FlexNet Operations

Web Services Integration Guide

Legal Information

Book Name:	Flexnet Operations Web Services Integration Guide (UAT)
Part Number:	FNO-2024.05UAT-WSI00
Product Release Date:	May 2024

Copyright Notice

Intellectual Property

Restricted Rights Legend

Contents

Contents

1

FlexNet Operations Web Services Integration Guide

FlexNet Operations supports the integration of software license delivery into the business operations of software producers. Much of the FlexNet Operations functionality is exposed as SOAP-based Web Services to facilitate its integration with software producer back office systems. In addition, FlexNet Operations supports REST endpoints for managing entity-specific data extracts.

Some FlexNet Operations functionality is exposed for customization via web services. The protocol supported for implementing an external service depends on the functionality being customized.

Table 1-1 ▪ FlexNet Operations Web Services Integration Guide

Section	Description
Introduction	Introduces you to the types of web services supported by FlexNet Operations: ● SOAP-Based Web Service Operations ● RESTful Web Services ● External Web Services
Using SOAP Web Services	Provides information about the SOAP services included in FlexNet Operations, where to find WSDLs for those services, and how to set up a Web Service client.
SOAP Web Services Reference	Link to complete reference information about FlexNet Operations SOAP-based APIs.
REST Web Services	Describes the REST services included with FlexNet Operations that producers can use to download data extract snapshots and manage their data extract job output as well as providing communication with end-user applications. Also provides details about REST services used to query data in the FlexNet Operations data warehouse and services available to producers who use the registry provided by Revenera to manage and distribute containerized applications.

Table 1-1 ▪ FlexNet Operations Web Services Integration Guide

Section	Description
External Web Services	Describes how to create external services to customize aspects of FlexNet Operations behavior, and how to obtain sample code and other resources to facilitate these customization efforts.

SOAP-Based Web Service Operations

A client application can call FlexNet Operations Web Services to import product and entitlement data from a back-office system, generate licenses, and manage users and organizations. The chapter on SOAP-based services provides information about the SOAP services included in FlexNet Operations, where to find WSDLs for those services, and how to set up a Web Service client. It also discusses FlexNet Operations Web Service versions (which differ from the FlexNet Operations product version) and, for select services, include special usage tips.

● For more details about integrating your organization's systems with FlexNet Operations via the SOAP-based Web Service operations, see Using SOAP Web Services.

● For complete reference information about FlexNet Operations SOAP-based APIs, see the *FlexNet Operations SOAP Web Services Guide*.

Tip ▪ *To see the list of FlexNet Operations SOAP services, open a browser to* `https://` `<siteID>.flexnetoperations.com/flexnet/services`*, where <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format* **flexNNNN**.

RESTful Web Services

FlexNet Operations supports a number of REST Web Service endpoints that allow producers to extract snapshots of changes to fulfillments, devices, served devices, license models, usage activity, and more. These entity-specific extracts are generated by jobs that administrators can schedule in the Producer Portal. Then, producer users or applications developed by producers can use the REST endpoints to oversee and manage the data extracts generated by the jobs.

Tip ▪ *The data extract jobs do not run by default. Producers can configure one or more of the data extract jobs to run in the Producer Portal (***Administer** > **Configure Alerts/Jobs***). For more information about managing data extract jobs and other alerts, see* Administering Alerts *in the* FlexNet Operations User Guide*.*

Other REST services are available that provide access to data in the FlexNet Operations data warehouse, enabling a producer to extract data for their tenant for any time period directly from the data warehouse.

For producers who use the registry provided by Revenera to manage and distribute containerized applications, the software container delivery REST API is available to download a log showing a summary of their end-customers' download activity from all registry service instances.

For more information, see REST Web Services.

External Web Services

Producer can extend or customize the way some features of FlexNet Operations function by implementing external services on their own servers. Most external services can be implemented with SOAP services but some, like the capability request callout, support REST services.

See External Web Services for more information about functionality that can be customized and guidance about how to implement an external service.

Product Support Resources

The following resources are available to assist you with using this product:

- Revenera Product Documentation
- Revenera Community
- Revenera Learning Center
- Revenera Support

Revenera Product Documentation

You can find documentation for all Revenera products on the Revenera Product Documentation site:

https://docs.revenera.com

Revenera Community

On the Revenera Community site, you can quickly find answers to your questions by searching content from other customers, product experts, and thought leaders. You can also post questions on discussion forums for experts to answer. For each of Revenera's product solutions, you can access forums, blog posts, and knowledge base articles.

https://community.revenera.com

Revenera Learning Center

The Revenera Learning Center offers free, self-guided, online videos to help you quickly get the most out of your Revenera products. You can find a complete list of these training videos in the Learning Center.

https://learning.revenera.com

Revenera Support

For customers who have purchased a maintenance contract for their product(s), you can submit a support case or check the status of an existing case by first logging into the Revenera Community and then making selections on the **Get Support** menu, including **Open New Case** and other options.
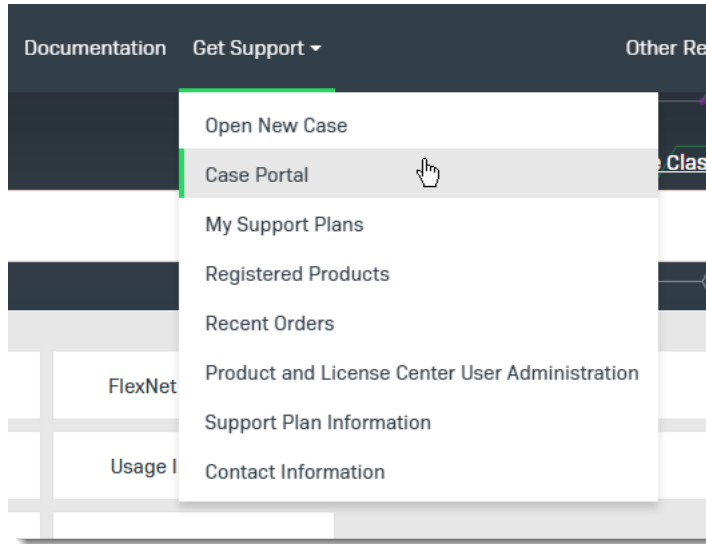
Figure 1-1: Get Support Menu of Revenera Community

Contact Us

Revenera is headquartered in Itasca, Illinois, and has offices worldwide. To contact us or to learn more about our products, visit our website at:

http://www.revenera.com

You can also follow us on social media:

- Twitter

- Facebook

- LinkedIn

- YouTube

- Instagram

2

Using SOAP Web Services

FlexNet Operations SOAP Web Services are accessed using a document-style SOAP mechanism from client applications that you write. SOAP is an XML-based protocol that supports information exchange using HTTP and has implementations in many programming languages. Because each Web Service is a document-style SOAP service, its parameters are sent in a specific XML format. This format is defined in a service-specific XML Schema document and a WSDL file. A language-specific client implementation (for example, C, C++, Java, Visual Studio .NET, Perl) of each interface can be generated from its WSDL file.

A WSDL file defines the interface to each Web Service. The custom data types and XML Schema elements specific to each interface are defined in the *FlexNet Operations SOAP Web Services Guide*. The files containing these interface definitions are located at `https://<siteID>.flexnetoperations.com/flexnet/services`, where `<siteID>` is the site ID for your organization, supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***.

Summary of SOAP Web Service Operations

A client application can call FlexNet Operations Web Services to import product and entitlement data from a back-office system, generate licenses, and manage users and accounts. FlexNet Operations supports the following Web Services, each providing a number of operations.

Table 2-1 ▪ Summary of FlexNet Operations Web Services

SOAP Web Service	Description
Product Packaging Service	● Create, update, and delete features, feature bundles, products, suites, and maintenance.
	● Set the state of features, feature bundles, products, suites, and maintenance.
	● Get the number of features, feature bundles, products, suites, and maintenance and the entities themselves that match specified criteria.
	● Create, update, and delete relationships between products, suites, and maintenance.
	● Create and delete unassigned part numbers.
	● Get the identifiers for existing license models.
	● Get the identifiers for existing transaction keys.
	● Get license technologies and their license generator configurations.
	● Manage product lines.
Entitlement Order Service	● Get entitlement-time license model attributes.
	● Create, update, and delete simple and bulk entitlements and their line items.
	● Set the state of an entitlement.
	● Email entitlement certificates to customers.
	● Get the number of existing entitlements and activatable line items and the entitlements and activatable line items themselves that match specified criteria.
	● Link and unlink maintenance line items and their parent/associated line items.
	● Merge entitlements.
	● Transfer entitlements and line items.
	● Split line items and bulk entitlements, and get matching line items and bulk entitlements to receive the splits.
	● Renew, upgrade, and upsell entitlements.
	● Import web register keys; get the number of web register keys and the web register keys themselves that match specified criteria.
	● Map activation and entitlement IDs to self-registered End-User Portal users.

Table 2-1 ▪ Summary of FlexNet Operations Web Services (cont.)

SOAP Web Service	Description
License Service	● Get fulfillment-time license model attributes.
	● Verify the generation of certificate licenses.
	● Generate certificate licenses, individually or in batch mode.
	● Email, return, rehost, and repair certificate licenses.
	● Consolidate licenses and email consolidated licenses.
	● Activate, return, and repair licenses with short codes.
	● Get existing simple and consolidated fulfillments that match specified criteria.
	● Get host attributes from a license technology.
	● Set the license text for on-hold fulfillments.
	● Delete on-hold fulfillments.
	● Submit an offline activation request for trusted activation.
	● Transfer entitlements and fulfillments on a particular host from one customer account to another.
User Account Hierarchy Service	● Add, update and delete account hierarchy information.
	● Link accounts in hierarchies.
	● Relate partner accounts.
	● Add, update and delete user information.
	● Update user roles.
	● Query for parent accounts, subaccounts, and related partner accounts.
FlexNet Authentication Service	● Provide a token to an external application to support a single sign-on mechanism for the external application and FlexNet Operations.
Device Management Service	● Create, update, and delete client, server, and test devices.
	● Set the state of devices.
	● Get the number of devices and the devices themselves that match specified criteria.
	● Generate pre-installed licenses for devices.
	● Generate a capability response from a submitted capability request or a capability request synthesized from submitted input data.
	● Link and remove product line items.

Table 2-1 ▪ Summary of FlexNet Operations Web Services (cont.)

SOAP Web Service	Description
Download Packaging Service	● Add-on to FlexNet Operations Entitlement Management Service. ● Components are files and download packages. ● Includes additional attributes of End User License agreements.
Usage Service	● Retrieve the end-user's product line, meter, unit of measure, actual use, entitled quantity, overage since statement, overage since reset, percentage, interval/reset, and time period.
Electronic Software Delivery Service	● Provide interfaces for accessing information related to the Software Delivery Module.

To see the list of FlexNet Operations services, open a browser to `https://<siteID>.flexnetoperations.com/flexnet/services`.

Note that the URLs for the following services differ from the URL above:

● The Download Packaging Service is available at `https://<siteID>-fno.flexnetoperations.com/flexnet/services/<version>/DownloadPackagingService`

● The Electronic Software Delivery (ESD) Service is available at `https://<siteID>-esd.flexnetoperations.com/esd-service/svc`.

In the URLs above, <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***. For a description of Download Packaging Service versions, refer to Web Service Version History.

Important ▪ Several other Web Services are displayed on this page. The `AdminService` and `Version` Web Services are specific to Axis. The `ActivationService` is a proprietary Web Service. Only the Web Service operations documented in this manual are intended to be invoked directly by a producer's client application.

SOAP Web Service Versioning

FlexNet Operations Web Services use a separate versioning system from the overall FlexNet Operations product. To provide producers with greater flexibility when managing their own Web Service client code, new Web Service versions are created as new features are added to existing services.

The base version of each Web Service that exists in the root of the Web Services directory is the original versions introduced in FlexNet Operations 2016 and, in some cases, modified in FlexNet Operations 2016 Release 2. New versions are indicated by a version designator: V1, V2, and so forth. Web Services with no additional versions listed offer only the base version. Producers can choose to use the newer version of a given Web Service or to continue using a prior release's Web Service version in their Web Service clients.

To see a listing of FlexNet Operations Web Services, open a Web browser and navigate to

`https://<siteID>.flexnetoperations.com/flexnet/services/`

where <siteID> is your organization's site ID which is supplied by *Revenera*. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***.

Working with Web Service Versions

As each Web Service changes in a way that could pose a risk for backwards compatibility, FlexNet Operations creates a new version of that Web Service. The base version of each service remains intact to preserve functionality of all existing Web Service clients.

To take advantage of a new Web Service version, producers must update their Web Service client code to reference the new version's WSDL and endpoint URL, and then make any additional code alterations necessary to take advantage of the new version's functionality.

For example, to use the v1 of the Product Packaging service, reference the WSDL at:

https://<siteID>.flexnetoperations.com/flexnet/services/v1/ProductPackagingService?wsdl

where <siteID> is your organization's site ID which is supplied by Revenera. Then make any additional code changes necessary to adapt your Web Service client to use the new Web Service version.

Web Service Version History

The following table identifies the available versions for each Web Service and identifies the release for which the version was introduced.

Table 2-2 ▪ FlexNet Operations Web Services Versions

Web Service	Versions	Changes
Product Packaging	**v2**	Introduced in FlexNet Operations 2018 R1, v2 changes include:
		● Added optional parameter **productLine** for the **getProductsQuery** operation to return details of all products that are linked with a particular product line.
		● Changing **organization** to **account** and **org** to **acct**
		● Removed the deprecated **createAccount** (formerly **createOrganization**) method.
		● Added optional parameter **AggregationType** for the **createFeatureRequest** operation to specify a feature count aggregation type. Valid values are SUM, MAX, and NONE.
	v1	Introduced in FlexNet Operations 2016 Release 3, v1 changes include
		● New attributes to products to support the specification of upgrade start and end dates and the email template variation to use for product version upgrade notifications.
		● Web Service versioning introduced.
	base	The original Product Packaging service introduced in FlexNet Operations 2016.

Table 2-2 ▪ FlexNet Operations Web Services Versions (cont.)

Web Service	Versions	Changes
Entitlement Order	**v7**	Introduced in FlexNet Operations 2024.05, v7 changes include:
		● Added the properties **isAutoRenewal**, **renewalInterval** and **renewalExpirationDate** to enable automatic renewal of entitlement line items. These properties are available for the following operations:
		● searchEntitlementDataType
		● createEntitlementLineItemDataType
		● updateLineItemDataType
		● searchActivatableItemDataType
		● entitlementLineItemResponseConfigRequestType
		● entitlementLineItemPropertiesType
	v6	Introduced in FlexNet Operations 2023.08, v6 changes include:
		● Added parameter tag **<urnactivationIds> ... </urn:activationIds>** to the **getActivatableItemsQuery** operation, to enable mass entitlement search.
		● Added optional parameter **BooleanValue** to the **getEntitlementsQuery** method to enable search for entitlements that have a particular Boolean custom attribute applied.
	v5	Introduced in FlexNet Operations 2021.09, v5 changes include:
		● Added optional parameter **lineItemState** to the **getEntitlementLineItemPropertiesQuery** operation.
		● Binding name format omits the "/".
		● Added optional parameter **isEmbeddedLicenseModel** to the **getEntitlementLineItemPropertiesQuery** operation.
	v4	Introduced in FlexNet Operations 2018 R3.
	v3	Introduced in FlexNet Operations 2018 R1, v3 changes include:
		● Changing **organization** to **account** and **org** to **acct**
	v2	Introduced in FlexNet Operations 2017 R4, v2 changes include:
		● Added **transferredFromLineItem** and **splitFromLineItem** to the response for the **getEntitlementLineItemPropertiesQuery**
	v1	Introduced in FlexNet Operations 2016 R4, v1 changes include
		● Removal of **entitledProducts** from **updateBulkEntitlement**.
		● Web Service versioning introduced.
	base	The original Entitlement Order service introduced in FlexNet Operations 2016.

Table 2-2 ▪ FlexNet Operations Web Services Versions (cont.)

Web Service	Versions	Changes
License	v1	Introduced in FlexNet Operations 2018 R1, v1 changes include: • Changing **organization** to **account** and **org** to **acct**
	base	The original License service introduced in FlexNet Operations 2016.
User Account Hierarchy	v5	Introduced in FlexNet Operations 2023.06, v5 changes include: • Added **name** field to the **acctRolesList** response in the **getUsersQuery** method.
	v4	Introduced in FlexNet Operations 2021.09, v4 changes include: • Binding name format omits the "/".
	v3	Introduced in FlexNet Operations 2018 R3, v3 changes include: • Added **createdDate**, **createdBy** and **lastModifiedBy** fields to the **getAccountsQuery**. • Added **createdBy** and **lastModifiedBy** fields to the **getUsersQuery**
	v2	Introduced in FlexNet Operations 2018 R1, v2 changes include: • Rename user related fields from **userAccount** to user.
	base	The original User Account Hierarchy service introduced in FlexNet Operations 2018. It replaces the User Organization Hierarchy Service.
FlexNet Authentication	v1	Introduced in FlexNet Operations 2016 Release 4, v1 changes include • Removal of deprecated API, **getUserToken()**.
	base	The original FlexNet Authentication service introduced in FlexNet Operations 2016.

Table 2-2 ▪ FlexNet Operations Web Services Versions (cont.)

