also be uploaded to the Identity Provider. - `IfIdpWantAuthnRequestsSigned`: (default if the attribute is missing): A certificate is required if the Identity Provider is configured to accept only signed assertions, in which case the public key for the certificate must also be uploaded to the Identity Provider.

Configuration information about the Identity Provider

Edit these attributes in the `identityProviders > add` element. This data identifies the Identity Provider for the service provider (FlexNet Manager Suite).

Attribute	Description
`entityId`	A mandatory URI that identifies the selected Identity Provider.

Attribute	Description
`loadMetadata`	Optional Boolean, with default: `false`. Determines whether FlexNet Manager Suite should use information about the Identity Provider taken from the metadata XML document. It downloads the document from the URL identified by `metadataLocation` (if specified), and otherwise downloads from the location identified by the `entityId`. The metadata is a XML document that contains information necessary for interaction by FlexNet Manager Suite with the Identity Provider. It can contain URLs of endpoints, information about supported bindings, identifiers, and public keys. For more information, see the SAML 2.0 metadata schema available at http://docs.oasis-open.org/security/saml/v2.0/saml-schema-metadata-2.0.xsd. ***Tip:*** *FlexNet Manager Suite re-reads the metadata file based on the* `cacheDuration` *setting within the metadata file itself. (If this value is not specified, the metadata is re-read every hour.) If a file read fails, the data is considered still valid for the further period specified by the* `validDuration` *attribute (again, within the metadata file). If the metadata file cannot be re-read by the expiry of these two periods, SAML authentication is shut down.*
`metadataLocation`	An optional URL or file location pointing to the metadata file. If this attribute is not specified, the URL defined by the `entityId` is checked. ***Tip:*** *If Secure Socket Layer (SSL) is in use, all URLs must use the HTTPS protocol.*
`signOnUrl`	Optional when `loadMetadata` is true. URL for the Identity Provider. If an operator attempts to access FlexNet Manager Suite without existing authorization, they are redirected to this URL to sign in through the Identity Provider. ***Tip:*** *If Secure Socket Layer (SSL) is in use, all URLs must use the HTTPS protocol.*

Attribute	Description
`logoutUrl`	Optional when `loadMetadata` is true. An optional URL that the Identity Provider uses to listen for log out requests, allowing FlexNet Manager Suite to perform a single log out. **Tip:** *If Secure Socket Layer (SSL) is in use, all URLs must use the HTTPS protocol.*
`binding`	Optional when `loadMetadata` is true. The binding that the services provider should use when sending requests to the identity provider. Values: `HttpRedirect` or `HttpPost`.
`disableOutboundLogoutRequests`	Optional with values: `True` or `False`. When set to true, it overwrites the single logout configuration set by the Identity Provider so that single log out is disabled.
`allowUnsolicitedAuthnResponse`	Mandatory Boolean, with default value `false`. Where IdP-initiated single sign-on is to be supported, this attribute *must* be set to true.
`signingCertificate`	Optional when `loadMetadata` is true. This is a separate element that is a child of the `identityProviders > add` element. It identifies the public key certificate supplied by the Identity Provider for signing and handling encrypted communications. The `signingCertificate` may have all the same attributes as are documented below for the similar certificate from the service provider.

Configuration information for the Signing Certificates for the Identity Provider and FlexNet Manager Suite as the Service Provider

A certificate identifying FlexNet Manager Suite is required when Single Logout is used, or whenever the Identity Provider requires signed or encrypted communication from the service provider (FlexNet Manager Suite). It allows the service provider to sign SAML assertions to the Identity Provider, validating the identity of the service provider. The requirement for use of certificates is recorded in the `authenticateRequestSigningBehavior` setting (see above). Use of signed assertions also requires that you have:

- Created the certificate (this may be from a well-known Certificate Authority such as Verisign, or it can conveniently be a self-signed certificate if the Identity Provider does not require a trusted Certificate Authority)
- Uploaded the public key for the certificate to the Identity Provider.

When a service provider's certificate is required, edit these attributes in the serviceCertificates element, adding them where they do not already exist.

Attribute	Description
storeLocation	A mandatory field with values CurrentUser or LocalMachine. Represents the location of the store to search for the certificate. CurrentUser — User store. The user corresponding to IIS App Pool user, configured for the FlexNet Manager Suite virtual directory. LocalMachine — The machine where the web application server is installed.
storeName	A mandatory field containing an alias for the certificate store within the storeLocation. Valid values are those from the System.Security.Cryptography.X509Certificates.StoreName enumeration (for details, see).
fileName	When you do not wish to store your certificate in the appropriate certificate store, you may save it as a file in a folder beneath the installation folder for FlexNet Manager Suite (represented by the special ~/ path element). Example: `fileName="~/App_Data/okta.cert"`
x509FindType	Defines what to search for to find the certificate. Valid values are those from the System.Security.Cryptography.X509Certificates.X509FindType enumeration (for details see .
findValue	A mandatory field containing the search term used to find the certificate. For example, if x509FindType=FindBySubjectName, then findValue must contain the certificate subject name.

5. Save this web.config file, but keep it open as a source for copying data if you also use FlexNet Report Designer.

6. If your implementation uses FlexNet Report Designer, configure the separate web.config file for your Cognos server.

   FlexNet Report Designer is visible by navigating to **Reports > Analytics**. If this is present:

   a. Switch to your Cognos server.