Web Service	Versions	Changes
Manage Device	**v6**	Introduced in FlexNet Operations 2023.08, v6 changes include: ● The **getDevice**, **getDevicesQuery** and **searchDevices** operations can now return the **SiteName** attribute value. ● The **getDevicesQuery** and **searchDevices** operations support the optional search parameter **SiteName**.
	v5	Introduced in FlexNet Operations 2022.11, v5 changes include: ● The **searchDevices** operation now supports searching and filtering by the parameters **addOnExpirationDate** and **hasLicense**.
	v4	Introduced in FlexNet Operations 2020 R3 SP3, v4 changes include: ● Added the **createdOn** attribute to **getDeviceResponseData**. This attribute enables users to view the device creation date.
	v3	Introduced in FlexNet Operations 2018 R1, v3 changes include: ● Changing **organization** to **account** and **org** to **acct**.
	v2	Introduced in FlexNet Operations 2017 R4, v2 changes include: ● Added the **soldToOrgId** attribute to **getDevicesQuery**. The **soldTo** attribute uses the display name when searching. The new parameter, **soldToOrgId**, uses the Account ID for searching. ● Added the **getAddonExpirationDate** service. This new service allows users to retrieve the expiration override date after an addon is mapped to a device.
	v1	Introduced in FlexNet Operations 2017, v1 changes include ● Introduction of a new User element for devices. ● Removal of unsupported operations.
	base	The original Manage Device service introduced in FlexNet Operations 2016.

Table 2-2 ▪ FlexNet Operations Web Services Versions (cont.)

Web Service	Versions	Changes
Download Packaging	**v4**	Introduced in FlexNet Operations 2024.01, v4 changes include:
		● Users can create and retrieve information about account and country restrictions for download packages:
		● New endpoint **CreateRestrict** enables users to incorporate account and country restrictions or both into a download package.
		● Existing endpoint **getDownloadPackageQuery** can now retrieve both types of restrictions.
		● Added search parameter **AttributeDescriptor** to the **getDownloadPackageQuery** and **getDownloadPackageCount** methods to support querying download packages based on custom attribute values.
	v3	Introduced in FlexNet Operations 2022.10, v3 changes include:
		● Added search parameter **LastModifiedDateTime** to the following operations:
		● **getDownloadPackageQuery**
		● **getDownloadPackageCount**
		● **getFileQuery**
		● **getFileCount**
		The new parameter enables producers to import data about periodic updates into their back office system and make this data available to their end customers.
		● Added search parameter **AttributeDescriptor** to the **getDownloadPackageQuery** and **getDownloadPackageCount** methods to support querying download packages based on custom attribute values.

Table 2-2 ▪ FlexNet Operations Web Services Versions (cont.)

Web Service	Versions	Changes
Download Packaging (continued)	**v2**	Introduced in FlexNet Operations 2016 Release 4, v2 changes include
		• The **getDownloadPackageQuery** is updated to accept product name and version to enable searching for a specified product via Web Services. The response is updated to include the system ID, version, and availability—ARCHIVE, CURRENT, or FUTURE—of the download package.
		• To export download packages into Excel, product association information is included in the response of the **getDownloadPackageQuery** method. When an existing download package ID is passed and **ReturnContainedObjects** is set to TRUE, associated product names and the versions (if any) are returned per download package result.
		Similarly, to export download files into Excel, the download packages each file is associated with must be populated. This information is included in the response of the **getFileQuery** method. When an existing file ID is passed and **ReturnContainedObjects** is set to TRUE, associated download package IDs (if any) are returned per download file result.
	v1	Introduced in FlexNet Operations 2016 Release 3, v1 changes include
		• Web Service versioning introduced.
		• No functional changes.
	base	The original Electronic Software Delivery service introduced in FlexNet Operations 2016. This service was previously called ESD Web Service.
Usage	**v1**	Introduced in FlexNet Operations 2018 R1, v1 changes include:
		• Changing **organization** to **account** and **org** to **acct**.
	base	The original Usage service introduced in FlexNet Operations 2016.
Electronic Software Delivery	**base**	The ESD service introduced in FlexNet Operations 2022.02.

SOAP Web Services Batch Limits

The following batch-size maximum limits apply for requests issued from SOAP web services:

- All read services have a maximum batch size of 2000.

- All services that result in a write have a batch size maximum of 25 records.

Specifying a batch size higher than the new cap results in an error.

Using FlexNet Operations SOAP Web Services

Any client application calling the FlexNet Operations Web Services needs the following:

- A Web Service client implementation containing stubs/proxies generated from the service interfaces

- An environment in which to develop and run clients to Web Services

- FlexNet user credentials (user ID and password) that have been assigned one or more roles with sufficient permissions to perform requested operations (See User for Executing SOAP Web Services.)

- A client program that you write to connect to the service that knows

  - The URL to connect to the service

  - FlexNet user name and password

  - The semantics of the service methods

  - The purpose of the each method

  - The return values expected from the methods

By appending `?wsdl` to the end of the Web Service URL, you obtain an automatically generated WSDL document that describes the Web Service:

`https://<siteID>.flexnetoperations.com/flexnet/services/<serviceName>?wsdl`

where `<serviceName>` is one of the base version Web Service names listed in Table 2-3. (To obtain a WSDL for a newer Web Service version, add the version designator before the service name. For example, `https://<siteID>.flexnetoperations.com/flexnet/services/v3/ManageDeviceService?wsdl`.)

Note that the locations for the WSDLs for the Download Packaging Service and Electronic Software Delivery Service differ from those mentioned above:

- **Download Packaging Service**: `https://<siteID>-fno.flexnetoperations.com/flexnet/services/<version>/DownloadPackagingService/wsdl/DownloadPackagingService.wsdl`.

- **Electronic Software Delivery (ESD) Service**: `https://<siteID>-esd.flexnetoperations.com/esd-service/svc/wsdl/ESDService.wsdl`.

Table 2-3 ▪ Names to Access FlexNet Operations Web Services

Web Service	Web Service Name	Parent Module
Product Packaging	`ProductPackagingService`	FlexNet Operations
Entitlement Order	`EntitlementOrderService`	FlexNet Operations
License	`LicenseService`	FlexNet Operations

Table 2-3 ▪ Names to Access FlexNet Operations Web Services (cont.)

Web Service	Web Service Name	Parent Module
User Account Hierarchy	`UserAcctHierarchyService`	FlexNet Advanced Organization Management
Flexnet Authentication	`FlexnetAuthentication`	FlexNet Operations
Manage Device	`ManageDeviceService`	FlexNet Advanced Lifecycle Management
Download Packaging	`DownloadPackagingService`	Software Delivery
Usage	`UsageService`	FlexNet Usage
Electronic Software Delivery	`ESDService`	Software Delivery

User for Executing SOAP Web Services

A client connecting to a FlexNet Operations Web Service must provide the user name and password of a user authorized to

- Execute FlexNet Operations Web Services

- Perform the requested task, the same as if the user were logged into the FlexNet Operations user interface

Creating a SOAP Web Service User

Though Web Services can be tested using the built-in **System Administration** user (ADMNadmin), Web Services should not be run as this user in production. Create one or more FlexNet users who have been assigned roles with the necessary permissions.

Creating a Role for Web Service User Access

Task   ***To create a role that provides access to Web Services***

1. Start the FlexNet Operations Producer Portal and log in as a user with a Producer role.

2. Click **Accounts & Users** > **All Roles** > **Add Role**.

3. Create the role as usual. Under **Role Type**, select **Publisher Role**.

4. Check the **Execute Web Services** permission.

5. Check any other permissions required to perform the tasks required by the Web Services operations performed by users with this role.

6. Click **Save**.

After the appropriate roles have been created, you must create a FlexNet Web Service user.

Creating a Web Services User for FlexNet Operations

Task   *To create a Web Services user*

1. In the FlexNet Operations Producer Portal, click **Accounts & Users** > **Create User**.

2. Enter the first and last names and email address of the user.

3. Click **Link accounts** to open the **Select Account** window.

4. From the **Producers** tab, select an account and assign the Web Services role created in the previous task to the user. Then click **OK**.

5. Click **Save**.

An email with a system-generated password is sent to the user's email address. The recipient of the email must log in to FlexNet Operations with the system-generated password and change that password.

Passing the SOAP Web Service User

By default, FlexNet Operations Web Services requires a client to provide credentials as BASIC HTTP user authentication. BASIC authentication encrypts the user ID and password with Base64 encoding and passes it as an HTTP request header parameter. For example:

```
Authorization: Basic QWxhghwelhijhrcGVuIHNlc2FtZQ==
```

However, not all Web Services client tools offer the ability to pass custom HTTP request header parameters in the request. Therefore, FlexNet Operations supports an alternative mechanism to pass user credentials as SOAP header parameters along with the SOAP message. The two case-sensitive parameters are `UserId` and `Password`. The password must be Base64 encoded.

```
<soapenv:Header xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/">
    <flex:UserId soapenv:actor="http://schemas.xmlsoap.org/soap/actor/next"
        soapenv:mustUnderstand="0" xmlns:flex="urn:com.macrovision:
        flexnet/platform">admin</flex:UserId>
    <flex:UserPassword soapenv:actor="http://schemas.xmlsoap.org/soap/actor/
        next"soapenv:mustUnderstand="0" xmlns:flex="urn:com.macrovision:
        flexnet/platform">YWRtaW4=</flex:UserPassword>
</soapenv:Header>
```

Choosing a SOAP Web Service Client Implementation

Choose one of these types of client implementations to write client applications to connect to the Web Services:

● Create a Basic Web Service Client in C# (see Creating a Basic Web Services Client in C# Using .NET Framework 4.7.2 and Creating a Basic Web Services Client in C# Using .NET Core)

● Generate your own Axis-Java client implementation (see Generating Your Own Axis–Java Client Implementation)

● Generate a client implementation with a different tool

Run your client applications using the same environment that you use to create the client implementation.

Creating a Basic Web Services Client in C# Using .NET Framework 4.7.2

To create a simple Entitlement using the EntitlementOrderService wsdl, you will need to create a C# Console Application project with a Web Reference that contains an override function which specifies that requests are to use "Basic" HTTPS authentication, adding a new "Authorization" header with credentials of the form "Basic " plus the base-64-encoded "Name:Password" string.

Task   ***Creating a Simple Entitlement for .NET Framework***

1. In Visual Studio 2008 or later, create a new C# Console Application project.

2. In the **Solution Explorer**, right-click the project icon and select **Add Service Reference**.

3. Click **Advanced** at the bottom of the **Add Service** screen and then **Add Web Reference** at the bottom of the **Service Reference Settings** screen.

4. Enter `https://<siteID>.flexnetoperations.com/flexnet/services/EntitlementOrderService?wsdl` and click **Go**. Alternatively, you can enter `https://<siteID>.flexnetoperations.com/flexnet/services` to see a list of all available FlexNet Operations WSDLs.

5. Change the Web reference name to `EntOrdSvc` and click **Add Reference**. The **Solution Explorer** view should have a new **EntOrdSvc** icon in the **Web References** folder.

6. Double-click the **EntOrdSvc** icon, which opens the **Object Browser**.

7. In the **Object Browser**, expand **WebServiceTest.EntOrdSvc**, and double-click one of the items in the tree. This should open the proxy class source file `Reference.cs`.

8. Near the top of `Reference.cs`, find the line that begins:

    ```
    public EntitlementOrderService()
    ```

    and insert the following function directly above:

    ```
    protected override WebRequest GetWebRequest(Uri uri)
    {
        HttpWebRequest request;
        request = (HttpWebRequest)base.GetWebRequest(uri);

        if (PreAuthenticate)
        {
            NetworkCredential networkCredentials =
                Credentials.GetCredential(uri, "Basic");
            if (networkCredentials != null)
            {
                byte[] credentialBuffer =
                new
                System.Text.UTF8Encoding( ).GetBytes(
                    networkCredentials.UserName + ":" +
                    networkCredentials.Password);
    ```

```
                    request.Headers["Authorization"] =
                        "Basic " +
                        Convert.ToBase64String(credentialBuffer);
                }
                else
                {
                    throw new ApplicationException(
                        "No network credentials");
                }
            }
            return request;
        }
```

9. At the top of the file in the namespace function for the project, add the following:

    `using` System.Net;

10. In the `Program.cs` file, add a Web Service request to create an entitlement. For example:

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Net;
using WebServiceTest.EntOrdSvc;

namespace WebServiceTest
{
    class Program
    {
        static void Main(string[] args)
        {
            EntitlementOrderService eos = new EntitlementOrderService();

            // begin copied-and-pasted authorization code
            NetworkCredential netCredential =
                new NetworkCredential("username@company.com", "MyPassword");
            Uri uri = new Uri(eos.Url);

            ICredentials credentials = netCredential.GetCredential(uri, "Basic");

            eos.Credentials = credentials;
            eos.PreAuthenticate = true;

            Console.WriteLine("[Successfully authenticated...]");
            // end copied-and-pasted authorization code

            // one and only simple entitlement
            createSimpleEntitlementDataType[] seArray = new
                createSimpleEntitlementDataType[1];
            createSimpleEntitlementDataType se1 = new createSimpleEntitlementDataType();
            seArray[0] = se1;

            idType idtype = new idType();
            // make sure to change the Order ID for each test...
            idtype.id = "ExampleOrderID";
            se1.entitlementId = idtype;
            // make sure this is a real customer account
```

```
                    se1.soldTo = "Atlas";

                    // one and only line item
                    createEntitlementLineItemDataType[] lineItems = new
                        createEntitlementLineItemDataType[1];
                    se1.lineItems = lineItems;
                    lineItems[0] = new createEntitlementLineItemDataType();
                    idtype = new idType();
                    idtype.id = "ActID-Atlas-123456";
                    lineItems[0].activationId = idtype;
                    lineItems[0].numberOfCopies = "5";
                    lineItems[0].startDate = DateTime.Today;

                    licenseModelIdentifierType lm = new licenseModelIdentifierType();
                    licenseModelPKType modelPk = new licenseModelPKType();

                    // Add a License Model for the desired Product
                    modelPk.name = "Embedded Counted";
                    lm.primaryKeys = modelPk;
                    lineItems[0].licenseModel = lm;
                    lineItems[0].versionDate = DateTime.Today.Date;

                    productIdentifierType ordId = new productIdentifierType();
                    productPKType productPk = new productPKType();
                    // Be sure to pick a real product and version
                    productPk.name = "LH Full Access";
                    productPk.version = "1.0";
                    ordId.primaryKeys = productPk;
                    lineItems[0].product = ordId;

                    // this function is in the auto-generated Reference.cs code
                    createSimpleEntitlementResponseType csert = eos.createSimpleEntitlement(seArray);

                    if (csert.statusInfo.status != StatusType.SUCCESS)
                    {
                        Console.WriteLine("Drat! Failed: " +
                            csert.statusInfo.reason);
                    }
                    else
                    {
                        Console.WriteLine("Success!");
                    }
                }
            }
        }
```

11. Build and run the application.

Creating a Basic Web Services Client in C# Using .NET Core

To create a simple Entitlement using the EntitlementOrderService wsdl, you will need to create a C# Console Application project with a Web Reference that contains an override function which specifies that requests are to use "Basic" HTTPS authentication, adding a new "Authorization" header with credentials of the form "Basic " plus the base-64-encoded "Name:Password" string.

Task   ***Creating a Simple Entitlement for .NET Core***

1. In Visual Studio 2022 or later, create a new .NET CORE WEB API project.

2. In the **Solution Explorer**, right-click the project icon and select **Add** > **Service Reference**.

   Alternatively, you can also open the **Connected Services** and click **Add a service reference**.

3. Select **WCF Web Service** and click **Next**.

4. In the **URI** field, enter `https://<siteID>.flexnetoperations.com/flexnet/services/` `EntitlementOrderService?wsdl` and click **Go**.

   Alternatively, enter `https://<siteID>.flexnetoperations.com/flexnet/services` to see a list of all available FlexNet Operations WSDLs.

5. Choose the service listed in the **Services** section to view the available APIs/operations.

6. Change the **Namespace** to `EntitlementOrderServiceReference` and click **Next**.

7. In the **Specify the client options** screen, select the check boxes **Generate Synchronous Operations** and **Enable Data Binding**. This allows you to generate both asynchronous and synchronous client operations.

8. Click **Finish**. The **Solution Explorer** window now shows the new **EntitlementOrderService** icon in the **Connected Services** folder.

9. Double-click the **EntitlementOrderService** icon, which opens the **Object Browser**.

10. Open the `Reference.cs` proxy class source file.

11. Search for the **EntitlementOrderServiceInterfaceV5Client** class and add the following code above it:

```
/// <summary>
/// Add credentials and endpoint headers here
/// </summary>
public partial class EntitlementOrderServiceInterfaceV5Client :
    System.ServiceModel.ClientBase<EntitlementOrderServiceReference.
    EntitlementOrderServiceInterfaceV5>,
    sEntitlementOrderServiceReference.EntitlementOrderServiceInterfaceV5
{
    static partial void ConfigureEndpoint(System.ServiceModel.Description.ServiceEndpoint
    serviceEndpoint, System.ServiceModel.Description.ClientCredentials clientCredentials)
    {
        byte[] credentialBuffer = new System.Text.UTF8Encoding().GetBytes("***Username***" + ":" +
        "***Password***");
        var headers = new Dictionary<string, string>
            {
                {"Authorization", "Basic " + Convert.ToBase64String(credentialBuffer)}
```

```csharp
            };
            var behavior = new AddHttpHeaderMessageEndpointBehavior(headers);
            serviceEndpoint.EndpointBehaviors.Add(behavior);

            clientCredentials.UserName.UserName = "***Username***";
            clientCredentials.UserName.Password = "***Password***";
        }
    }
    /// <summary>
    /// define custom endpoint behavior
    /// </summary>
    public class AddHttpHeaderMessageEndpointBehavior : IEndpointBehavior
    {
        private readonly IClientMessageInspector _httpHeaderMessageInspector;

        public AddHttpHeaderMessageEndpointBehavior(Dictionary<string, string> headers)
        {
            _httpHeaderMessageInspector = new HttpHeaderMessageInspector(headers);
        }

        public void AddBindingParameters(ServiceEndpoint endpoint, BindingParameterCollection
            bindingParameters)
        {