      FlexNet Report Designer (Cognos) is likely to reside on a separate server. For SAML-based single sign-on to work, the Cognos server and web application server must be in the same domain.

b. In your flat text editor, open the local `web.config` file for the Cognos server.

   The default location (on Windows) is `<drive>:\Program Files\ReportDesigner\c10_64\webcontent`.

c. Edit the `web.config` file using the same values noted in step 2 and 4 above.

d. From the first `web.config` file for your web application server, copy the `machineKey` element, and paste it over the same element in the `web.config` file *for your Cognos server*.

   This XML element has the format:

```
<machineKey validationKey="…" decryptionKey="…" validation="SHA1" />
```

7. The final step requires you to configure IIS on your application server (or in a multi-server installation, the web application server), and on your Cognos server (where the "Gateway service" operates).

   There are several sites related to FlexNet Manager Suite, enabling various features. Repeat the following configuration for each of these sites:

Feature	IIS Site Name
FlexNet Manager Suite	`Suite`
Simulations	`ECMBusinessPortal`
FlexNet Manager for SAP Applications	`SAPOptimization`
Analytics (FlexNet Report Designer)	`ibmcognos`

   For each site, ensure the following have been set:

   - **Windows Authentication** is disabled
   - **Forms Authentication** is enabled
   - **Anonymous Authentication** is enabled.

8. Restart IIS.

It is possible to revert back to Windows Integrated Authentication if required. Keep in mind that operators created for use with SAML will no longer have access, and will need to be re-created using Integrated Windows Authentication. To revert, restore the original values to the `web.config` file(s), and revert the IIS configuration, restarting IIS.

Customizing Operator Login Data Type

By default, in a single sign-on environment conforming to SAML 2.0, a SAML user logs in using an email address, or a SAML user name. The Identity Provider then passes a property to FlexNet Manager Suite that allows look-up of the operator to identify which roles are applicable, and so on.

In FlexNet Manager Suite, the received property value is matched against the `OperatorLogin` column of the `ComplianceOperator` table in the compliance database.

Some enterprises require that the Identity Provider uses a different property (such as an employee number) to authorize use of the service provider (in this case, FlexNet Manager Suite) by the operator. At a high level, the following steps are required to allow the use of a custom identifier.

To customize the property for operator login using SAML 2.0:

1. Ensure that the Identity Provider stores the necessary property (such as employee number) for each authorized account.

   The details for this configuration depend on your chosen Identity Provider.

2. Configure the Identity Provider to return the required value in a custom property, for which you set a custom property name (for example, `EmpNo`).

3. Ensure that the required values (in this case, the employee numbers) are also saved in the `OperatorLogin` column of the `ComplianceOperator` table of the compliance database for FlexNet Manager Suite.

   Individually, these values can be entered in the **Account** field of the **Account Properties** page of the web interface (navigate to the system menu (⚙ ▼ in the top right corner) > **Accounts > Create an account**).

4. Within the `web.config` file for the web application server of FlexNet Manager Suite, in the `signOn` element, update the `authenticationLogin` attribute with the name of the custom property to receive from the Identity Provider (in this example, `EmpNo`).

When configuration is complete, the following scenario applies:

- Operator Sam successfully logs in using your preferred SAML 2.0 single sign-on tool (for example, Okta).
- The tool (Okta) looks up Sam's employee number, and returns it to FlexNet Manager Suite as the value for the agreed custom property (such as `EmpNo=135798642`).
- FlexNet Manager Suite looks for this value in `ComplianceOperator.OperatorLogin`.
- Finding a match, FlexNet Manager Suite grants Sam access with access rights determined by the roles of which she is a member.

Managing Operators

In FlexNet Manager Suite, privileges are controlled by the **Role**(s) assigned to an operator. Without a role, an operator cannot log in; nor can FlexNet Manager Suite determine whether a newly authorized operator should have administrator privileges until that operator's account has been both created and assigned the `Administrator` role within FlexNet Manager Suite. However, role assignment can only be performed by an administrator. This could produce a chicken-and-egg situation, where no one can log in to make anyone an administrator.

To resolve this situation, FlexNet Manager Suite looks for the existence of a custom assertion (or attribute) in the SAML 2.0 response called `FnmsAdmin`. This is configured from the Identity Provider, which passes this to FlexNet Manager Suite. This custom assertion needs to return a Boolean value (either True or False) to indicate whether the user is a member of the Administrator role in FlexNet Manager Suite.

For example,when using the Identity Provider Okta, the values used are:

Attribute	Value
Name	FnmsAdmin
Name format (optional)	Basic
Value	IsMemberOfGroupName("Administrators")

When you configure your Identity Provider to transmit this custom assertion, on first login by the marked account, the operator account is created automatically and immediately assigned to the Administrator role.

Note: *In the account properties for this operator, the* ***Role*** *is set to* `Administrator`*, and cannot be changed. If you wish to remove the administrator permission, you must first change the setting from the Identity Provider, and thereafter update the role assignment within FlexNet Manager Suite.*

Creating an Operator

To manually create an operator, enter the SAML 2.0 login name into the **Account** field on the **Create an Account** page in FlexNet Manager Suite. (This differs from the use of Windows Authentication, where you can select the account name from a drop-down list, imported from Active Directory.)

Tip: *If you are migrating from Integrated Windows Authentication, the existing operator accounts using that method are invalid when you switch to SAML authentication. You need to create new operator accounts, each of which will be based on the SAML user name.*

An optional setting is available that permits automatic creation of operators when they attempt to login to FlexNet Manager Suite (true by default). While the account will be automatically created, no roles are assigned, so that the user will be presented with a screen stating that there has been a `Sign In Failure`. To permit access, an administrator will need to add the appropriate role(s) for each new operator (see Configuring FlexNet Manager Suite as a SAML Service Provider).

Kentor.AuthServices Example

An example of the values entered into the `kentor.authServices` section of the `web.config` file, when using the Identity Provider Okta:

```
<kentor.authServices entityId="http://localhost:62500/AuthServices"
  returnUrl="http://localhost:62500/"
  authenticateRequestSigningBehavior="Always">
  <identityProviders>
   <add entityId="http://www.okta.com/exk8cq8c02Kg1OVRl0h7"
    signOnUrl="https://dev-271049.oktapreview.com/app/
flexerasoftwaredev717079_markslocalfnms_1/exk8cq8c02Kg1OVRl0h7/sso/saml/"
    allowUnsolicitedAuthnResponse="true"
    binding="HttpRedirect"
    loadMetadata="true"
    metadataLocation="https://dev-271049.oktapreview.com/app/exk8cq8c02Kg1OVRl0h7/sso/
saml/metadata">
```

```
    <signingCertificate fileName="~/App_Data/okta.cert"/>
   </add>
  </identityProviders>
  <serviceCertificates>
    <add fileName="~/App_Data/Kentor.AuthServices.Tests.pfx"/>
  </serviceCertificates>
</kentor.authServices>
```

Configuring Your Identity Provider to Recognize FlexNet Manager Suite

So far, the tasks have covered the configuration needed on the service provider side of the communication. It is also necessary to configure your Identity Provider so that it can integrate with FlexNet Manager Suite as an authorized service provider.

To prepare, have the following information at hand:

- The `entityId` provided for FlexNet Manager Suite
- The full-qualified domain name of your application server (or, in a multi-server implementation, your web application server)
- The public key certificate identifying FlexNet Manager Suite, ready to upload (if signing and/or encryption is required).

To configure your Identity Provider:

1. Log on to your Identity Provider, and complete the following information.

Different Identity Providers use different naming conventions for these data elements. The following table lists the

- Terms for FlexNet Manager Suite, some of which are already identified in your `web.config` file (see Configuring FlexNet Manager Suite as a SAML Service Provider)
- The equivalent terms used by three example Identity Providers
- The appropriate values to use, and any other notes.

FNMS	Google G Suite	Okta	Salesforce	Notes
`entityId`	**Entity ID**	**Audience URI (SP Entity ID)**	**Entity Id**	The unique identifier for FlexNet Manager Suite as a service provider.
`entityId`	n.a.	**SP Issuer**	n.a.	Same as above.

FNMS	Google G Suite	Okta	Salesforce	Notes
ACS URL	**ACS URL**	**Single sign on URL**	**ACS URL**	- Not using SSL: `http://`*`wapsvr`*`/Suite/AuthServices/Acs` - Using SSL: `https://`*`wapsvr`*`/Suite/AuthServices/Acs` where *`wapsvr`* is the fully-qualified domain name of your web application server. Supported bindings: `HTTP-Post`, `HTTP-Redirect`.
SLO URL	n.a.	**Single Logout URL**	n.a.	- Not using SSL: `http://`*`wapsvr`*`/Suite/AuthServices/Logout` - Using SSL: `https://`*`wapsvr`*`/Suite/AuthServices/Logout` where *`wapsvr`* is the fully-qualified domain name of your web application server. Supported bindings: `HTTP-Post`, `HTTP-Redirect`.
Start URL	**Start URL**	n.a.	**Start URL**	- Not using SSL: `http://`*`wapsvr`*`/Suite` - Using SSL: `https://`*`wapsvr`*`/Suite` where *`wapsvr`* is the fully-qualified domain name of your web application server. This is the start page for FlexNet Manager Suite.
SP Certificate	n.a.	**Signature Certificate**	**Verify Request Signatures** (check box)	See next step.

2. If you are using signing or encryption for SAML assertions, follow the instructions provided by your Identity Provider to upload the public key digital certificate created for FlexNet Manager Suite.

Troubleshooting

Possible issues when configuring or using SAML.

Error type:

```
An unexpected error has occurred while attempting to communicate with the authentication
provider. The application configuration may be incomplete or incorrect. Please refer to
the log and the FlexNet Manager Suite application documentation for further information.
```

Connectivity

- When the `Load Metadata` attribute is set to true in the `identityProviders/add` attribute, and no internet connection exists while trying to load the metadata. Metadata reload period could be set by the identity provider.
- Analytics - If neither of the kentor.authServices `entityId` or the signOn `authenticationHost` attributes in the **ibmcognos** `web.config` file are provided when an error occurs when trying to authenticate with the SAML Identity Provider.

Configuration

- When (Kentor.authServices/entityId) attribute is missing, empty or having wrong value.
- When identityProviders section does not exist in the web config.
- When (identityProviders/add/entityId) attribute does not exist or has invalid value.
- When (identityProviders/add/signOnUrl) attribute does not exist
- When (identityProviders/add/binding) attribute does not exist or has invalid value.