        }

        public void ApplyClientBehavior(ServiceEndpoint endpoint, ClientRuntime clientRuntime)
        {
            clientRuntime.ClientMessageInspectors.Add(_httpHeaderMessageInspector);
        }

        public void ApplyDispatchBehavior(ServiceEndpoint endpoint, EndpointDispatcher
            endpointDispatcher)
        {

        }

        public void Validate(ServiceEndpoint endpoint)
        {

        }
    }

    /// <summary>
    /// define customer message inspector
    /// </summary>
    public class HttpHeaderMessageInspector : IClientMessageInspector
    {
        private readonly Dictionary<string, string> _headers;

        public HttpHeaderMessageInspector(Dictionary<string, string> headers)
        {
            _headers = headers;
        }

        public void AfterReceiveReply(ref Message reply, object correlationState)
```

```
            {

            }

            public object BeforeSendRequest(ref Message request, IClientChannel channel)
            {
                if (request.Properties.Count == 0 || request.Properties
                    [HttpRequestMessageProperty.Name] == null)
                {
                    request.Properties.Add(HttpRequestMessageProperty.Name, new
                        HttpRequestMessageProperty());
                }
                var headersCollection =
                    ((HttpRequestMessageProperty)request.Properties[HttpRequestMessageProperty.Name])
                        .Headers;

                foreach (var header in _headers) headersCollection[header.Key] = header.Value;

                return null;
            }
        }
```

12. Search for all occurrences of *****Username***** and *****Password*****, using the correct credentials.

13. Search for the **GetBindingForEndpoint** method definition and replace it with the following code:

```
private static System.ServiceModel.Channels.Binding GetBindingForEndpoint(EndpointConfiguration
endpointConfiguration)
{
    if ((endpointConfiguration == EndpointConfiguration.EntitlementOrderServiceV5))
    {
        System.ServiceModel.BasicHttpsBinding result = new System.ServiceModel.BasicHttpsBinding();
        result.Security.Transport.ClientCredentialType = HttpClientCredentialType.Basic;
        result.MaxBufferSize = int.MaxValue;
        result.ReaderQuotas = System.Xml.XmlDictionaryReaderQuotas.Max;
        result.MaxReceivedMessageSize = int.MaxValue;
        result.AllowCookies = true;
        return result;
    }
    throw new System.InvalidOperationException(string.Format("Could not find endpoint with name
        \'{0}\'.", endpointConfiguration));
}
```

14. Search for the **GetEndpointAddress** method definition and change the URL used to return the `EndpointAddress` from `http` to **https**.

15. Create a new Controller **"EntitlementOrderController"**. Replace the code generated by the Visual Studio editor with the following code:

```
using EntitlementOrderServiceReference;
using Microsoft.AspNetCore.Mvc;

namespace ConsumeWSDLConnectedServices.Controllers
{
    [ApiController]
    [Route("EntitlementOrderController")]
    public class EntitlementOrderController : Controller
    {
```

```csharp
[Route("CreateSimpleEntitlement")]
[HttpPost]
public ActionResult CreateSimpleEntitlement()
{
    EntitlementOrderServiceInterfaceV5Client entitlementOrderServiceInterface =
        new EntitlementOrderServiceInterfaceV5Client();

    // one and only simple entitlement
    createSimpleEntitlementRequestType createSimpleEntitlementRequestType =
        new createSimpleEntitlementRequestType();
    createSimpleEntitlementDataType[] seArray = new createSimpleEntitlementDataType[1];
    createSimpleEntitlementDataType se1 = new createSimpleEntitlementDataType();

    seArray[0] = se1;
    idType idtype = new idType();

    // make sure to change the Order ID for each test...

    idtype.id = "ExampleOrderID";
    se1.entitlementId = idtype;

    // make sure this is a real customer account

    se1.soldTo = "Atlas";

    // one and only line item

    createEntitlementLineItemDataType[] lineItems =
        new createEntitlementLineItemDataType[1];
    se1.lineItems = lineItems;
    lineItems[0] = new createEntitlementLineItemDataType();
    idtype = new idType();
    idtype.id = "ActID-Atlas-123456";
    lineItems[0].activationId = idtype;
    lineItems[0].numberOfCopies = "5";
    lineItems[0].startDateSpecified = true;
    lineItems[0].startDate = DateTime.Today;
    lineItems[0].expirationDateSpecified = true;
    lineItems[0].expirationDate = DateTime.Today.AddYears(1);

    licenseModelIdentifierType lm = new licenseModelIdentifierType();
    licenseModelPKType modelPk = new licenseModelPKType();

    // Add a License Model for the desired Product

    modelPk.name = "Embedded Counted";
    lm.primaryKeys = modelPk;
    lineItems[0].licenseModel = lm;
    lineItems[0].versionDate = DateTime.Today.Date;

    productIdentifierType ordId = new productIdentifierType();
    productPKType productPk = new productPKType();

    // Be sure to pick a real product and version

    productPk.name = "LH Full Access";
```

```
                    productPk.version = "1.0";
                    ordId.primaryKeys = productPk;
                    lineItems[0].product = ordId;

                    // this function is in the auto-generated Reference.cs code

                    createSimpleEntitlementRequestType.simpleEntitlement = seArray;

                    createSimpleEntitlementResponseType csert =
                        entitlementOrderServiceInterface.createSimpleEntitlement
                        (createSimpleEntitlementRequestType);

                    if (csert.statusInfo.status != StatusType.SUCCESS)
                    {
                        Console.WriteLine("Drat! Failed: " + csert.statusInfo.reason);
                    }
                    else
                    {
                        Console.WriteLine("Success!");
                    }

                    return new JsonResult(csert);
                }
            }
        }
```

16. Build and run the application.

Generating Your Own Axis–Java Client Implementation

If you want a Axis–Java implementation that reflects the Java package structure of your own, you can generate your own Axis–Java implementation from the Web Service WSDLs using the WSDL2Java utility in Axis. This has been tested using Axis 1.4 and JDK 1.8.x.

Product Packaging Service

Information about the products you develop and sell may be stored in an Enterprise Resource Planning (ERP) or Customer Relationship Management (CRM) system. The Product Web Service facilitates the integration of your ERP or CRM system with FlexNet Operations. It can be used to import product definitions and to import part numbers that can be associated with products you create through the FlexNet Operations user interface or Product Packaging Service. This section describes the ProductPackagingService interface.

- ProductPackagingService Interface presents the XML files that define the ProductPackagingService interface. The interface is used to generate language-specific client implementations that can communicate with the Product Packaging Service to import a product hierarchy.

- Product Packaging Service Operations contains a list of the basic types of Web Services operations.

- Using the Product Packaging Service Operations gives an overview of how to use the Product Packaging Service operations.

ProductPackagingService Interface

The endpoint to connect to the Product Packaging service depends on the Web Service version you are using:

- **Default endpoint**—`https://<siteID>.flexnetoperations.com/flexnet/services/ProductPackagingService`

- **Version-specific endpoint (for v1)**—`https://<siteID>.flexnetoperations.com/flexnet/services/v1/ProductPackagingService`

`ProductPackagingService.wsdl` defines the ProductPackagingService interface and references `productPackagingTypes.xsd`, which in turn references the XML Schema documents that define Product Packaging Service custom data types, service requests, and service responses.

Product Packaging Service Operations

The following table shows the basic types of Web Services operations that manage the entities in the product hierarchy: features, feature bundles, products, suites, and maintenance. Many of these types of operations are also supported in the other FlexNet Operations Web Services.

Table 2-4 ▪ Patterns in Product Packaging Service Operations

Operation Type	Description
create	Create the entity in the draft state.
update	Update an existing entity with the new values provided, if its state allows modification. (Depending on the state and the modified field this may require the **Allow Editing of Deployed Entities** setting to be checked on the Producer Portal—**System > Configure > FlexNet Operations**.)
delete	Delete an existing entity, if its state allows deletion.
getCount	Return the number of entities that match the specified criteria.
getQuery	Return the entities that match the specified query parameters.
get	Provide one query parameter (usually an identifier) and return data.
setState	Change the state of an entity, if its current state allows the change.

Using the Product Packaging Service Operations

Before using FlexNet Operations Web Services, plan how to exchange customer, product, order, and fulfillment information between FlexNet Operations and your other back-office systems. The following table provides a quick overview of how to approach managing your product hierarchy with the Product Packaging Service.

Table 2-5 ▪ Product Packaging Service Operations

Step	Description
Step 1	Plan how you want to license, package, and support the lifecycle of licenses for your products.
Step 2	Create a license generator configuration for your production VCG or custom license technologies, custom license generator configurations, and custom attributes, if necessary. These entities cannot be created or managed through Web Services.
Step 3	Create license models (and transaction keys, if you are using trusted license models) in the FlexNet Operations UI. These entities cannot be created or managed through Web Services. In additional to deciding how to express your licensing strategy in one or more license models, consider when and by whom you want values for license attributes to be set—that is, by a product manager at the time a license model is created, by an order entry person in your company, by a support person in your company who generates licenses with input provided by customers, or by the customers themselves with the End-User Portal. Also consider policies on license lifecycle operations such as extra activations, returns, and rehosts, especially if your customers will use the End-User Portal.
Step 4	If you use part numbers to identify your products, import part numbers using the Product Packaging Service.
Step 5	Create features and optionally group features into convenient feature bundles.
Step 6	Create maintenance products to represent the value of your support contracts.
Step 7	Create products by adding features and/or feature bundles, linking license models and possibly a transaction key, mapping part numbers, and relating products to maintenance and other products. You may want to use the two getIdentifiers operations to populate look-up tables of the available transaction keys and license model names.
Step 8	Optionally, you can create suites containing groups of products.
Step 9	Create accounts.
Step 10	If you want to test license models and products while you can modify them, you are ready to create test entitlements. Before you can create deployable entitlements that can be fulfilled by customers, you must deploy your license models (only through the UI) and product hierarchy.

Entitlement Order Service

The Entitlement Order service facilitates the integration of your ERP/CRM system with FlexNet Operations by creating regular and bulk entitlements. This section describes the EntitlementOrderService interface.

- EntitlementOrderService Interface presents the XML files that define the EntitlementOrderService interface. The interface is used to generate language-specific client implementations that can communicate with the Entitlement Order service to import entitlements.

- Specifying a Product and License Model when Creating a Line Item or Bulk Entitlement explains how to define at least one product and one primary license model to deploy an entitlement line item or bulk entitlement.

- Using the Entitlement Order Service Operations gives an overview of how to use the Entitlement Order service operations.

EntitlementOrderService Interface

The endpoint to connect to the Entitlement Order service depends on the Web Service version you are using:

- **Default endpoint**—https://<siteID>.flexnetoperations.com/flexnet/services/EntitlementOrderService

- **Version-specific endpoint (for v1)**—https://<siteID>.flexnetoperations.com/flexnet/services/v1/ EntitlementOrderService

EntitlementOrderService.wsdl defines the EntitlementOrderService interface and references entitlementOrderTypes.xsd, which in turn references the XML Schema documents that define Entitlement Order service custom data types, service requests, and service responses.

Specifying a Product and License Model when Creating a Line Item or Bulk Entitlement

To deploy an entitlement line item or bulk entitlement, at least one product and one primary license model must be defined. The contents of Web Service requests that create entitlements may or may not specify product and license model data explicitly, but between the request contents and the product data in FlexNet Operations, there must be enough information provided to uniquely define at least one product and one primary license model on the line item or bulk entitlement. You can define what is necessary in several ways, depending on the following factors:

- The number of license models linked to a product

- The mapping of part numbers to products

  - Are part numbers mapped to products?

  - How many part numbers are mapped to each product—one to one or many to one?

A part number can be mapped either to a particular product-license model pair or just to a product. Each part number can be mapped to only one product, but one product can have many part numbers mapped to it.

There are two primary ways to specify a product and license model:

1. Use the `product` element (preserved for backward compatibility) or no element to specify a single product.

2. Use the `entitledProducts` element to specify one or more products.

The `entitledProducts` element includes one or more `entitledProduct` elements, and each `entitledProduct` element contains a `product` element and a `quantity`. In the request, it is possible to use either a single `product` element without `entitledProducts` or to use an `entitledProducts` element that contains one or more products, each encapsulated in an `entitledProduct`. Use either the `product` element or the `entitledProducts` element in the request, not both.

Tip ▪ For update operations with multiple products, use updatedEntitledProducts instead of entitledProducts.

Using the product Element or No Element to Specify a Product

For Entitlement Order Service requests that create line items or bulk entitlements, if there are no elements that specify a product or if a `product` element specifies a product, FlexNet Operations first looks for a part number in the request. If a part number is specified in the Web Service request, the part number is used to identify the product in the request. If a part number is omitted from the request, FlexNet Operations tries to get the product from the request. The following sections discuss how FlexNet Operations behaves when a part number is specified in the request versus when a part number is not specified.

Part Number Specified

If a part number is provided in the request, FlexNet Operations attempts to determine the product based on the part number. The following points describe the FlexNet Operations behavior when a request includes a part number.

Table 2-6 ▪ Request Contains a Product and a Part Number

Conditions	Results
The part number is not mapped to an existing product.	An error is generated.
The part number is mapped to a particular license model linked to a product.	The part number is used to identify both the product and the license model in the request. (If a product or a license model is also specified in the request, it is ignored.)
The part number is mapped to a product with exactly one license model linked to it.	The license model does not have to be specified in the request.
The part number is mapped to a product with more than one license model.	FlexNet Operations tries to get the license model from the request. If no license model is specified in the request, and the line item or bulk entitlement is set to be deployed in the request, an error is generated.

Part Number not Specified

If a part number is not included in the request, FlexNet Operations tries to get the product from the request. The following points describe the FlexNet Operations behavior when a request excludes a part number.

Table 2-7 ▪ Request Contains a Product and No Part Number

Conditions	Results
No product exists in the request.	FlexNet Operations generates an error.
The product in the request is linked to exactly one license model.	The linked license model is used. (Any license model specified in the request is ignored.)
The product in the request is linked to multiple license models.	FlexNet Operations tries to get the license model from the request. If there is no license model in the request, and the line item or bulk entitlement is set to be deployed, an error is generated.
The product in the request is mapped to one or more part numbers (but the part numbers are not mapped to the license model specified in the request).	No part number is loaded into the entitlement.
Both the product and license model in the request are mapped to one or more part numbers.	One of the part numbers (indeterminate) is loaded into the entitlement. Therefore, if part numbers are mapped to products, it is a best practice to specify a part number in Web Service requests.

Using the entitledProducts Element

For Entitlement Order Service requests that create line items or bulk entitlements, if an `entitledProducts` element is used, it might contain multiple products. Therefore, if a part number is specified along with the `entitledProducts` element, the part number is not used to specify a product. (A part number can be mapped to only one product.) If a part number is specified in the request, FlexNet Operations checks that the part number is mapped to one of the products specified in the `entitledProducts` element.

Part Number Specified

If a part number is provided in the request, FlexNet Operations tries to get the license model from the request.

Table 2-8 ▪ Request Contains entitledProducts and a Part Number

Conditions	Results
The part number is not mapped to a product specified in the `entitledProducts` element.	An error is generated.
Part number maps to a license model that is linked to one or more products in the `entitledProducts` element.	FlexNet Operations uses the part number to identify the license model for the request. (License models specified in the request are ignored.)

Table 2-8 ▪ Request Contains entitledProducts and a Part Number (cont.)

Conditions	Results
• Part number maps to one of the products in the `entitledProducts` element. • Mapped product is linked with exactly one license model.	FlexNet Operations uses the license model linked with the products. (License models specified in the request are ignored.)
• Part number maps to one of the products in the `entitledProducts` element. • Mapped product is linked to multiple license models.	FlexNet Operations tries to get the license model from the request. If no license model is specified in the request, an error is generated.

Part Number not Specified

If a part number is omitted from the request, FlexNet Operations tries to get the products and license models from the request. Even if exactly one license model is linked to all the products in the `entitledProducts` element, FlexNet Operations still tries to get the license model from the request.

Table 2-9 ▪ Request Contains entitledProducts and No Part Number

Conditions	Results
No license model exists in the request.	An error is generated.
Multiple part numbers are mapped to the product-license model combinations specified in the request.	One of the part numbers (indeterminate) is loaded into the entitlement. Therefore, if part numbers are mapped to products, it is best to specify a part number in the Web Service request.

The following table shows the operations that create line items or bulk entitlements and use data types that allow part numbers to specify products or products and license models:

Table 2-10 ▪ Data Types that Find Products from Part Numbers

Web Service Operation	Data Type
createSimpleEntitlement	createEntitlementLineItemDataType createMaintenanceLineItemDataType
createEntitlementLineItem	createEntitlementLineItemDataType createMaintenanceLineItemDataType
replaceEntitlementLineItem	createEntitlementLineItemDataType createMaintenanceLineItemDataType
createBulkEntitlement	createBulkEntitlementDataType

Table 2-10 ▪ Data Types that Find Products from Part Numbers (cont.)

Web Service Operation	Data Type
upgradeLicense	createEntitlementLineItemDataType
upsellLicense	createEntitlementLineItemDataType

Using the Entitlement Order Service Operations

The following provides a quick overview of how to approach managing entitlements with the Entitlement Order service. These steps assume that you already have license models, the product hierarchy, and accounts in your FlexNet Operations database.

Table 2-11 ▪ Steps for Managing Entitlements

Step	Description
Step 1	Plan how you will transform orders into entitlements.
Step 2	Do you map part numbers to your products with a single license model, with multiple license models, or to individual product-license model combinations? Consider identifying products or products and license models in entitlement line items with part numbers.
Step 3	When you have identified a license model to be used in an entitlement line item, identify the license model attributes whose values must be set at entitlement time using the getEntitlementAttributesFromModel operation.
Step 4	If you want to test license models and the product hierarchy while you can still modify them, create test entitlements. When test entitlements are deleted, fulfillments created from them are also deleted.
Step 5	After you have deployed license models and your product hierarchy, create deployable simple or bulk entitlements for your customers. Add entitlement line items (identified by activation IDs) and provide values for entitlement-time license attributes.
Step 6	Load web register keys (activation IDs) into bulk entitlements.
Step 7	Optionally, send your customers entitlement certificates listing the products to which the customers are entitled and their activation IDs.
Step 8	Consider using getEntitlementsQuery, getActivatableItemCount, getActivatableItemsQuery, getBulkEntitlementPropertiesQuery and getEntitlementLineItemPropertiesQuery operations to support your license fulfillment process.
Step 9	Optionally, renew, upgrade, or upsell entitlements. Upgrading and upselling require that upgrade or upsell product relationships between products have been configured.

License Service

The License Web Service allows you to generate and email certificate licenses, perform license lifecycle operations for FlexNet Licensing certificate and custom technology licenses, and generate short code activation responses for FlexNet Licensing trusted activations. This section describes the LicenseService interface.

● LicenseService Interface presents the XML files that define the LicenseService interface. The interface is used to generate language-specific client implementations that can communicate with the License service to import entitlements.

● Using the License Service Operations gives an overview of how to use the License service operations.

LicenseService Interface

The endpoint to connect to the License service depends on the Web Service version you are using:

● **Default endpoint**—`https://<siteID>.flexnetoperations.com/flexnet/services/LicenseService`

● **Version-specific endpoint (for v1)**—`https://<siteID>.flexnetoperations.com/flexnet/services/v1/LicenseService`

`LicenseFulfillmentService.wsdl` defines the LicenseService interface and references `licenseFulfillmentTypes.xsd`, which in turn, references the XML Schema documents that define License service custom data types, service requests, and service responses.

Using the License Service Operations

The following provides a quick overview of how to approach managing fulfillments with the License service. These steps assume that you have planned how your customers will fulfill their licenses and whether and how you support license lifecycle operations.

Table 2-12 ▪ License Service Operations

Step	Description
Step 1	If you want to test license models and the product hierarchy while you can still modify them, create test entitlements and generate licenses for them. When test entitlements are deleted, fulfillments created from them are also deleted.
Step 2	After you have deployed license models and your product hierarchy, create deployable simple or bulk entitlements for your customers. Load web register keys (activation IDs) into bulk entitlements.
Step 3	Consider using getEntitlementsQuery, getActivatableItemCount, getActivatableItemsQuery, getBulkEntitlementPropertiesQuery and getEntitlementLineItemPropertiesQuery operations to support your license fulfillment process.

Table 2-12 ▪ License Service Operations

Step	Description
Step 4	When you have chosen activatable items, identify the license model attributes whose values must be set at fulfillment time using the getLicenseModelIdentifiers operation in the Product Packaging Service (required counts and hostids) and the **getFulfillmentAttributesFromModel** or **getFulfillmentAttributesForBatch** operation.
Step 5	Verify that licenses can be generated with the supplied attribute values, then generate licenses. Decide whether to override any policy you have set on the license model concerning extra activations.
Step 6	Optionally, consolidate fulfillments.
Step 7	Deliver licenses or consolidated licenses as email attachments.
Step 8	If you support the license lifecycle operations, process license renewals, upgrades, upsells, returns, repairs, and rehosts. Decide whether to override any policy you have set on the license model concerning lifecycle operations.

User Account Hierarchy Service

The User Account Hierarchy service creates, updates, and queries account hierarchies and creates, updates, or deletes users and user roles in an account. This section describes the UserAcctHierarchyService interface.

● UserAcctHierarchyService Interface presents the XML files that define the UserAcctHierarchyService interface. The interface is used to generate language-specific client implementations that can communicate with the User Account Hierarchy service to manage accounts and users.

● Creating an Account for .NET provides example code for creating an account using the UserAcctHierarchyService wsdl.

Version ▪ *As of the FlexNet Operations 2017 R1 release, UserAcctHierarchyService replaces the UserOrgHierarchyService.*

UserAcctHierarchyService Interface

The endpoint to connect to the User Account Hierarchy service depends on the Web Service version you are using:

● **Default endpoint**—`https://<siteID>.flexnetoperations.com/flexnet/services/UserAcctHierarchyService`

● **Version-specific endpoint (for v1)**—`https://<siteID>.flexnetoperations.com/flexnet/services/v1/UserAcctHierarchyService`

`UserAcctHierarchyService.wsdl` defines the User Account Hierarchy interface and references `UserAcctHierarchyService.xsd` that defines User Account Hierarchy service custom data types, service requests, and service responses.

Creating an Account for .NET

To create an account using the UserAcctHierarchyService wsdl, you will need to create a C# Console Application project with a Web Reference that contains an override function which specifies that requests are to use "Basic" HTTPS authentication.

Task   ***Creating an account for .NET***

1. In Visual Studio 2008 or later, create a new C# Console Application project.

2. In the **Solution Explorer**, right-click the project icon and select **Add Service Reference**.

3. Click **Advanced** at the bottom of the **Add Service** screen and then **Add Web Reference** at the bottom of the **Service Reference Settings** screen.

4. Enter **https://<siteID>.flexnetoperations.com/flexnet/services/v3/UserAcctHierarchyService?wsdl** and click **Go**. Alternatively, you can enter **https://<siteID>.flexnetoperations.com/flexnet/services** to see a list of all available FlexNet Operations WSDLs.

5. Change the Web reference name to **UserAcctOrdSvc** and click **Add Reference**. The **Solution Explorer** view should have a new **UserAcctOrdSvc** icon in the **Web References** folder.

6. Double-click the **UserAcctOrdSvc** icon, which opens the **Object Browser**.

7. In the **Object Browser**, expand **WebServiceTest.UserAcctOrdSvc**, and double-click one of the items in the tree. This should open the proxy class source file `Reference.cs`.

8. Near the top of `Reference.cs`, find the line that begins:

```
public v3UserAcctHierarchyService()
```

and insert the following function directly above:

```
protected override WebRequest GetWebRequest(Uri uri)
{
    HttpWebRequest request;
    request = (HttpWebRequest)base.GetWebRequest(uri);

    if (PreAuthenticate)
    {
        NetworkCredential networkCredentials =
            Credentials.GetCredential(uri, "Basic");
        if (networkCredentials != null)
        {
            byte[] credentialBuffer =
            new
            System.Text.UTF8Encoding( ).GetBytes(
                networkCredentials.UserName + ":" +
                networkCredentials.Password);

            request.Headers["Authorization"] =
                "Basic " +
                Convert.ToBase64String(credentialBuffer);
        }
        else
        {
```

```
                    throw new ApplicationException(
                        "No network credentials");
                }
            }
            return request;
        }
```

9. At the top of the file in the namespace function for the project, add the following:

    ```
    using System.Net;
    ```

10. In the `Program.cs` file, add a Web Service request to create an account. For example:

    ```
    using System;
    using System.Collections.Generic;
    using System.Linq;
    using System.Text;
    using System.Net;
    using WebServiceTest.UserAcctOrdSvc;

    namespace WebServiceTest
    {
        class Program
        {
            static void Main(string[] args)
            {
                v3UserAcctHierarchyService usrAccSer = new
                    v3UserAcctHierarchyService();

                // begin copied-and-pasted authorization code
                NetworkCredential netCredential =
                    new NetworkCredential("username@company.com", "MyPassword");
                Uri uri = new Uri(usrAccSer.Url);

                ICredentials credentials = netCredential.GetCredential(uri, "Basic");

                usrAccSer.Credentials = credentials;
                usrAccSer.PreAuthenticate = true;

                Console.WriteLine("[Successfully authenticated...]");
                // end copied-and-pasted authorization code

                // one and only account
                createAcctRequestType acc1 = new createAcctRequestType();

                accountDataType[] account = new accountDataType[1];
                acc1.account = account;
                account[0] = new accountDataType();

                // make sure to change the Account ID for each test...

                account[0].id = "ExampleAccountID";
                account[0].name = "ExampleAccountName";
                account[0].description = "ExampleDescriptionForAccount";

                // add address for the respective account

                addressDataType address = new addressDataType();
    ```

```
            address.address1 = "No.45, 2nd Street";
            address.address2 = "Sunset Avenue";
            address.city = "Bangalore";
            address.state = "Karnataka";
            address.zipcode = "560054";
            address.country = "IN";
            address.region = "Asia";

            AcctType accountType = new AcctType();
            accountType = AcctType.CUSTOMER;

            // this function is in the auto-generated Reference.cs code
            createAcctResponseType creatAccResType = usrAccSer.createAccount(acc1);

            if (creatAccResType.statusInfo.status != StatusType.SUCCESS)
            {
                Console.WriteLine("Failed to create account: " +
                    creatAccResType.statusInfo.reason);
            }
            else
            {
                Console.WriteLine("Success!");
            }
        }
    }
}
```

11. Build and run the application.

FlexNet Authentication Service

The FlexNet Authentication service manages the authentication of a FlexNet Operations user by processing a token passed from another application that performs user authentication, such as a company portal. This section describes the FlexNet Authentication interface.

FlexnetAuthentication Interface presents the XML file that defines the FlexnetAuthentication interface. The interface is used to generate language-specific client implementations that can communicate with the FlexNet Authentication service to manage token authentication of users.

FlexnetAuthentication Interface

The endpoint to connect to the FlexNet Authentication service depends on the Web Service version you are using:

- **Default endpoint**—https://<siteID>.flexnetoperations.com/flexnet/services/FlexnetAuthentication

- **Version-specific endpoint (for v1)**—https://<siteID>.flexnetoperations.com/flexnet/services/v1/ FlexnetAuthentication

FlexnetAuthentication.wsdl defines the FlexnetAuthentication interface and its custom data types, service requests, and service responses.

Device Management Service

The Device Management service enables management of hardware devices. This section describes the ManageDeviceService interface.

Device Management Interface presents the XML files that define the ManageDeviceService interface. The interface is used to generate language-specific client implementations that can communicate with the ManageDeviceService service to manage accounts.

ManageDeviceService Interface

The endpoint to connect to the Device Management service depends on the Web Service version you are using:

- **Default endpoint**—`https://<siteID>.flexnetoperations.com/flexnet/services/ManageDeviceService`

- **Version-specific endpoint (for v1)**—`https://<siteID>.flexnetoperations.com/flexnet/services/v1/ManageDeviceService`

`ManageDeviceService.wsdl` defines the ManageDeviceService interface and references `ManageDevice.xsd` that defines Device Management service custom data types, service requests, and service responses.

Download Packaging Service

The Download Packaging Service is an add-on to the FlexNet Operations entitlement management system. Its primary components are Files and Download Packages (a collection of Files). Download Packages refer to additional optional attributes of End User License Agreements and Producers which are also defined in this service. Products and Product Lines, which are defined in the Product Service, are also used by the Download Packaging Service.

DownloadPackagingService Interface

The endpoint to connect to the Download Packaging Service depends on the Web Service version you are using:

`https://<siteID>-fno.flexnetoperations.com/flexnet/services/<version>/DownloadPackagingService`

Replace <siteID> with your organization's site ID (supplied by Revenera), and <version> with the desired version. For information about versions of the Download Packaging Service, see Web Service Version History.

`DownloadPackagingService.wsdl` defines the DownloadPackagingService interface.

Version ▪ *As of the FlexNet Operations 2016 R2 release, DownloadPackagingService replaces EsdWebService.*

Usage Service

The Usage Service is a SOAP-based web service that enables producers to retrieve the end-user's product line, meter, unit of measure, actual use, entitled quantity, overage since statement, overage since reset, percentage, interval/reset, and time period.

UsageService Interface

The endpoint to connect to the UsageService service depends on the Web Service version you are using:

- **Default endpoint**—`https://<siteID>.flexnetoperations.com/flexnet/services/UsageService`

- **Version-specific endpoint (for v1)**—`https://<siteID>.flexnetoperations.com/flexnet/services/v1/UsageService`

`UsageService.wsdl` defines the UsageService interface.

Electronic Software Delivery Service

The Electronic Software Delivery Service (ESD Service) provides customers with access to Download Package information for file delivery, so that they can build their own customer portals.

Note ▪ *The ESD Service is available to customers who have purchased the Software Delivery module.*

ESDService Interface

Use the following endpoint to connect to the ESDService service:

`https://<siteID>-esd.flexnetoperations.com/esd-service/svc`

`ESDService.wsdl` defines the ESDService interface. To use ESD Service, reference the WSDL at `https://<siteID>-`

`esd.flexnetoperations.com/esd-service/svc/wsdl/ESDService.wsdl`.

3

SOAP Web Services Reference

The Using SOAP Web Services section of this guide provides details about integrating your organization's systems with FlexNet Operations via the SOAP-based Web Service operations, including where to find WSDLs for those services and how to set up a Web Service client.

However, for complete reference information on the individual FlexNet Operations SOAP-based APIs, see the *FlexNet Operations SOAP Web Services Guide*, available from the Revenera Product Documentation site.

4

REST Web Services

FlexNet Operations includes REST services that producers can use to do the following:

- Query data in the FlexNet Operations data warehouse (available for FlexNet Operations deployments in the Data Center and deployments in AWS (Amazon Web Services) in EMEA (Europe, Middle East, and Asia))

- Manage projects for containerized applications in the Revenera registry

- Download data extract snapshots and manage their data extract job output

- Provide communication with end-user applications.

These REST services are described in the following topics:

Table 4-1 ▪ Summary of RESTful services provided by FlexNet Operations

Topic	Description
RESTful Services for Data Access	Details REST API services used to query data in the FlexNet Operations data warehouse
RESTful Services for Software Container Delivery	Details REST API services used to manage projects in the Revenera registry (for example, get project details, delete repositories or images, get/reset the registry secret, get end-user download log).
Data Extract RESTful Services	Details REST API services associated with job-related back office integration
Application RESTful Services	Details REST API services associated with end-user application communication

Swagger Documentation

In addition to this manual, you can consult the Swagger documentation, which provides more detailed information. This section lists the URLs for the Swagger documentation.

The Swagger documentation is available for two environments:

● User Acceptance Testing (UAT)

● Production (PROD)

About Your Site ID

The URLs for the entry points into the FlexNet Operations systems use a site ID, which is supplied by Revenera. This ID is usually your organization's **DNS name**, but can also be the **Tenant ID** that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***.

User Acceptance Testing (UAT)

The following URLS are entry points into the UAT instance of the Swagger pages for FlexNet Operations.

Description	FlexNet Operations Swagger Page (UAT)
Data Access API	`https://<siteID>-uat.flexnetoperations.com/data/swagger-ui.html`
Software Container Delivery API	`https://<siteID>-uat.flexnetoperations.com/registry/swagger-ui.html`
Application RESTful Services	`https://<siteID>-uat.flexnetoperations.com/flexnet/swagger-ui.html`
Updates and Insights API	`https://<siteID>-ns-uat.flexnetoperations.com/uai/documentation/swagger-ui.html`
Cloud Monetization API (CMAPI)	`https://<siteID>-uat.compliance.flexnetoperations.com/documentation/swagger-ui.html`

Note ▪ For more information on `<siteID>`, see About Your Site ID.

Note ▪ For further information about Updates and Insights, consult the FlexNet Operations User Guide, in particular section Getting Started with Updates and Insights. For further information about the Cloud Monetization API (CMAPI), refer to the Cloud Monetization API User Guide (available from the Product and License Center).

Production (PROD)

The following URLS are entry points into the production instance of the Swagger pages for FlexNet Operations.

Description	FlexNet Operations Swagger Page (Production)
Data Access API	`https://<siteID>.flexnetoperations.com/data/swagger-ui.html`

Description	FlexNet Operations Swagger Page (Production)
Software Container Delivery API	`https://<siteID>.flexnetoperations.com/registry/swagger-ui.html`
Application RESTful Services	`https://<siteID>.flexnetoperations.com/flexnet/swagger-ui.html`
Updates and Insights API	`https://<siteID>-ns.flexnetoperations.com/uai/documentation/swagger-ui.html`
Cloud Monetization API (CMAPI)	`https://<siteID>.compliance.flexnetoperations.com/documentation/swagger-ui.html`

Note ▪ For more information on `<siteID>`, see About Your Site ID.

Note ▪ For further information about Updates and Insights, consult the FlexNet Operations User Guide, in particular section Getting Started with Updates and Insights. For further information about the Cloud Monetization API (CMAPI), refer to the Cloud Monetization API User Guide (available from the Product and License Center).

RESTful Services for Data Access

The Data Access REST APIs are available for FlexNet Operations deployments in the Data Center and deployments in AWS (Amazon Web Services) in EMEA (Europe, Middle East, and Asia).

These REST APIs provide access to data in the FlexNet Operations data warehouse, giving a view of the data for reporting purposes. Using these APIs, a producer user can extract data for their tenant from any time period directly from the data warehouse. This enables them to view a history of the data without having to build up an archive in their own separate database.

Note ▪ The functionality provided by the Data Access APIs is distinct from the Reporter features that are available through the FlexNet Operations Producer Portal. For information about the latter, see the section Viewing Reports in the FlexNet Operations User Guide.

Availability of Custom Attributes

The data warehouse only contains custom attributes that have been marked as "Required for Reporting" in FlexNet Operations. Consequently, only these custom attributes can be included in reports generated using the Data Access REST APIs. See the FlexNet Operations User Guide for more information, in particular the topic Creating a Custom License Model Custom Attribute.

URLs

URLs in this document refer to v1 of the APIs. Further releases of the API may increment this version. Please consult the Swagger documentation to identify the latest version of the API, and modify the URLs you use appropriately.

Further Documentation

This manual provides a brief overview over RESTful services for reporting. Detailed information about the Data Access APIs is available on the following platforms:

Swagger

Use the following URL to access the Data Access API documentation on Swagger:

    https://<siteID>.flexnetoperations.com/data/swagger-ui.html

where <siteID> is your organization's site ID which is supplied by Revenera. For more information on <siteID>, see About Your Site ID.

Redocly

Use the following URL to access the Redocly documentation:

    https://fnoapi-da.redoc.ly/

The Data Access API pages on the Redocly platform provide the same information as the Data Access API pages on Swagger, but in a slightly different format.

The **Try It Console** enables you to test requests and responses. Before you can make an API call, you need to authenticate yourself. To do so, open the **Security** panel and enter your user name and password. Enter your site ID below the **Security** panel. (For more information on the site ID, see About Your Site ID.)

Using Data Access REST Endpoints

Endpoints for data access are available on your FlexNet Operations host:

    https://<siteID>.flexnetoperations.com/data/api/v1/report/

where <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flexNNNN**.

Report Groups

Reports can be requested for a group, and the available groups can be identified by querying the API `/report/report-names`.

The following groups are available:

- Account
- Device
- Served device
- Entitlement
- Fulfillment
- Product features
- User

The names, data types and allowed length of the fields provided for each of the report groups can be seen by querying the API `/report/report-types/{group}`, where the parameter {group} is one of the values returned by `/report/report-names/`.

Tip ▪ Users can use the name, data type and length information to replicate the data into their own data warehouse using the Data Access APIs. Note that the length of fields might change in the future.

For the groups "device" and "served device", query results are returned in PDT (UTC-7). For all other groups, query results are returned in UTC.

Permissions for the Data Access API

The REST APIs do not require any specific permissions.

Authentication for the Data Access API

When calling the API, a producer user must authenticate themselves.

Credentials can be provided in the following ways:

- Providing FlexNet Operations Credentials
- Providing a JWT

Providing FlexNet Operations Credentials

Authentication information (in Base64) must be included in the header. The following procedure explains how to provide credentials, including an example for each step.

Task   ***To provide FlexNet Operations credentials***

1. Concatenate the user name and password with a single colon.

    Example: If the user name is "alice" and the password is "password", the resulting concatenated string would be `alice:password`

2. Base64 encode the concatenated user name and password.

    Example: Base64 encode the string `alice:password` to obtain "YWxpY2U6cGFzc3dvcmQ="

3. Add the "Authorization" key to the header of the request, with the Base64-encoded result as the value.

    Example: Add the value "Basic YWxpY2UucGFzc3dvcmQ=" to the Authorization header.

Providing a JWT

Producers can also authenticate themselves by including a JSON Web Token (JWT) in the header of the request. The validity of the JWT is 60 minutes.

Task	**To provide a JWT**

1. Call `https://<siteID>.flexnetoperations.com/data/api/v1/authenticate` to obtain the JWT.

2. Add the "Authorization" key to the header of the request, with the JWT as the value, so that it resembles this example:

```
Authorization: Bearer
eyJhbGciOiJSUzI1NiJ9.eyJleHAiOjE1NTcwOTEwOTl9.PMMvCRlOkTCtS1pDIKzEHIvEjIctvc5RrN2keQCU5AUp-
tg1ekIXOOtuaHKZJEfVFdmZqvDulI47t5_vcB_VeFbl2QQirvzkrg1YHbyZMLmc_jMSSsgAqvSlaz83jOU7lJvF_bZl_xv5O3jb
5MJDoD6v4Miuc-J46hJGe4UvEc
```

Building a Query

The basic form of an API query on a group is as follows:

`https://<siteID>.flexnetoperations.com/data/api/v1/report/{group}.`

In the URL, above, <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flexNNNN**. The parameter {group} is one of the report groups returned when you make a GET call to `/api/v1/report/report-names`.

You can add filters as query parameters. For example, to specify the mode of the response and obtain the data of the last 10 days, use a query similar to the following:

`https://<siteID>.flexnetoperations.com/data/api/v1/report/{group}?`**mode=INTERACTIVE**&**pastDays=10**

For information about filtering, see Filtering Query Results.

Note ▪ Some parameters contain characters that are not compatible with acceptable content of a URL. The characters used in a query string must therefore be URL-encoded.

Filtering Query Results

The Data Access API offers filters to obtain specific data, or to reduce the amount of data returned:

● Global Filters

● Group Filters

● Conditional Operators

For information about building a query that includes filters, see Building a Query.

Global Filters

Global filters can be applied to all report groups.

Task   ***To view the global filters***

Make a `GET` call to `/api/v1/report/global-filters`.

The following filters are available:

Query parameter	Data Type	Description
dateFrom	String	Report start date in the format YYYY-MM-DD (FlexNet Operations server time).
		Example: `2020-01-28`
		The date range, specified using `dateFrom` and `dateTo`, can span a maximum of 30 days for each request.
		The time period is inclusive of dates specified in `dateFrom` and `dateTo`.
dateTo	String	Report end date in the format YYYY-MM-DD (FlexNet Operations server time)
		Example: `2021-01-27`
		The date range, specified using `dateFrom` and `dateTo`, can span a maximum of 30 days for each request.
		The time period is inclusive of dates specified in `dateFrom` and `dateTo`.
format	String	Format of the resulting report. Valid values: `json`, `csv`.
		Default: `json`
limitRecords	Numeric	Limits the number of records returned. Valid values: 1 to 2500.
		Default: 500
mode	String	In `INTERACTIVE` mode, the returned payload includes the count of records and the total number of pages in the header. Valid values: `BATCH` or `INTERACTIVE`.
		Default: `BATCH`.
		For more information and sample output, see mode.
pastDays	Numeric	Specifies the number of historical days for which data should be returned. Valid values: 1 to 30.
		If a range is specified using `dateFrom` and `dateTo`, then `pastDays` is ignored.
		Default: 1

Query parameter	Data Type	Description
pageNumber	Numeric	Specifies the page of results to return. Minimum value: 1. Default: 1

mode

Possible values for `mode` are `INTERACTIVE` and `BATCH`. The default mode is `BATCH`.

In `INTERACTIVE` mode, the count of records and the total number of pages are provided in the header of the returned payload. The header also includes URLs (in the `previousPageURL` and `nextPageURL` elements) for navigating to the next and previous pages. This enables a user to make a decision about what to do once the current page has been viewed.

The following is an example for output using `mode=INTERACTIVE`:

```
"header": {
    "recordCount": 190537,
    "totalPages": 1906,
    "previousPageURL": "https://[HOST]/api/v1/report/account?
    mode=INTERACTIVE&format=json&pastDays=1&limitRecords=100&requestID=cV9yYzoxOTA1Mzc=pageNumber=19",
    "nextPageURL": "https://[HOST]/api/v1/report/account?
    mode=INTERACTIVE&format=json&pastDays=1&limitRecords=100&requestID=cV9yYzoxOTA1Mzc=&pageNumber=21"
}
```

`BATCH` mode is intended to be used by a batch process which begins at the start and iterates across the complete set of available pages. It also provides URLs for navigating to the next and previous pages.

The following is an example for output using `mode=BATCH`:

```
"header": {
    "recordCount": -1,
    "totalPages": -1,
    "previousPageURL": "https://[HOST]/api/v1/report/account?
    mode=BATCH&format=json&pastDays=1&limitRecords=100&requestID=cV9yYzotMQ==&pageNumber=19",
    "nextPageURL": "https://[HOST]/api/v1/report/account?
    mode=INTERACTIVE&format=json&pastDays=1&limitRecords=100&requestID=cV9yYzotMQ==&pageNumber=21"
}
```

Group Filters

In addition to global filters, each report group has its own filters.

Task   ***To view the filters for a particular group***

1. Make a GET call to `/api/v1/report/report-types/{group}`, where the parameter {group} is the report group for which you require filter information. (Available groups are returned by `/report/report-names`.)

2. In the GET response body, the `data` array lists the filters that are available for the report group.

The following optional report filters are available:

Report Name	Available Filters
account	accountID, accountName
user	userName, displayName, email, accountID, accountName
entitlement	entitlementID, activationID, productName, partNumber, accountID, accountName
device	deviceName, deviceID, accountID, accountName, entitlementID, activationID, productName, partNumber, deviceUserEmail, siteName
served-device	accountID, accountName, siteName, servedClientHostID
product-feature	productName, productVersion, featureName, featureVersion
fulfillment	fulfillmentID, activationID, productName, partNumber, accountID, accountName, hostEntityID

Conditional Operators

Conditional operators can be used to narrow down the result set when querying the `/report/{group}` API.

All values passed in the optional filters must be URL encoded (`/api/v1/report/account?query=<URL encoded>`). In the table below, the Example column shows queries for the `account` group.

Operator Notation	Description	Example
$eq	Exact string	?query={"accountID" : {"$eq" : "101202692754"}}
$sw	Starts with	?query={"accountID" : {"$sw" : "1012"}}
$ew	Ends with	?query={"accountID" : {"$ew" : "7058"}}
$con	Contains	?query={"accountID" : {"$con" : "2692"}}
$in	Multiple values	?query={"accountID" : {"$in" : ["101202692754", "101098417058"]}}

Data Access API Entity Relationship Diagram

The following Data Access API Entity Relationship diagram shows how different data elements map across the different Data Access API responses.

For a description of the response fields that are returned by the FlexNet Operations Data Access API, see Data Access API Entity Relationship Diagram and Field Descriptions.
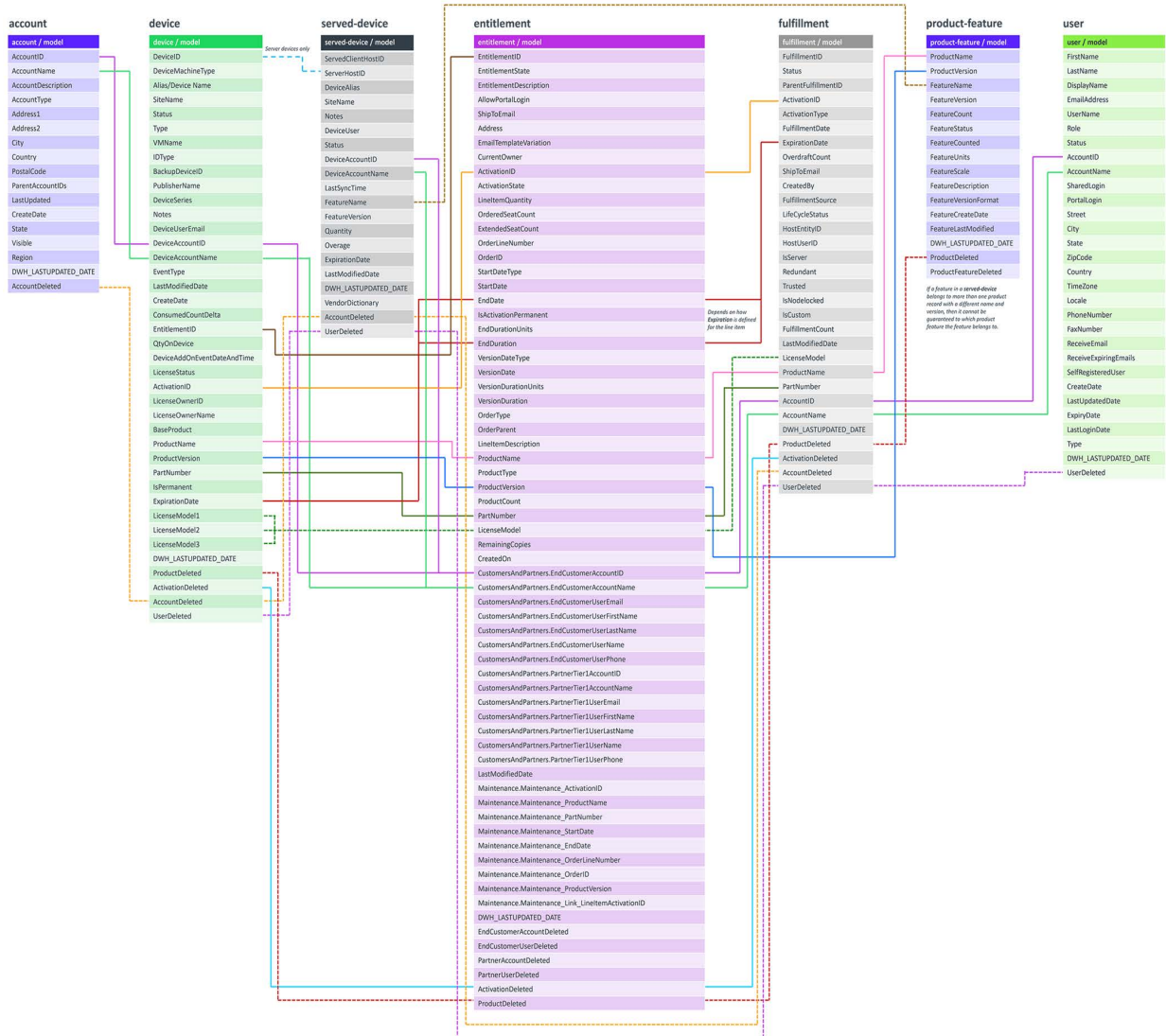
Figure 4-1: FlexNet Operations Data Access API Entity Relationship Diagram

RESTful Services for Software Container Delivery

Version ▪ This functionality is only available for producers who use the Software Delivery module.

The Software Container Delivery REST API enables producers who distribute containerized applications using the Revenera registry to manage their projects directly, without using the Docker or Helm command-line interface (CLI). This allows producers to incorporate relevant functionality into their own portal implementations.

The REST API can be used regardless of the type of registry—shared, dedicated, or open registry. For information about the different deployment options, see About the Revenera Registry in the FlexNet Operations User Guide.

This section is grouped into the following subsections:

- Accessing the REST API—Discusses the base URL, permissions and authorization required to access the REST endpoints.

- Using Software Container Delivery REST Endpoints—Describes the individual endpoints.

Further Documentation

This manual provides a brief overview over RESTful services for software container delivery. For detailed information about the Software Container Delivery API, see the Swagger documentation, using the following URL:

`https://<siteID>.flexnetoperations.com/registry/swagger-ui.html`

where <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***.

Note ▪ For detailed information about managing containerized applications and the Revenera registry using the FlexNet Operations Producer Portal, see Managing Containerized Applications in the FlexNet Operations User Guide.

Accessing the REST API

The following sections provide detail about the base URL and authentication required to access the Software Container Delivery REST API:

- Base URL for Software Container Delivery REST API

- Permissions for Software Container Delivery REST API

- Authentication for Software Container Delivery REST API

Base URL for Software Container Delivery REST API

Endpoints for the Software Container Delivery REST API are available on your FlexNet Operations host:

```
https://<siteID>.flexnetoperations.com/registry/api/v1/
```

where <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***.

Note ▪ URLs in this document refer to v1 of the APIs. Further releases of the API may increment this version. Please consult the swagger documentation to identify the latest version of the API, and modify the URLs you use appropriately.

Permissions for Software Container Delivery REST API

A producer user must be assigned a role that includes the "View and Manage Download Packages" permission to be able to call any endpoint of the Software Container Delivery REST API (with the exception of **/authenticate**).

No specific permissions are required to call the **/authenticate** endpoint.

Authentication for Software Container Delivery REST API

When calling the Software Container Delivery REST API, a producer user must authenticate themselves, using the **/authenticate** endpoint. The FlexNet Operations producers pass their credentials to the **/authenticate** endpoint, which creates a JSON Web Token (JWT) that can be used to authorize access to any endpoint of the Software Container Delivery REST API. Credentials are a Base64-encoded combination of the producer's user name and password separated by a colon (:).

The following sections describe the main steps involved in authentication:

● Step 1: Providing FlexNet Operations Credentials

● Step 2: Providing a JWT

Step 1: Providing FlexNet Operations Credentials

The following procedures explain how to provide credentials, including an example for each step.

Task   **To provide FlexNet Operations credentials**

1. Concatenate the user name and password with a single colon.

    Example: If the user name is "registryserviceuser@revenera.com" and the password is "password", the resulting concatenated string would be registryserviceuser@revenera.com:password.

2. Base64 encode the concatenated user name and password.

    Example: Base64 encode the string registryserviceuser@revenera.com:password to obtain "cmVnaXN0cnlzZXJ2aWNldXNlckByZXZlbmVyYS5jb20cGFzc3dvcmQ="

3. Add either "Fno" or "Basic" before the Base64-encoded string.

    Examples:
    Fno cmVnaXN0cnlzZXJ2aWNldXNlckByZXZlbmVyYS5jb20cGFzc3dvcmQ=