Error type:

```
We have a problem. Unexpected error.
```

Analytics - If an error occurs when trying to authenticate with the SAML Identity Provider, due to the populated values in either the kentor.authServices `entityId` or the signOn `authenticationHost` attributes in the **ibmcognos** `web.config` file, then the user will be redirected to the authentication error page:

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Overview of Inventory Export Tool

The FlexNet Manager Suite Inventory Export Tool is a stand-alone executable for Windows platforms. It exports information about installed software recorded in FlexNet Manager Suite, transferring the data to Vulnerability Intelligence Manager. More specifically, here is what is exported and what is excluded:

What is exported	What is NOT exported
Applications automatically identified within your enterprise by matching any kind of evidence rules published in the downloadable Application Recognition Library.	Any of the evidence records linked to these applications.
Application records you created manually and linked to evidence found within your enterprise.	Any of the evidence records linked to these applications.
Installer evidence found in the enterprise that is *not* yet linked to any application record.	Any other form of evidence such as file evidence, WMI evidence, and so on.
	Application definitions downloaded in the Application Recognition Library that have not yet been identified in your enterprise.

Within Vulnerability Intelligence Manager, the data appears as a software asset list, allowing assessment and notification of possible vulnerabilities in the applications present in your enterprise. Within Vulnerability Intelligence Manager, each company's account supports a single pool of data imported from FlexNet Manager Suite, which may be assigned to one or more asset lists for convenient management. At each data transfer, the entire pool is updated.

***Tip:** Multiple user accounts within one company have their own unique access tokens for Vulnerability Intelligence Manager. If the Inventory Export Tool is run multiple times from FlexNet Manager Suite, even using separate access tokens, the entire company data pool is updated by each of these user's actions.*

The Inventory Export Tool is separately downloadable, and must be installed on the application server of any on-premises implementation of FlexNet Manager Suite (for larger implementation that have scaled up to multiple servers, it may be installed on the batch server). From there, using resources already saved on that operational server, the tool accesses the necessary operations databases to collect the required data. The tool is configured to then deliver the data to a remote instance of Vulnerability Intelligence Manager.

Prerequisites

The requirements for the FlexNet Manager Suite Inventory Export Tool are simple:

- You must have a fully operational, on-premises implementation of FlexNet Manager Suite release 2015 R2 SP2 or later. (Each instance of FlexNet Manager Suite must have a single company account for Vulnerability Intelligence Manager. For managed service providers, there must be a separate account for each tenant.)

  Tip: *Supply of the Inventory Export Tool as a separate utility will be deprecated at a future release when equivalent functionality is more fully integrated within FlexNet Manager Suite. Please ensure that you refer to the correct documentation for your version of FlexNet Manager Suite.*

- The system must have completed at least one successful import of the Application Recognition Library.
- You must have completed at least one full inventory import, including successful recognition of at least some installed applications, so that appropriate data is available for export from FlexNet Manager Suite.
- You must have an access token that the Inventory Export Tool uses to authenticate with Vulnerability Intelligence Manager. If you do not already have this token, a summary is provided in the following process description.

Installing and Configuring the Inventory Export Tool

It is convenient to start this process logged into your FlexNet Manager Suite application server (in larger implementations where you have scaled up to multiple servers, use the batch server). Use an account with administrator privileges, or at least sufficient privileges to copy executables between folders and execute them.

After installation, the configuration process mainly consists of running the tool with appropriate command-line parameters. These simple steps are included in the following process.

To install and configure FlexNet Manager Suite Inventory Export Tool:

1. If you do not already have an API access token for Vulnerability Intelligence Manager, obtain one:

   Tip: *Managed service providers (MSPs) must have a separate company account for Vulnerability Intelligence Manager available for each tenant, and must provide a distinct API access token for each tenant.*

   a. Log into Vulnerability Intelligence Manager as an administrator user with sufficient privileges to access the **Settings** tab. (It is disabled if you do not meet this requirement.)

   b. Navigate to **Settings** > **API** > **Tokens**.

      The `Tokens` page lists all generated tokens, with each user account having a pre-generated token available.

   c. For the **User** account that will import the data from FlexNet Manager Suite and manage the resulting asset list, expand the value in the **Token** column by clicking the trailing ellipsis (...).

   d. Select the token value, copy, and save it conveniently for use at the end of this process. (You may then log out of Vulnerability Intelligence Manager.)

2. Use your browser to access the Flexera Software Customer Community.

   a. On https://flexeracommunity.force.com/customer/CCLanding, use the account details emailed to you with your order confirmation from Flexera Software to log in (using the **Login** link in the top right).

   > ***Tip:*** *Access requires your Customer Community user name and password. If you do not have one, use the `Request Community Access` link on the login page to request one. Your credentials are configured for access to content you have licensed.*

   b. Select the **Downloads** tab from the row across the top of the page.

   A routing page appears to let you `Access Product and License Center`, displaying lists of products from Flexera Software.

   c. In the lists of products, identify FlexNet Manager Platform, and click the **Access Above Products** button that is *below* that product name.

   The `Product and License Center` site is displayed.

   d. In the `Your Downloads` section of the `Home` page, click the link for FlexNet Manager Platform.

   e. In the `Download Packages` page, click the link for FlexNet Manager Platform 2017 R1 to access the downloads. (You may need to repeat this action on a second page to access the downloadable files.)

3. In the `Downloads` page, click FNMS2VIM.zip to download the Inventory Export Tool to Vulnerability Intelligence Manager. In your browser dialog, choose to save the file, and if the browser allows it, direct the saved file to a convenient working location (such as `C:\Temp` on your server).

4. Right-click the downloaded zip archive, choose **Extract All...**, and save to a convenient location (such as `C:\Temp\FNMS2VIM`).

5. From the extracted archive, copy the following files into `bin` folder of your FlexNet Manager Suite installation on this server (the default path is `C:\Program Files (x86)\Flexera Software\FlexNet Manager Platform\DotNet\bin`):

   - `FNMS-VIM.exe`
   - `FNMS-VIM.exe.config`
   - `Flexera.VIM.Export.dll`.

6. Open a command-line window, and navigate to the `bin` directory where you have placed those files, ready to configure the tool.

7. Use the following command once to configure the tool:

```
FNMS-VIM.exe set -u vimUploadLocation -a vimAccessToken
```

   Both options are mandatory.

> ***Note:** Managed service providers (MSPs) must make every command specific to an individual tenant account by supplying the `--tenantUID` parameter whenever Inventory Export Tool is invoked.*

Replace the placeholders as follows:

Placeholder	Replacement
`vimUploadLocation`	The URL for uploads to Vulnerability Intelligence Manager. If the URL happens to include spaces, enclose it in double quotation marks (which are otherwise optional). A typical example is: `https://api.app.secunia.com/api/fnms/sync/`
`vimAccessToken`	Replace with the access token for the user account (in Vulnerability Intelligence Manager) that will receive the data exported by the tool. (You may have obtained this token at the start of this process.) For example: `3214a105b796e396dd6b36435bb92d5003566dd1`
`tenantuid`	Managed service providers (MSPs) must include the 16-digit `--tenantUID` parameter while providing both the URL and a unique access token for each tenant. For normal, single-tenant on-premises installations, do not use this option.

> ***Tip:** The values you declare are written to the `ComplianceTenantSetting` table of the compliance database for subsequent use. If you change the upload location (such as from a UAT to a production address) or received a different token, re-run the utility as above with the new values for both options.*

8. Optionally, modify the location where log files are created.

   By default, the `FNMS-VIM.log` file is written to the `C:\ProgramData\Flexera Software\Compliance\Logging\VIM` folder. To change this location, edit the `FNMS-VIM.exe.config` XML file, saving it back to the `bin` folder again afterward (see Customizing the Configuration File).

9. Optionally, test the tool to assess the exported data.

   The `dump` command drops the exported data into a `.csv` file on the server where the Inventory Export Tool is installed. The command is:

   ```
   FNMS-VIM.exe dump -f folderPath
   ```

   (The *`folderPath`* does not include the file name, which is automatically generated.) This command saves a tab-delimited `.csv` file, showing all exported data, in the folder identified in the command.

The Inventory Export Tool is now ready for operation. When you invoke the tool with the `export` command (and, for single tenant implementations, no other options), it exports the full dataset of:

- All applications installed in your enterprise (regardless of how the application records were created)
- All installer evidence found in your enterprise that has not yet been linked to any application record.

Operating the Inventory Export Tool

Once installation and configuration of the tool are complete (see Installing and Configuring the Inventory Export Tool), data about installed software can be exported to Vulnerability Intelligence Manager at any time, simply by invoking the Inventory Export Tool with the export verb and no other command line options. Operation is then fully automatic.

```
FNMS-VIM.exe export
```

⏰ ***Remember:*** *MSPs must always include the `tenantUID` parameter.*

```
FNMS-VIM.exe export --tenantUID tenantuid
```

The export process is fast (worst case is in the order of a few minutes), and since no data is written to the operations databases, no data locking can occur to interfere with other processes in FlexNet Manager Suite. As an indication of performance, an export of around 340,000 installed items took around five minutes to successfully transfer into Vulnerability Intelligence Manager, with about a minute of that time needed for execution on FlexNet Manager Suite.

If the tool runs without error, the following message is displayed on the command line: `Data upload to VIM successfully completed.` You may also check the log file for results.

The data uploaded to Vulnerability Intelligence Manager is visible if you navigate in its web interface to **Vulnerability Manager > Inventory** tab, and find the appropriate software asset list (the default name is `FNMS_Import`).

For normal operation, Flexera Software recommends that you create a Microsoft Windows Scheduled Task to trigger the data exchange daily, after data imports have been completed from all regular data sources. Given that the default trigger for the internally-scheduled `Inventory import and license reconcile` occurs at 2am, you might consider a time around 5am (for more about schedules, see Server-Side Scheduled Tasks).

The process for setting up Windows scheduled tasks varies across different editions of Windows Server. The following example is for Windows Server 2012. Adjust to suit your application server (or batch server).