```
Basic cmVnaXN0cnlzZXJ2aWNldXNlckByZXZlbmVyYS5jb206cGFzc3dvcmQ=
```

4. Make a GET call to the **/authenticate** endpoint, where you add the "Authorization" key to the header of the request, with the Base64-encoded result as the value.

    Example: Add the value "`Basic cmVnaXN0cnlzZXJ2aWNldXNlckByZXZlbmVyYS5jb206cGFzc3dvcmQ=`" (or "`Fno cmVnaXN0cnlzZXJ2aWNldXNlckByZXZlbmVyYS5jb206cGFzc3dvcmQ=`") to the Authorization header.

The response will include a JWT, which producers can use to authenticate themselves when calling any endpoint of the Software Container Delivery REST API.

Step 2: Providing a JWT

When accessing any endpoint of the Software Container Delivery REST API, producers authenticate themselves by including the JWT (generated in Step 1: Providing FlexNet Operations Credentials) in the header of the request. The validity of the JWT is 60 minutes.

Task   ***To provide a JWT***

1. Call the desired endpoint.

2. Add the "Authorization" key to the header of the request, with the JWT as the value, so that it resembles this example:

    ```
    Authorization: Bearer
    eyJhbGciOiJSUzI1NiJ9.eyJleHAiOjE1NTcwOTEwOTl9.PMMvCRlOkTCtS1pDIKzEHIvEjIctvc5RrN2keQCU5AUp-
    tg1ekIXOOtuaHKZJEfVFdmZqvDulI47t5_vcB_VeFbl2QQirvzkrg1YHbyZMLmc_jMSSsgAqvSlaz83jOU7lJvF_bZl_xv5O3jb
    5MJDoD6v4Miuc-J46hJGe4UvEc
    ```

Using Software Container Delivery REST Endpoints

The following endpoints are available for the Software Container Delivery REST API. Prefix each with the appropriate base URL, as described in Base URL for Software Container Delivery REST API.

To access any of the endpoints in the table below, a JWT must be passed in the header of the request. For more information, see Authentication for Software Container Delivery REST API.

Table 4-2 ▪ Overview of Software Container Delivery REST endpoints

URI	Methods	Description
/downloads	GET	Returns a log showing a summary of the end-customers' download activity from all registry service instances.
/event/{entity_name}/status	GET	Returns the processing status of a specified entity.
/projects	GET	Lists projects created in the Revenera registry.
/projects/{project_name}	GET	Gets projects, repositories and helm charts.
/projects/{project_name}/members	GET	Lists the users who have access to images and charts.

Table 4-2 ▪ Overview of Software Container Delivery REST endpoints (cont.)

URI	Methods	Description
/projects/{project_name}/repositories/ {repository_name}	DELETE	Deletes a repository or an image from a project.
/projects/{project_name}/charts/ {chart_name}	DELETE	Deletes a chart from a project.
/projects/{project_name}/repositories/ {repository_name}/artifacts	GET	Lists artifacts.
/secret	GET, PUT	Gets or resets the registry secret (Base64 encoded) for the current user.

The following sections describe these APIs:

- Downloading Logs

- Managing Projects

- Managing the Registry Secret

- Getting the Entity Status

Downloading Logs

The **/downloads** endpoint enables producers to download a log showing a summary of their end-customers' download activity from all registry service instances.

Calling the **/downloads** endpoint using GET retrieves the following data:

- The ID of the artifact that was downloaded

- The name of the user who downloaded the artifact

- The account to which user belongs

- The timestamp when an artifact was accessed

Item	Description
URI	/registry/api/v1/downloads
Method	GET
Query parameters	month, page, pageSize, year For details, see Table 4-3, below.
Request body	N/A

Item	Description
Response codes	200: Success
	400: Bad request format.
	401: Unauthorized
	403: Authentication failed
	500: Internal server error

The following query parameters must be specified:

Table 4-3 ▪ Mandatory query parameters for the **/downloads** endpoint

Parameter	Description
month	The calendar month for which data is requested. Format=mm, where mm is the two-digit month (01 - 12).
	If the month is the current month, then all data for that month up to the current time is returned.
page	Retrieves a specific page. Must be a number.
pageSize	Specifies how many data sets per page should be returned. Must be a number.
year	The year of the calendar month for which data is requested. Format=yyyy.

Sample Response

The following shows a data set from a sample response:

```
[
    {
        "id": 1234,
        "artifact": "test1_id/abcd-123:blue",
        "username": "registryserviceuser@revenera.com",
        "account": "[test_acc1]",
        "timestamp": "Fri Mar 11 09:50:06 UTC 2022"
    }
]
```

Managing Projects

Producers can use the endpoints described in this section to do the following:

- Retrieving Project Details

- Retrieving Repositories and Helm Charts

- Listing Members with Access to Images and Helm Charts

- Deleting Images

- Deleting Charts

- Retrieving Artifact Details

Producers must authenticate themselves when calling any of the endpoints described in this section (see Authentication for Software Container Delivery REST API).

Retrieving Project Details

The **/projects** endpoint lists the projects that are currently stored in the Revenera registry.

The list of projects is sorted alphabetically by the project name (which is identical with the Download Package ID). The list is paged, where the number of data sets per page can be configured using the `pageSize` parameter. A specific page of results can be requested by setting the `page` parameter.

Item	Description
URI	/registry/api/v1/projects
Method	GET
Query parameters	page: Retrieves a specific page. Must be a number. pageSize: Specifies how many data sets per page should be returned. Must be a number.
Request body	N/A
Response codes	200: Success 400: Bad request format. 401: Unauthorized 500: Internal server error

Sample Response

The following shows project details from a sample response:

```
[
    {
        "project_id": 1234,
        "name": "test_project_001",
        "repo_count": 1,
        "chart_count": 1,
        "creation_time": "Tue Dec 14 09:59:23 UTC 2021",
        "update_time": "Fri Mar 11 09:50:06 UTC 2022"
    }
]
```

Retrieving Repositories and Helm Charts

The **/projects/{project_name}** endpoint returns the repositories and helm charts associated with a specified project that is currently available to entitled end users. The name of the project must be passed in the {project_name} parameter.

[icon]

Important ▪ If you are using a shared registry, the project names are automatically prefixed with your 4-character tenant ID. Omit this tenant ID when you specify the project name. For example, if your project name is 1234-1000-project1-April2020 (where 1234 is your tenant ID), use the URI /registry/api/v1/projects/1000-project1-April2020.

Item	Description
URI	/registry/api/v1/projects/{project_name}
Method	GET
Query parameters	project_name (path parameter, required)
Request body	N/A
Response codes	200: Success
	401: Unauthorized
	403: Forbidden
	404: Project not found
	500: Internal server error

Sample Response

The following shows a sample response for a successful GET call, which returns the project, repository, names of images included in the repository, and charts:

```
{
    "id": 369,
    "downloadPackageId": "hello-world-dp",
    "sysDownloadPackageId": 8592822,
    "downloadPackageName": "Hello World Download Package",
    "version": "2021",
    "effectiveDateTimestamp": "Aug 4, 2021, 7:00:00 AM",
    "expirationDateTimestamp": "Aug 4, 2025, 7:00:00 AM",
    "downloadPackageAvailability": false,
    "downloadPackageProducer": "Revenera (Revenera)",
    "productLine": "748232",
    "owner": false,
    "restrictedDownloadPackage": false,
    "supportsDockerImagesAndHelmCharts": false,
    "tenantId": "1107",
    "repositories": [
        {
```

```
            "pullCount": 3,
            "artifactCount": 1,
            "projectId": 11,
            "repositoryName": "hello-world-dp/hello-world-image",
            "projectPublic": false
        }
    ],
    "charts": [
        {
        "score": 0,
        "name": "hello-world-dp/hello-world-chart",
        "chart": {
            "digest": "b60b767eece0a87840e6f58f60747e72d5a11749e364faac4a91c095127f24cc",
            "urls": [
                "hello-world-dp/charts/hello-world-chart-0.1.0.tgz"
            ],
            "created": "2021-08-05T11:51:04Z",
            "name": "hello-world-dp/hello-world-chart",
            "version": "0.1.0",
            "description": "A Helm chart for Kubernetes",
            "apiVersion": "v2"
            }
        }
    ]
}
```

Listing Members with Access to Images and Helm Charts

When FlexNet Operations creates a project in the registry, information about producer users and entitled end-users that are associated with the download package in FlexNet Operations is automatically propagated to the registry. This includes:

● All producer users from the producer account and its sub-accounts who have the "View and Manage Download Packages" permission. In the registry, these producer users are added as "members" to the project.

● All end-users who are entitled to the download package and have the "Get Downloads" permission.

The **/projects/{project_name}/members** endpoint returns a list of the members who have access to a particular project. The name of the project must be passed in the {project_name} parameter.

To retrieve information about a particular member, specify their user name using the query parameter user_id (the user_id is identical with the entityName field in the response).

Important ▪ If you are using a shared registry, the project names are automatically prefixed with your 4-character tenant ID. Omit this tenant ID when you specify the project name. For example, if your project name is 1234-1000-project1-April2020 (where 1234 is your tenant ID), use the URI /registry/api/v1/projects/1000-project1-April2020.

Item	Description
URI	/registry/api/v1/projects/{project_name}/members

Item	Description
Method	GET
Query parameters	`page`: Retrieves a specific page. Must be a number. Default: 1. `page_size`: Specifies how many records per page should be returned. Must be a number. Default: 10. `project_name`: The name of the project for which information is requested. Required path parameter. `user_id`: Retrieves information about a particular member.
Request body	N/A
Response codes	200: Success 400: Bad request 401: Unauthorized 404: Project not found 500: Internal server error

Sample Response

The following shows a sample response for a successful GET call, where no particular member was specified (therefore, all members with access to the project are returned):

```
[
    {
        "roleName": "projectAdmin",
        "entityName": "AdminRegistryUser",
        "projectId": 1234
    },
    {
        "roleName": "developer",
        "entityName": "user1@mycompany.com",
        "projectId": 1234
    },
    {
        "roleName": "developer",
        "entityName": "user2@mycompany.com",
        "projectId": 1234
    },
    {
        "roleName": "developer",
        "entityName": "user3@mycompany.com",
        "projectId": 1234
    },
]
```

Note ▪ In the output, the `entityName` field is equivalent to a member's `user_id`.

Deleting Images

The **/projects/{project_name}/repositories/{repository_name}** endpoint deletes images that are part of a project. The name of the project and the repository containing the image must be passed in the {project_name} and {repository_name} parameters, respectively.

> **Important ▪** If you are using a shared registry, the project names are automatically prefixed with your 4-character tenant ID. Omit this tenant ID when you specify the project name. For example, if your project name is **1234-1000-project1-April2020** (where 1234 is your tenant ID), use the URI /registry/api/v1/projects/**1000-project1-April2020**.

Item	Description
URI	/registry/api/v1/projects/{project_name}/repositories/{repository_name}
Method	DELETE
Query parameters	project_name, repository_name (both are path parameters and required)
Request body	N/A
Response codes	200: Success 400: Bad request 401: Unauthorized 500: Internal server error

Sample Response

In case of a successful DELETE operation, a response code 200 is returned.

Deleting Charts

The **/projects/{project_name}/charts/{chart_name}** endpoint deletes charts that are part of a project. The name of the project and the chart must be passed in the {project_name} and {chart_name} parameters, respectively.

> **Important ▪** If you are using a shared registry, the project names are automatically prefixed with your 4-character tenant ID. Omit this tenant ID when you specify the project name. For example, if your project name is **1234-1000-project1-April2020** (where 1234 is your tenant ID), use the URI /registry/api/v1/projects/**1000-project1-April2020**.

Item	Description
URI	/registry/api/v1/projects/{project_name}/charts/{chart_name}

Item	Description
Method	DELETE
Query parameters	project_name, chart_name (both are path parameters and required)
Request body	N/A
Response codes	200: Success
	400: Bad request
	401: Unauthorized
	500: Internal server error

Sample Response

In case of a successful DELETE operation, a response code 200 is returned.

Retrieving Artifact Details

The **/projects/{project_name}/repositories/{repository_name}/artifacts** endpoint returns the details of artifacts that are included in a particular project. The name of the project and the repository containing the artifact must be passed in the {project_name} and {repository_name} parameters, respectively.

*Important ▪ If you are using a shared registry, the project names are automatically prefixed with your 4-character tenant ID. Omit this tenant ID when you specify the project name. For example, if your project name is **1234-1000-project1-April2020** (where 1234 is your tenant ID), use the URI /registry/api/v1/projects/**1000-project1-April2020**.*

Item	Description
URI	/registry/api/v1/projects/{project_name}/repositories/{repository_name}/artifacts
Method	GET
Query parameters	page, pageSize, project_name, repository_name, withImmutableStatus, withLabel, withScanOverview, withSignature, withTag
	For details, see Table 4-4, below.
Request body	N/A

Item	Description
Response codes	200: Success
	401: Unauthorized
	403: Forbidden
	404: Project not found
	500: Internal server error

The following query parameters can be added:

Table 4-4 ▪ Query parameters for the **/projects/{project_name}/repositories/{repository_name}/artifacts** endpoint

Parameter	Description
page	Retrieves a specific page. Must be a number.
pageSize	Specifies how many data sets per page should be returned. Must be a number.
project_name	The name of the project containing the artifact (path parameter). Required parameter.
repository_name	The name of the repository containing the artifact (path parameter). Required parameter.
withImmutableStatus	Specifies whether the immutable status is included inside the tags of the returning artifacts.
withLabel	Specifies whether the labels are included inside the returning artifacts.
withScanOverview	Specifies whether the scan overview is included inside the returning artifacts.
withSignature	Specifies whether the signature is included inside the tags of the returning artifacts.
withTag	Specifies whether the tags are included inside the returning artifacts.

Sample Response

The following shows a sample response for a successful GET call, which returns the project, repository, names of images included in the repository, and charts:

```
{
    "id": 369,
    "downloadPackageId": "hello-world-dp",
    "sysDownloadPackageId": 8592822,
    "downloadPackageName": "Hello World Download Package",
    "version": "2021",
    "effectiveDateTimestamp": "Aug 4, 2021, 7:00:00 AM",
    "expirationDateTimestamp": "Aug 4, 2025, 7:00:00 AM",
    "downloadPackageAvailability": false,
```

```
"downloadPackageProducer": "Revenera (Revenera)",
"productLine": "748232",
"owner": false,
"restrictedDownloadPackage": false,
"supportsDockerImagesAndHelmCharts": false,
"tenantId": "1107",
"artifacts": [
    {
        "size": 4524,
        "pushTime": "Sep 24, 2021, 5:52:43 PM",
        "scanOverview": {},
        "tags": [],
        "pullTime": "Sep 24, 2021, 5:55:28 PM",
        "labels": [],
        "references": [],
        "manifestMediaType": "application/vnd.docker.distribution.manifest.v2+json",
        "extraAttrs": {
            "os": "linux",
            "created": "2021-03-05T23:25:25.230064203Z",
            "architecture": "amd64"
        },
        "id": 8,
        "digest": "sha256:1b26826f602946860c279fce658f31050cff2c596583af237d971f4629b57792",
        "icon": "sha256:0048162a053eef4d4ce3fe7518615bef084403614f8bca43b40ae2e762e11e06",
        "repositoryId": 7,
        "mediaType": "application/vnd.docker.container.image.v1+json",
        "projectId": 11,
        "type": "IMAGE",
        "annotations": {}
    }
]
}
```

Managing the Registry Secret

Producer users who distribute containerized software need the container registry secret to log in to the Revenera registry. This section discusses the following:

- Retrieving the Registry Secret

- Changing the Registry Secret

Producers must authenticate themselves when calling the **/secret** endpoint (see Authentication for Software Container Delivery REST API).

Retrieving the Registry Secret

The authenticated producer user can retrieve their registry secret by querying the **/secret** endpoint using GET.

The returned secret is Base64 encoded and must be decoded before it can be used to log into the registry.

Item	Description
URI	`/registry/api/v1/secret`
Method	`GET`
Query parameters	`N/A`
Request body	`N/A`
Response codes	`200`: Processing complete `400`: Bad request format.

Sample Response

The following shows a sample response for returning a Base64-encoded secret:

```
TXlTZWNyZXM3Q=
```

Changing the Registry Secret

A producer user can change their registry secret by calling the **/secret** endpoint using the `PUT` method. This procedure will remove the current secret for the logged-in user and replace it with a new value.

In the request body, the existing secret must be the Base64-encoded current secret.

Important ▪ The registry secret must fulfill the following requirements:

- *at least 8 characters long*
- *at least one uppercase letter*
- *at least one lowercase letter*
- *at least one digit*

The returned secret is Base64 encoded and must be decoded before it can be used to log into the registry.

Item	Description
URI	`/registry/api/v1/secret`
Method	`PUT`
Query parameters	`N/A`

Item	Description
Request body	```{``` ``` "existing-secret": "string",``` ``` "new-secret": "string"``` ```}``` **Note** ▪ *The new-secret parameter is optional. When new-secret is left blank, a random registry secret is generated.*
Response codes	200: Processing complete 400: Bad request format.

Sample Response

In case of a successful PUT operation, a response code 200 is returned.

Getting the Entity Status

Producer users can call the **/event/{entity_name}/status** endpoint using GET to understand if the registry service instance has processed a specified entity. If processing of an entity was not successful, the producer can then take appropriate steps.

Currently, only entities of type USER are supported.

Item	Description
URI	/registry/api/v1/event/{entity_name}/status
Method	GET
Query parameters	entity_name (path parameter, required). Specify the user ID of the user whose status is queried. entity_type (query parameter, required). Specify USER.
Request body	N/A
Response codes	200: Success 400: Bad request 401: Unauthorized 500: Internal server error

Sample Response

The response indicates the processing status, which can be one of the following values:

- **Processed**—The entity has been processed successfully.

- `In-Progress`—Processing of the entity is ongoing.

- `Cancelled`—Processing of the entity did not complete due to an error.

The following shows a sample response for a successful `GET` call, which returns the status `Processed` for the specified user:

```
{
    "status": "Processed"
}
```

Data Extract RESTful Services

Data extract REST APIs enable a user to query any jobs that have run for their tenant. The response provides the status for any jobs that are pending, and timestamps for when a job started and ended. The user can also call a service to retrieve an artifact created by the job. For example, the job artifact is often a comma-separated value (CSV) file for data extract jobs. If a job produces two (or more) CSV files, the artifact would be a .zip file that contained all the CSV files.

> **Important ▪** *Data extract job outputs must be downloaded within a 7 day period from creation. Outputs older than 7 days are automatically purged.*

See the following sections for details about the data extract jobs:

- Using Data Extract REST Endpoints

- Fulfillment Data Extract

- Device Data Extract

- Served Device Data Extract

- User Data Extract

- Account Data Extract

- Usage Data Extract

- Entitlement Data Extract

- Product Packaging Data Extract

- Device Updates Extract

- Updates Extract

> **Tip ▪** *The data extract jobs do not run by default. Producers can configure one or more of the data extract jobs to run in the Producer Portal (**Administer** > **Configure Alerts/Jobs**). For more information about managing data extract jobs and other alerts, see Administering Alerts in the FlexNet Operations User Guide.*

Using Data Extract REST Endpoints

The following table shows examples of how to view jobs that have run and get the output from those jobs.

Endpoints for data extract job information are available on your FlexNet Operations host:

`https://<siteID>.flexnetoperations.com/flexnet/operations/extracts`

where `<siteID>` is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flex*NNNN***.

(The FlexNet Operations host prompts you for your Producer Portal username and password.)

Service URL	Method	Example Response

`.../operations/extracts`	GET	Retrieves a list of all jobs that have run.
		
		/operations/extracts returns a response like the following:
		
		`[{"id":2087,"jobName":"FULFILLMENT","status":"C","startTime":` `"2016-12-12T20:31:54.473Z", "endTime":"2016-12-12T20:31:55.543Z",` `"artifactAvailable":false,"filesize":null,"checksum":null},`
		
		`{"id":2088,"jobName":"DEVICE","status":"C","startTime":` `"2016-12-09T23:31:54.450Z", "endTime":"2016-12-09T23:31:54.580Z",` `"artifactAvailable":true,"filesize":"244","checksum":"B92B84053BA5` `EAB1EA78B515793411C3D1EEA438F445433B821B6AB118F3131A"},`
		
		`{"id":2089,"jobName":"USAGE","status":"P","startTime":` `"2016-12-09T23:29:39.197Z","endTime":"2016-12-09T23:29:39.337Z",` `"artifactAvailable":false,"filesize":null,"checksum":null},`
		
		`{"id":2090,"jobName":"FULFILLMENT","status":"C","startTime":` `"2016-12-09T23:28:39.193Z","endTime":"2016-12-09T23:28:39.307Z",` `"artifactAvailable":true,"filesize":"244","checksum":"B92B84053BA5` `EAB1EA78B515793411C3D1EEA438F445433B821B6AB118F3131A"},`
		
		Optional Parameters
		
		Filter the job entries, if necessary, in the response using optional parameters:
		
		• name values include ACCOUNT, DEVICE, DEVICEUPDATES, ENTITLEMENT, FULFILLMENT, PRODUCTS, SERVEDDEVICE, UPDATES, USAGE, and USER. These values limit the job entries to the entity specified.

Service URL	Method	Example Response
`.../operations/extracts` (continued)	GET	`beginDate` values use the format YYYY-MM-DD (FlexNet Operations server time). `endDate` values use the format YYYY-MM-DD (FlexNet Operations server time). `status` values can be C for "completed," F for "failed," or P for "pending." `artifactAvailable` values can be true or false. If false, no artifact (.csv or .zip file) is available. `filesize` (size in bytes) and `checksum` (using the SHA-256 algorithm) are available when two conditions are satisfied: `status = C` `artifactavailable = true` If both conditions are not satisfied, these fields will be null. Optional parameters can be combined in the request. For example, `https://<siteID>.flexnetoperations.com/flexnet/operations/extracts ?name=DEVICE&status=C` returns entries for all completed Device Data Extract jobs.
`.../operations/extracts /{jobid}`	GET	Retrieves an entry about the job that matches the job ID. `/operations/extracts/2088` returns `{"id":2088,"jobName":"DEVICE","status":"C","startTime": "2016-12-09T23:31:54.450Z", "endTime":"2016-12-09T23:31:54.580Z", "artifactAvailable":true,"filesize":"244","checksum":"B92B84053BA5 EAB1EA78B515793411C3D1EEA438F445433B821B6AB118F3131A"}`
`.../operations/extracts /{jobid}/file`	GET	Retrieves the output of the job that matches the specified job ID. This method returns the contents of the artifact file associated with the job, as a binary stream, if an artifact file location is provided. See entity-specific data extract descriptions, below, for information about the contents of a job's artifact file. For best performance, consider deleting a job after successfully downloading the job's artifact file.
`.../operations/extracts /delete/{jobid}`	POST	Deletes the job that matches the specified job ID as well as its corresponding artifact file, if any, from its given location.

Fulfillment Data Extract

The first time the Fulfillments Data Extract job runs it creates a snapshot of fulfillment events from the day prior to the day the job runs. (Fulfillments created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of fulfillments created or updated; it does not include fulfillment history data.

The first line of the job output contains the header information for the table described by the CSV. If no fulfillments were created or updated in the job period, the CSV output includes only the header row content.

☰

*Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** configuration option. For more information, see Configuring System Settings | General Options in the FlexNet Operations User Guide.*

Sample Output: Fulfillment Data Extract Job

FulfillmentID, Status, ParentFulfillmentID, ActivationID, FulfillmentDate, FulfillCount, OverdraftCount, ExpirationDate, ShipToEmail, CreatedBy, LicenseModel, FulfillmentSource, LifecycleAction, HostEntityID, HostUserId, IsServer, Redundant, Trusted, IsNodelocked, IsCustom,

FID_d43cbaf4_3b97_43bf_be75_be9e9ec52503, bo.constants.states.active, null, 709b-434b-6312-4c30-a3f4-bfdc-c5a9-e329, 2016-10-10 14:35:11.313,1,0, null, my.enduser@mycompany.com, ADMNadmin, Floating Counted, bo.constants.fulfillmentSource.online, null, ANY, null, true, false, false, false, false,

FID_02bafdb9_835e_44c4_a95a_ef37ed846f00, bo.constants.states.active, null, 709b-434b-6312-4c30-a3f4-bfdc-c5a9-e329, 2016-10-10 14:35:12.377,1,0, null, my.enduser@mycompany.com, ADMNadmin, Floating Counted, bo.constants.fulfillmentSource.online, null, ANY, null, true, false, false, false, false,

FID_e0e1ccb4_e62d_408a_a9a1_f1ef0343e132, bo.constants.states.active, null, 709b-434b-6312-4c30-a3f4-bfdc-c5a9-e329, 2016-10-10 14:35:14.457,1,0, null, my.enduser@mycompany.com, ADMNadmin, Floating Counted, bo.constants.fulfillmentSource.online, null, ANY, null, true, false, false, false, false,

...

Notice that, for fulfillments that have multiple host IDs, FlexNet Operations structures the CSV output so that a new row appears for each additional host ID on a given device. On these extra rows, the fulfillment ID is repeated, the fulfillment details between the fulfillment ID and the additional host ID are left empty, and the additional host ID follows. (See "Example for Multiple Host IDs on a Fulfillment," below.)

Example for Multiple Host IDs on a Fulfillment

```
FulfillmentID, ..., HostID, ...
FID01, ..., Host101, ...,
FID02, ..., Host201, ...
FID02, ..., Host202, ...
FID03, ..., Host301, ...
...
```

Above, FID02 has two host IDs mapped to it: Host201 and Host202. FID01 and FID03 both have only one host ID mapped. In an actual output file, the row for FID02 and Host201 would show the status, the parent fulfillment ID, the activation ID (if any), and so forth. Extra rows for FID02 would not show those values.

Device Data Extract

The first time the Device Data Extract job runs it creates a snapshot of device events (including FlexNet Embedded devices and license servers) from the day prior to the day the job runs. (Device and license servers created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of devices and license servers created or updated; it does not include device history data.

The first line of the job output contains the header information for the table described by the CSV. If no devices were created or updated in the job period, the CSV output includes only the header row content.

Sample Output: Device Data Extract Job

```
DeviceID, Type, IDType, BackupDeviceID, Alias, DeviceSeries, PublisherName, DeviceAccountID,
DeviceAccountName, Status, DeviceUserEmail, BaseProduct, SiteName, Notes, ActivationID, LicenseOwnerID,
LicenseOwnerName, ProductName, ProductVersion, QtyOnDevice, LicenseStatus, LicenseModel1, LicenseModel2,
LicenseModel3, IsPermanent, ExpirationDate

Device-1, CLIENT, STRING, , , FLX_CLIENT_SERIES, fnedemo, O1, O1, ACTIVE, , , , CLS-SITE, ba7f-6048-
68a5-4630-b8b1-502a-8548-a115, O1, O1, 3rdLevelUpgradeProd, 3.0, 2, LICENSE_GENERATED, Embedded Counted,
, , NO, Sat Nov 05 00:00:00 PDT 2016,

Device-2, CLIENT, STRING, , , FLX_CLIENT_SERIES, fnedemo, O1, O1, ACTIVE, , FNP_FNE, , , ba7f-6048-68a5-
4630-b8b1-502a-8548-a115, O1, O1, 3rdLevelUpgradeProd, 3.0, 12, LICENSE_GENERATED, Embedded Counted, , ,
NO, Sat Nov 05 00:00:00 PDT 2016,

Device-2, ,,,,,,,,,,,,, 8793-2031-9c1e-4e4a-a5a8-4ff4-8d91-3d70, O1, O1, FNP_FNE, 3.0, 14,
LICENSE_GENERATED, Embedded Uncounted, , , NO, Sat Dec 03 00:00:00 PST 2016,

Device-3, CLIENT, STRING, , , FLX_CLIENT_SERIES, fnedemo, O1, O1, ACTIVE, , , , , ba7f-6048-68a5-4630-
b8b1-502a-8548-a115, O1, O1, 3rdLevelUpgradeProd, 3.0, 3, LICENSE_GENERATED, Embedded Counted, , , NO,
Sat Nov 05 00:00:00 PDT 2016,

...
```

Notice that, for license servers or devices that have multiple activation IDs, FlexNet Operations structures the CSV output so that a new row appears for each additional activation ID on a given device. On these extra rows, the device ID of the device or license server is repeated, the device details between the device ID and the additional activation ID are left empty, and the additional activation ID (as well as information specific to that activation ID) follows. (See "Example for Multiple Activation IDs on a Device," below.)

Example for Multiple Activation IDs on a Device

```
DeviceID, ..., ActivationID, ...
Device01, ..., Activation101, ...,
Device02, ..., Activation201, ...
Device02, ..., Activation202, ...
Device03, ..., Activation301, ...
...
```

Above, Device02 has two activation IDs mapped to it: Activation201 and Activation202. Device01 and Device03 both have only one activation ID mapped. In an actual output file, the row for Device02 and Activation201 would show the type, the type ID, the alias (if any), and so forth. Extra rows for Device02 would not show those values.

Also notice that, for license servers or devices with activation IDs that have more than one product, FlexNet Operations creates an extra row for each additional product. This follows a very similar pattern to the one used to generate extra rows for multiple activation IDs. In the multiple-products case, both the device ID and the activation ID are repeated, and then additional product name (as well as different information specific to that product) follows. In these extra rows, the device details between the device ID and the activation ID, and the license owner details between the activation ID and the product name, are left empty. (See "Example for Multiple Products in an Activation ID," below.)

Example for Multiple Products in an Activation ID

```
DeviceID, ..., ActivationID, ..., ProductName, ...
Device01, ..., Activation101, ..., Product1A, ...
...
Device04, ..., Activation401, ..., Product4A, ...
Device04, ..., Activation401, ..., Product4B, ...
Device04, ..., Activation401, ..., Product4C, ...
Device05, ..., Activation501, ..., Product5A, ...
...
```

Above, Device04 has one activation ID mapped to it: Activation401. Activation401 has three products: Product4A, Product4B, and Product4C. Each additional product after Product4A causes an extra row to be generated for Device004.

Extra rows are generated for both activation IDs and products. In the case of multiple activation IDs, the device ID is repeated. In the case of multiple products, the device ID and the activation ID are repeated.

Served Device Data Extract

The first time the Served Device Data Extract job runs it creates a snapshot of served device events from the day prior to the day the job runs. (Served devices created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of served devices created or updated; it does not include device history data.

The first line of the job output contains the header information for the table described by the CSV. If no served devices were created or updated in the job period, the CSV output includes only the header row content.

Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** *configuration option. For more information, see* Configuring System Settings | General Options *in the* FlexNet Operations User Guide.

Sample Output: Served Device Data Extract Job

```
ServedClientHostID, ServerHostID, Alias, SiteName, Notes, DeviceUser, Status, AccountID, AccountName,
DeviceAccountName, LastSyncTime, FeatureName, FeatureVersion, Quantity, Overage, ExpirationDate

clsClient1, 6FK36Q3496KS, ServedDevice, Site-Server-Cloud, CITE_CLS_DEC9,,, Customer, Customer,
Customer, 2016-11-08T19:29:11.900Z, WSfeature3, 1.0, 1, , 1970-01-18T02:53:58.151Z

clsClient2, 6FK36Q3496KS, ,,,,, Customer, Customer, Customer, 2016-11-08T19:29:24.885Z, WSfeature3, 1.0,
1, , 1970-01-18T02:53:58.164Z

clsClient3, 6FK36Q3496KS, ,,,,, Customer, Customer, Customer, 2016-11-08T19:29:31.441Z, WSfeature3, 1.0,
1, , 1970-01-18T02:53:58.171Z

clsClient4, 6FK36Q3496KS, ,,, User_clsClient4, , Customer, Customer, Customer, 2016-11-09T00:25:33.107Z,
WSfeature3, 1.0, 1, , 1970-01-18T02:53:58.178Z

clsClient4, ,,,,,,,,,, WSfeature2, 1.0, 1, , 1970-01-18T02:54:09.994Z

clsClient4, ,,,,,,,,,, WSfeature3, 1.0, 0, , 1970-01-18T02:44:05.194Z

clsClient4, ,,,,,,,,,, WSfeature2, 1.0, 0, , 1970-01-18T02:44:11.133Z

clsClient4, ,,,,,,,,,, WSfeature3, 1.0, 1, , 1970-01-18T02:54:15.933Z

...
```

Note ▪ For served devices that have multiple features, FlexNet Operations structures the CSV output so that a new row appears for each additional feature on a given served device. On these extra rows, the device ID and the feature details are repeated.

User Data Extract

The first time the User Data Extract job runs it creates a snapshot of user events from the day prior to the day the job runs. (User accounts created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of user accounts created or updated; it does not include historical data.

The first line of the job output contains the header information for the table described by the CSV. If no users were created or updated in the job period, the CSV output includes only the header row content. When a user is assigned multiple roles in a given account, the output lists all the user's assigned roles and separates roles with a pipe character (|). Custom attributes, if any, are displayed in columns following the Type column.

The expiry date will display in the template if the **Enable User Expiration** is checked in the system configuration.

*Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** configuration option. For more information, see Configuring System Settings | General Options in the FlexNet Operations User Guide.*

Sample Output: User Data Extract Job

FirstName, LastName, EmailAddress, UserName, Role, Status, AccountID, AccountName, SharedLogin,
PortalLogin, Street, City, State, ZipCode, Country, TimeZone, Locale, PhoneNumber, FaxNumber,
ReceiveEmail, RecieveExpiringEmails, SelfRegisteredUser, CreateDate, LastLoginDate, Type, ExpiryDate,
CA[USER|UserType], CA[USER|SSN]

John, Smith, user-a@flexerasoftware.com, user-a@flexerasoftware.com, Portal User Role|Portal Admin User
Role, Yes, 0814Account1, 0814Acct1, No, Yes, ,,,, US, GMT-8.0DST60, en_US, ,, No, No, No, ,,
CUSTOMER,12/22/2018 0:00,,

Chandra, Smith, user1_extract@gmail.com, user1_extract@gmail.com, Portal User Role|Portal User Role,
Yes, Bravo, bravo_subacct, Yes, Yes, 101 Metro drive, San Jose, CA, 95123, US, GMT-8.0DST60, en_US, 408-
0000, 408-909-0000, Yes, No, ,,, CUSTOMER, Customer, , 123

,,, user1_extract@gmail.com, Portal User Role, , Charlie's Chocolates, Charlie's Chocolates,
,,,,,,,,,,,,,,,,,,

,,, user1_extract@gmail.com, Portal Admin User Role, , Acme, Acme Software Corporation,
,,,,,,,,,,,,,,,,,,

Samuel, cust, user-c@flexerasoftware.com, user-c@flexerasoftware.com, Portal Admin User Role, Yes,
Aberdeen Golf, Aberdeen Golf, No, Yes, ,,,, US, GMT-8.0DST60, en_US, ,, No, No, No, ,, CUSTOMER,,,

...

Notice that, for users that belong to multiple accounts, FlexNet Operations structures the CSV output so that a
new row appears for each additional account. On these extra rows, the UserName of the user is repeated. along
with that user's assigned roles in that account and the additional account name. Other details are left empty. (See
"Example for Users Linked to Multiple Accounts," below.)

Example for Users Linked to Multiple Accounts

FirstName, LastName, EmailAddress, UserName, Role, Status, AccountID, AccountName, ...

Manuel, Enblach, menblach@MIB.com, menblach@MIB.com, Portal User Role, Yes, MIB, MIB, ...

Theresa, Cullen, tcullen@delos.com, tcullen@delos.com, Portal Admin User Role, No, Delos, Delos, ...

Robert, Ford, rford@delos.com, rford@delos.com, Portal Admin User Role, Yes, Delos, Delos, ...

,,, rford@delos.com, Portal Admin User Role|Portal User Role,, Sweetwater, Sweetwater, ...

,,, rford@delos.com, Portal Admin User Role|Portal User Role,, Confederatos, Confederatos, ...

Elsie, Hughes, ehughes@delos.com, ehughes@delos.com, Portal Admin User Role, Yes, Delos, Delos, ...

R, Mistice, armistice@westwrld.com, armistice@westwrld.com, Portal User Role, Yes, Sweetwater,
Sweetwater, ...

...

Above, rford@delos.com is linked to three accounts: Delos, Sweetwater, and Confederatos. The other users are
each linked to only one account. In the accounts, Sweetwater and Confederatos, rford@delos.com has both portal
administrator and portal user roles.

Account Data Extract

The first time the Account Data Extract job runs it creates a snapshot of account events from the day prior to the day the job runs. (Accounts created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of accounts created or updated; it does not include historical account data.

The first line of the job output contains the header information for the table described by the CSV. If no accounts were created or updated in the job period, the CSV output includes only the header row content. If there are custom attributes, they appear in the columns following the AccountDescription column. Although the extract does not support hierarchies, it does list the parent accounts if applicable. If more than one parent account exists, they are separated by a pipe (|).

Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** *configuration option. For more information, see* Configuring System Settings | General Options *in the* FlexNet Operations User Guide.

Sample Output: Account Data Extract Job