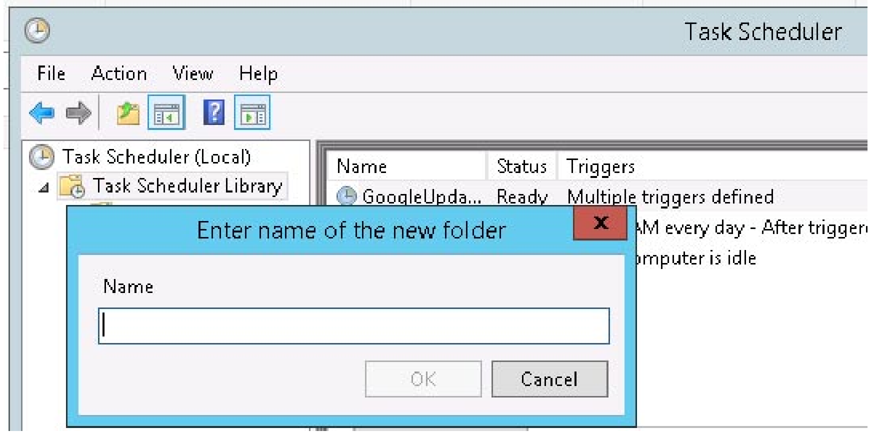
To set up an appropriate scheduled task:

1. In Windows Explorer, navigate to **Control Panel** > **System and Security** > **Administrative Tools**, and double-click **Task Scheduler**.

   The **Task Scheduler** window appears.

2. In the navigation tree on the left, select **Task Scheduler Library**, and then in the **Actions** list on the right, click **New Folder...**.

   A dialog appears for entering the folder name.



A suggested value is FlexNet Manager Suite.

3. Click **OK**, and select the new folder in the navigation tree.
4. Select **Action** > **Create Task...**.

   The **Create Task** dialog appears.
5. Enter an appropriate **Name**, such as `Installed Software Export to VIM`, and add any **Description** to help future maintenance of this task.

   Your description may be something like `Exports identified applications and unrecognized installer evidence to VIM for security assessment`.
6. Click **Change User or Group...**.

   The **Select User, Service Account, or Group** dialog appears.
7. Enter the account name that is to run the scheduled task, and click **OK**.

   This is the service account that runs on your application server (or web application server in a multi-server implementation), for which the name suggested during implementation was `svc-flexnet`.
8. Further down in the **Security options** group, select **Run whether user is logged in or not**.
9. Switch to the **Triggers** tab, and click **New...**.

   The **New Trigger** dialog appears.
10. Ensure that the default setting **Begin the task** `On a schedule` is selected, set the parameters for the schedule, and from the **Advanced settings** group, be sure that **Enabled** is selected.

    A suggested time is 5am daily, but choose a setting that suits your environment.
11. Switch to the **Action** tab, and click **New...**.

    The **New Action** dialog appears.
12. Ensure that the default **Action**, `Start a program`, is selected, and browse to your local copy of `FNMS-VIM.exe`.

    Remember to add the `export` command line parameter, which is all that is needed for regular operation in a single tenant, on-premises implementation. (MSPs must add the tenant UID as always.)

13. Click **OK**.
14. Optionally, make any preferred adjustments to the **Conditions** or **Settings** tabs (normally the defaults are acceptable).
15. Click **OK** to close the **Create Task** dialog.

    The new task appears in the list of scheduled tasks for this server.
16. Right-click the new task, and click **Run** in the context menu.

    This checks that the scheduled task completes successfully.
17. You may validate the results in the first place by inspecting the log file, and subsequently examining the appropriate asset list within Vulnerability Intelligence Manager.

The FlexNet Manager Suite Inventory Export Tool tool is now fully operational.
The remaining topics are reference material for advanced operators.

FNMS-VIM.exe Command Line

This topic provides a reference summary of the command line options for the FlexNet Manager Suite Inventory Export Tool executable, `FNMS-VIM.exe`. The command line options are identical whether the executable is invoked manually or through a Microsoft Windows Scheduled Task.

The command line is run from the `bin` directory in the installation of FlexNet Manager Suite on your application server. For larger implementations that have scaled up to multiple central servers, the installation should be on the batch server, or on the server which is hosting this functionality. The default path to the installed tool is `C:\Program Files (x86)\Flexera Software\FlexNet Manager Platform\DotNet\bin`.

***Note:** In the unlikely event that you have multiple separate implementations of FlexNet Manager Suite, each must be linked to a separate company account within Vulnerability Intelligence Manager. In the same way, managed service providers (MSPs) must provide a separate company account for each tenant.*

Synopsis

Syntax:
`FNMS-VIM.exe` *verb* [*options*]

Each verb has its own set of supported options. Each option has both a verbose name and a single-letter short form. Notice that the verbose option names are preceded by two dashes, but the short form alternatives have a single dash.

Syntax:
`set` [**`-a`** | **`--accesstoken`**] *vimAccessToken* [**`-u`** | **`--url`**] *vimUploadLocation*
`dump` [**`-f`** | **`--folder`**] *folderPath*
`export`
`\?`

***Note:** Managed service providers (MSPs) must add the following option to every invocation of the tool:*

[-t | --tenantUID] tenantuid

However, this option must not be used for single tenant, on-premises implementations.

Command line verbs and options are not case sensitive. Details about the verbs (listed alphabetically) and associated options are:

Verb	Option	Notes
(All verbs)	**-t** | **--tenantUID** *tenantuid*	Do not use this option in a single tenant, on-premises implementation. Managed service providers (MSPs) *must* supply this option at every invocation of the utility.

`dump`	**-f** | **--folder** *folderPath*	Runs the data gathering part of the export process, and dumps the result in a `.csv` file on the server where the Inventory Export Tool is executing. This file uses a tab delimiter to separate values. The path option is mandatory, and defines the folder for saving `.csv` files.
		The file name is a fixed format, defined as:
		`AssetList_[tenantuid_]dateTime.csv`
		where:
		• *tenantuid* is omitted for a single tenant, on-premises implementation. For a multi-tenant system, it is copied from the command line option that identified the tenant.
		• The *dateTime* identified the run time of the dump command, in a 14-digit format `YYYYMMDDHHMMSS`.
		Therefore, in a default single tenant environment, if you gave a command line option `-f d:\temp`, an example of a saved `.csv` file path is:
		`D:\temp\AssetList_20161018011000.csv`
		Tip: *If you have multiple queries in your configuration file, all of them are executed at every invocation of `FNMS-VIM.exe`, and the `.csv` file contains the union of all query results. For more information, see Customizing the Configuration File.*

Verb	Option	Notes
`export`	(No options for single tenant implementation)	In normal operation for a single tenant, on-premises implementation, the executable is invoked with the `export` verb and no options. (Managed service providers must include the `--tenantUID` option.) It then exports all records of applications installed in the enterprise (no matter whether these records were created automatically through matching rules supplied in the Application Recognition Library, or were created manually), and all other installer evidence found within your enterprise inventory but not yet linked to any application. It also exports the installation count for each entry. The combined dataset is then handed off to Vulnerability Intelligence Manager as an asset list, by default called `FNMS_Import` (and configurable in the configuration file, described in Customizing the Configuration File).
`set`	**-a | --accesstoken** *`vimAccessToken`*	Run the command once to configure the utility (this must be done before commencing exports). The access token option is mandatory, and the value is saved in the `ComplianceTenantSetting` table of the compliance database for use at each subsequent connection to Vulnerability Intelligence Manager. (If for any reason you are ever issued a replacement token, re-run the command with both options.) The access token is available from the web interface for Vulnerability Intelligence Manager (for details, see Installing and Configuring the Inventory Export Tool). ***Note:*** *Managed service providers (MSPs) must supply a separate `vimAccessToken` value for each tenant, and register it while including the `--tenantUID` option in the command line.*

Verb	Option	Notes
`set`	**-u** | **--url** *`vimUploadLocation`*	Run the command including this option once to configure the utility (this must be done before commencing exports). The URL for upload to Vulnerability Intelligence Manager is mandatory, and is saved in the `ComplianceTenantSetting` table of the compliance database for subsequent connection. ***Tip:*** *The URL you enter is not validated by running this command. Run the `FNMS-VIM.exe export` command manually (without options) to check the connection and data results. The `FNMS-VIM.log` log file, where you can check results, is saved to the location declared in `FNMS-VIM.exe.config` file (which is installed in the `bin` directory with the executable). The default log file path is `C:\ProgramData\Flexera Software\Compliance\Logging\VIM`.* ***Note:*** *Managed service providers (MSPs) must register the `vimUploadLocation` separately for each tenant, and include the `--tenantUID` option in the command line while doing so.*
`\?`	(No options)	Display relevant help (for example, if this is appended to the executable alone, it lists all available verbs; and if it is appended after any valid verb, it lists the options available for that verb). The appropriate command line help is also displayed for any unrecognized input values.

Examples

Configure the Inventory Export Tool in a single-tenant implementation, supplying both the mandatory options: the URL for upload to Vulnerability Intelligence Manager and the token supplied from Vulnerability Intelligence Manager:

```
FNMS-VIM.exe set -a 3434343== -u https://api.app.secunia.com/api/fnms/sync/
```

Run a test export of the data to a `.csv` file in the `\temp` directory of the `D:` drive on the application server for FlexNet Manager Suite, so that you can inspect the records that are created:

```
FNMS-VIM dump -f d:\temp
```

Export the application and unrecognized installer evidence data from your FlexNet Manager Suite database directly to Vulnerability Intelligence Manager (this is the command that you should set up in a Microsoft Scheduled Task):

```
FNMS-VIM export
```

The same command when set up by a managed service provider must include the 16-character tenant UID, such as:

```
FNMS-VIM export -t 654SDF24SD6F5Z74
```

Customizing the Configuration File

The configuration file for the FlexNet Manager Suite Inventory Export Tool executable, `FNMS-VIM.exe`, is called `FNMS-VIM.exe.config`, and must reside in the same folder as the executable.

Certain parts of the configuration file can be modified, but proceed with caution:

1. Always make a backup copy of the originally supplied configuration file, so that if any changes cause problems, you can reliably revert to the original settings.
2. Customizations that you add to the configuration file are not migrated automatically in any future upgrades. You should therefore be careful to document the changes you make, so that you can conveniently reproduce these in future versions of the utility when required.

The configuration file is an XML text file. To make any of the following changes, save a copy of the original, then open your working copy in a flat text editor. When you save changes, be sure not to modify the saved file name.

To modify the location for saving log files:

1. In `FNMS-VIM.exe.config`, find the element that starts:

   ```
   <appender name="FileAppender" ...
   ```

2. This contains a child `file` element, for which the `value` attribute defines the path and file name for logging. Modify this `value` as required.

   The default element is:

   ```
   <file type="log4net.Util.PatternString"
         value="%property{ComplianceLoggingPath}\FNMS-VIM_%date{yyyyMMdd}.log"/>
   ```

   The variables expand to a default path of `C:\ProgramData\Flexera Software\Compliance\Logging\VIM`. To redirect log files of the same name pattern to your `D:\temp` folder, overwrite the above to read:

   ```
   <file type="log4net.Util.PatternString"
         value="d:\temp\FNMS-VIM_%date{yyyyMMdd}.log"/>
   ```

To change the name of the asset list exported to Vulnerability Intelligence Manager:

3. Find the relevant `<query>` child in the following hierarchy within the configuration file:

   ```
   <vimexport>
           <queries>
                   <query name="Default" asset-list="FNMS_Import">
   ```

4. Modify the value of the `asset-list` attribute.

Tip: *You may also change the name of the query. This modifies the file names for any `.csv` files dumped as tests of the export.*

To experiment with additional queries (for expert administrators only):

5. Add a new `<query>` element as a child of the `<queries>` parent. (Copying the default one is an easy first step.)

Important: *For the attributes of the query:*

- *Every `<query>` element should have a unique value for its `name` attribute, as this will assist in trouble-shooting where issues are logged against the query name in the log file.*
- *There is no requirement for its `asset-List` attribute to be unique: multiple queries may contribute to the union of data shown in the one asset list within Vulnerability Intelligence Manager. However, you may use distinct asset list names, and each unique name results in the creation of a matching asset list in Vulnerability Intelligence Manager.*
- *The `tenantuid` attribute should be omitted in a single tenant, on-premises implementation. In a multi-tenant environment:*
    - *Any `<query>` element that does not include a `tenantuid` attribute is considered "global" and is executed as a part of every tenant's data export*
    - *The managed service provider may add a `tenantuid` attribute to any `<query>` element, in which case the relevant query is run only for that tenant's data export.*

6. Modify the SQL query embedded within the element to customize the scope of the returned data.

If your configuration file contains more than one `<query>` element, each data export (or test file dump) transmits the full set (union) of the data for all relevant queries (where 'relevant' means filtered for matching tenants: for a tenant-specific export, the data transferred is a union of results from global queries without a `tenantuid` attribute plus tenant-specific queries with a matching `tenantuid` attribute).

Note: *In Vulnerability Intelligence Manager, the entire data pool for each company account is overwritten for each data transfer. This means you should take care to use consistent queries against FlexNet Manager Suite to export data on each occasion. For example, if today you identify a separate access list (say `Special List`) in a new `<query>` element, and transfer the resulting data to Vulnerability Intelligence Manager, the new access list is created in Vulnerability Intelligence Manager, showing the matching installations gathered by that query. Supposing that tomorrow your remove that `<query>` element from the configuration file, the `Special List` access list in Vulnerability Intelligence Manager is not itself automatically deleted, but instead shows all its member installations as deleted, because they were no longer included in the data transfer.*

When you are satisfied with your changes, save the configuration file in the same folder and with the same name (keeping the original file elsewhere, unchanged). First test your SQL modifications with the `dump` command before exporting anything to the production instance of Vulnerability Intelligence Manager.

Data Fields Exported to Vulnerability Intelligence Manager

The following data fields are exported from FlexNet Manager Suite and uploaded to Vulnerability Intelligence Manager to form the asset list visible there. These fields represent:

- All applications known to be present in the enterprise, regardless of whether the application records were created manually, or created automatically through recognition rules downloaded in the Application Recognition Library (other records from the Application Recognition Library that have *not* been identified within your enterprise are excluded)
- All installer evidence that is both present in your enterprise and not yet linked to any application record ("unrecognized" installer evidence).

For both kinds of record, the count of installations is included.

Application table.field	Evidence table.field	Comments
`SoftwareTitle.SoftwareTitleID`	(Not applicable)	The internal identification key for the application record. ***Tip:** This field is omitted for installer evidence records.*
`SoftwareRecognitionID.SoftwareRecognition`	(Not applicable)	The application ID used in the Application Recognition Library (also known as the Flexera ID). This is the identification used for title matching within Vulnerability Intelligence Manager. ***Tip:** This field is omitted for installer evidence records.*
`SoftwareTitle.FullName`	`InstallerEvidence.DisplayName`	By default for application records, the full name of the application is the concatenation of the product name, version name, and edition fields. However, an operator may have overwritten this with any preferred value. For installer evidence records, this is the raw name returned in inventory.

Application table.field	Evidence table.field	Comments
`SoftwareTitlePublisher.PublisherName`	`InstallerEvidence.Publisher`	Application records use a normalized publisher name, so that "Microsoft" and "Microsoft Corporation", for example, may both be normalized to "Microsoft Corp". For unrecognized installer evidence, it is the publisher's name as recorded in that evidence returned through inventory.
`SoftwareTitleVersion.VersionName`	`InstallerEvidence.Version`	The release number of the application. For application records, this is the version recorded in FlexNet Manager Suite, which may or may not be the full text of the actual version number (for example, a version of `10.2.5.1062` may be truncated to `10.2` for license management purposes, since minor release numbers rarely affect licensing). For installer evidence, it is the full version number collected through inventory (for example, `10.2.5.1062`).

`InstalledSoftware.InstallCount`	`InstallerEvidence`
	`MatchCount.MatchedCount`
	(summed across connections)
		For applications, the count of matching records in the `InstalledSoftware` table.
		For unrecognized installer evidence, it is the total number of times that this evidence appears in software inventory.
		Notice that the result (for either object) is the total installation count unrestricted by any access rights or other scoping rules. This figure is used by Vulnerability Intelligence Manager as a risk multiplier (a higher number of installations of a vulnerable application means a higher risk).