```
AccountID,AccountName,AccountType,ParentAccount,Address1,Address2,City,State,PostalCode,Country,
Visible,Region,AccountDescription,CA[ACCT|CUSTOM_ACCT2222],CA[ACCT|CUSTOM3],CA[ACCT|CUSTOM_ACCT]

MYACCT,My Account,PUBLISHER,,aaaaa,dddd,ccc,ssss,333,US,true,dssd,dddd,,,231

PORTAL_ACCT_UNIT,Portal Account,CUSTOMER,,,,,,,,true,,,,,

UNKNOWN_ACCT_UNIT,Information Not Available,UNKNOWN,,,,,,,,true,,,,,

TEST1,TEST2,CUSTOMER,,add1,add2,cc,sss,6666,US,true,dddd,descrip,789,AAA,197

TEST1_SUB1,TEST1_SUB1,CUSTOMER,TEST1,,,,,,US,true,,,,,

TEST1_PARTNER1,TEST1_PARTNER1,CHANNEL_PARTNER,,,,,,,US,true,,,,,

TEST1_PARTNER1_SUB1,TEST1_PARTNER1_SUB1,CHANNEL_PARTNER,TEST1_PARTNER1,,,,,,US,true,,,,,

MYACCT_SUB1,MYACCTSUB1,PUBLISHER,MYACCT,,,,,,US,true,,,,,

user-n@flexerasoftware.com-FLEX1000,FLEX1000,SELF_REGISTERED,,,,,,,,true,,,,,

TEST1_SUB1_SUB2,TEST1_SUB1_SUB2,CUSTOMER,TEST1_SUB1,TEST1_SUB1_SUB2,TEST1_SUB1_SUB2,

TEST1_SUB1_SUB2,TEST1_SUB1_SUB2,,US,true,TEST1_SUB1_SUB2,TEST1_SUB1_SUB2,,,23

TWOPARENTS,TWOPARENTS,CUSTOMER,TEST1|TEST1_SUB1,TWOPARENTS,TWOPARENTS,TWOPARENTS,TWOPARENTS,,US,

true,TWOPARENTS,TWOPARENTS,,,12

...
```

Usage Data Extract

The first time the Usage Data Extract job runs it creates a snapshot of usage events from the day prior to the day the job runs. (Usage events from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The first line of the job output contains the header information for the table described by the CSV. If no usage events occurred in the job period, the CSV output includes only the header row content.

*Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** configuration option. For more information, see Configuring System Settings | General Options in the FlexNet Operations User Guide.*

Sample Output: Usage Data Extract Job

Account, Product, Feature, Transaction Time, Received Time, Count, Acquisition ID, Consumer ID, Device ID, Server ID

"Usage Account", "Uncategorized Products", "Usage_Feature", 2016-03-11T07:41:38.-0600,2016-03-11T07:42:11.-0600,1,,,"TestHost","7KV4HEY2XFWU"

"Usage Account", "Uncategorized Products", "Usage_Feature", 2016-03-11T07:41:40.-0600,2016-03-11T07:42:11.-0600,1,,,"TestHost","7KV4HEY2XFWU"

"Usage Account", "Uncategorized Products", "Usage_Feature", 2016-03-11T07:41:41.-0600,2016-03-11T07:42:11.-0600,1,,,"TestHost","7KV4HEY2XFWU"

...

The structure of this job output file matches the structure used for downloads of usage summaries from the Producer Portal.

Entitlement Data Extract

The first time the Entitlements Data Extract job runs it creates a snapshot of fulfillment events from the day prior to the day the job runs. (Entitlements created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job results in the extract information getting downloaded as a zip file (not as a CSV file). This is different from the other extracts. The zip file contains two CSV files – one for entitlement line items and the other for maintenance line items. As an example, the name of the zip file would be Entitlements-2017-07-07-02-27-18.zip and inside this the name of the CSV's would be EntitlementsExtract-2017-07-05-03-07-21.csv (entitlement line items) and MaintenanceLine-2017-07-05-03-07-21.csv (for maintenance line items). The naming format in these files is "YYYY-MM-DD-HH-MM-SS". The job output is a snapshot of fulfillments created or updated; it does not include entitlement history data. The first line of the job output contains the header information for the table described by the CSV. If no entitlements were created or updated in the job period, the CSV output includes only the header row content.

Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** *configuration option. For more information, see* Configuring System Settings *|* General Options *in the* FlexNet Operations User Guide*.*

Sample Output: Entitlement Data Extract Job - Entitlement Line Items

EntitlementID,EntitlementState,EntitlementDescription,AllowPortalLogin,ShipToEmail,Address,End Customer|Account,End Customer|AccountName,End Customer|UserName,End Customer|UserFirstName,End Customer|UserLastName,End Customer|UserEmail,End Customer|UserPhone,Partner Tier 1|Account,Partner Tier 1|AccountName,Partner Tier 1|UserName,Partner Tier 1|UserFirstName,Partner Tier 1|UserLastName, Partner Tier 1|UserEmail,Partner Tier 1|UserPhone,CurrentOwner,ActivationId,ActivationState, LineItemQuantity,OrderLineNumber,OrderId,StartDateType,StartDate,IsActivationPermanent,EndDate,EndDurationUnits,EndDuration,VersionDateType,VersionDate,VersionDurationUnits,VersionDuration,OrderType,OrderParent,LineItemDescription,ProductName,ProductVersion,ProductType,ProductCount,PartNumber,LicenseModel, LM[Embedded Counted|NOTICE],LM[Embedded Counted|SERIAL_NUMBER],LM[Embedded Counted|VENDOR_STRING], LM[Floating Uncounted|NOTICE],LM[Floating Uncounted|SERIAL_NUMBER],LM[Nodelocked Uncounted|NOTICE], LM[Nodelocked Uncounted|SERIAL_NUMBER],LM[Embedded Uncounted|NOTICE],LM[Embedded

```
Uncounted|SERIAL_NUMBER],LM[Embedded Uncounted|VENDOR_STRING],LM[Nodelocked
Counted|NOTICE],LM[Nodelocked Counted|SERIAL_NUMBER],LM[Floating Counted|NOTICE],LM[Floating
Counted|LM_TESTING],LM[Floating Counted|SERIAL_NUMBER]
```

```
1ad4-60c4-be37-4df6-a456-584c-51f9-0bd9,Deployed,My Example Entitlement,Yes,test@customer1.org,"100,
California Avenue, USA",Acct1,Acme,endUser1,John,Smith,john.smith@earthday.com,111-222-
3334,Acct2,Acme2,partnerUser1,Jack,Jill,jack.jill@nurseryrhymes.com,999-999-
9998,bo.constants.partnertiernames.endcustomer,enterpriseAct,Deployed,100,,,DefineNow,30:00.0,TRUE,,,,,
,,,,1ad4-60c4-be37-4df6-a456-584c-51f9-0bd9,,Enterprise,1,LicensedProduct,1,,Enterprise
Activation,,,,,,,,,,,,,,
```

The sections **Account** to **UserPhone** will be repeated for each reseller/tier. For example, if the entitlement had
"End Customer" and "Partner Tier 1" (2 tiers only), then that particular section would look like

- End Customer|Account

- End Customer|UserName

- End Customer|UserFirstName

- End Customer|UserLastName

- End Customer|UserEmail

- End Customer|UserPhone

- Partner Tier 1|Account

- Partner Tier 1|AccountName

- Partner Tier 1|UserName

- Partner Tier 1|UserFirstName

- Partner Tier 1|UserLastName

- Partner Tier 1|UserEmail

- Partner Tier 1|UserPhone

Notice that, for entitlements that have multiple line items (or activation IDs), FlexNet Operations structures the
CSV output so that a new row appears for each activation ID. On these extra rows, the entitlement ID is repeated,
the entitlement details between the entitlement ID and the activation ID are left empty.

Example of Multiple Activation IDs on an Entitlement

```
EntitlementID, ..., ActivationId, ...
EID01, ..., act101, ...,
EID02, ..., act201, ...,
EID02, ..., act301, ...,
EID03, ..., act401, ...,
...
```

Sample Output: Entitlement Data Extract Job - Maintenance Line Items

```
EntitlementID,EntitlementState,EntitlementDescription,AllowPortalLogin,ShipToEmail,Address,ActivationId
,LineItemLink,ActivationState,ProductName,ProductVersion,PartNumber,OrderLineNumber,OrderId,StartDate,I
sActivationPermanent,EndDate,CA[MAINT_LINE|cA_MNT_LI_B2],CA[MAINT_LINE|CA1M],CA[MAINT_LINE|cA_MNT_LI_B1
],CA[MAINT_LINE|CAm2],CA[MAINT_LINE|BMLICA1],CA[MAINT_LINE|TESTCA_Ent_MNT],CA[MAINT_LINE|DateCA_MLI]
```

```
Nu-a270-0047-487b-651,Deployed,,Yes,,,actmain_01,,Deployed,maintenance19082016,1.1,,8232016,8232016,Mon
Aug 22 17:00:00 PDT 2016,FALSE,Wed Aug 30 05:30:00 IST 2017,1234567,A2,123456,A1M|A2M,TRUE,12345,24-Aug-
17
```

In the maintenance CSV file, the ActivationId refers to the maintenance line item ID and the LineItemLink refers to the linked entitlement line item ID. If there are multiple maintenance items linked to the same line item, a new row appears for each activation ID. On these extra rows, the entitlement ID and the line item link are repeated and the details between the entitlement ID and the activation ID are left empty.

The format for custom attribute columns is: CA[MAINT_LINE|*name*], where *name* is the name of the custom attribute for a maintenance line item. The custom attribute column can appear as many times as there are custom attributes defined for the maintenance line item.

Example of Multiple Maintenance Items Attached to the Same Line Item

```
EntitlementID, ..., activationID, LineItemLink..
EID01, ..., act101, lil01, ..,
EID01, ..., act201, lil01, ..,
EID01, ..., act301, lil01, ..,
EID01, ..., act401, lil01, ..,
...
```

Product Packaging Data Extract

The first time the Product Packaging Data Extract job runs it creates a snapshot of product events from the day prior to the day the job runs. (Products created or updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job results in the extract information getting downloaded as a zip file. The output contains the details of products and their dependent entities (such as maintenance, suites, part numbers, and license models). It also captures features (including their version, state, and quantity) that are associated with the products. The job output is a snapshot of products created or updated; it does not include historical product data.

The name of the zip file would be Products-<date and time>.zip. Inside the zip file, the output is grouped into four CSV files which contain the following information:

- **ProductsExtract-<date and time>.csv**—Contains the main product record information and details about dependent entities

- **ProductsLicenseModel-<date and time>.csv**—Contains the license model details that are associated with the products

- **ProductsPartNumber-<date and time>.csv**—Contains details about the part numbers associated with the products

- **ProductsRelation-<date and time>.csv**—Contains details about the relationships between the products and the related products

The naming format in the zip file and the CSV files is "YYYY-MM-DD-HH-MM-SS" (for example, **Products-2019-06-07-16-29-10.zip**).

The first line of the job output contains the header information for the table described by the CSV. If no products were created or updated in the job period, the CSV output includes only the header row content.

> **Note ▪** *The date/time format of the data extract is controlled by the* **Use ISO 8601 time format in extracts**
> *configuration option. For more information, see* *Configuring System Settings | General Options* *in the* *FlexNet*
> *Operations User Guide.*

Sample Output: Product Packaging Data Extract Job - Product Extract

ProductName, OrderableType, Description, Version, State, PackageName, PackageVersion,
PackageVersionFormat, LicenseTechnologyName, UsedOnaDevice, UsageModel, LicenseGenerator, FnpVersion,
AllowDownloadObsoleteFrInPortal, AllowDownloadObsoleteFrInAdmin, StartDate, EndDate, Product Line,
AllowUpgrades, AllowUpsells, AllowRenewals, UpgradeEmailTemplate, Feature|Bundle Name, FeatureType,
FeatureVersion, FeatureCount, FeatureDescription, FeatureState, SuiteProductName, SuiteProductVersion,
SuiteProductState, SuiteProductQty, CA[PROD|Prod_boolean_new], CA[PROD|product_NUMBER],
CA[PROD|Product_boolean], CA[PROD|Product_mal_val], CA[PROD|product_date], CA[PROD|TestProduct],
CA[PROD|Prd], CA[PROD|Product_boolean1]

ExtractMaintenance1556128254153,bo.constants.orderable.type.maintenance,test,1,bo.constants.states.draf
t,,,,,,,,,,,,,Uncategorized Products,FALSE,FALSE,TRUE,,,,,,,,,,,,,,

Suites_extract1,bo.constants.orderable.type.uniform_suite,Suites_extract11,2019/21,bo.constants.states.
draft,Extract121,4564,Fixed,NEW_LIC_TECH,FALSE,,TEST_LIC_GEN_CONF,,TRUE,FALSE,,,UncategorizedProducts,,
,,,,,,,,Product_extract1,1.0,bo.constants.states.deployed,2,FALSE,,FALSE,,,sdgsfg,fsdfg,FALSE

PhotoPrint,bo.constants.orderable.type.licensedProduct,,2,bo.constants.states.deployed,PACKAGE,1234,Fix
ed,FlexNet Licensing,TRUE,None,demo,7.1 | 10.1 | 10.8,FALSE,FALSE,2019-04-26T05:30:00Z,2019-05-
31T05:30:00Z,Uncategorized Products,,,,DEFAULT,F1,FEATURE,2,12,,DEPLOYED,FALSE,142,TRUE,,11-Apr-
19,,TEST12,FALSE
...

When a product supports multiple FNP versions, the output lists all supported FNP versions and separates them
with a pipe character (|). The FeatureType column identifies whether the item is a feature or a bundle; possible
values are FEATURE and FEATURE BUNDLE. Custom attributes, if any, are displayed in columns following the
FeatureState column.

Notice that, for products that contain multiple features or feature bundles, FlexNet Operations structures the CSV
output so that a new row appears for each additional feature or feature bundle. On these extra rows, the product
name of the product is repeated. Other details are left empty. (See Example for Products Containing Multiple
Features or Feature Bundles, below.)

Example for Products Containing Multiple Features or Feature Bundles

ProductName, OrderableType, Description, Version, State, PackageName, PackageVersion,
PackageVersionFormat, LicenseTechnologyName, UsedOnaDevice, UsageModel, LicenseGenerator, FnpVersion,
AllowDownloadObsoleteFrInPortal, AllowDownloadObsoleteFrInAdmin, StartDate, EndDate, Product Line,
AllowUpgrades, AllowUpsells, AllowRenewals, UpgradeEmailTemplate, Feature|Bundle Name, FeatureType,
FeatureVersion, FeatureCount, FeatureDescription, FeatureState, CA[PROD|Prod_boolean_new],
CA[PROD|product_NUMBER], CA[PROD|Product_boolean], CA[PROD|Product_mal_val], CA[PROD|product_date],
CA[PROD|TestProduct], CA[PROD|Prd], CA[PROD|Product_boolean1]

PhotoPrint,bo.constants.orderable.type.licensedProduct,,2,bo.constants.states.deployed,PACKAGE,1234,Fix
ed,FlexNet Licensing,TRUE,None,demo,7.1 | 10.1 | 10.8,FALSE,FALSE,2019-04-26T05:30:00Z,2019-05-

```
31T05:30:00Z,Uncategorized Products,,,,DEFAULT,F1,FEATURE,2,12,,DEPLOYED,FALSE,142,TRUE,,11-Apr-
19,,TEST12,FALSE
```

```
PhotoPrint,,,,,,,,,,,,,,,,,,,,,,,FB1,FEATURE BUNDLE,,4,,DEPLOYED,,,,,,,,
```

...

Above, the product PhotoPrint contains a feature called F1 and a feature bundle called FB1.

Sample Output: Product Packaging Data Extract Job - Product License Model

```
ProductName,LicenseModel,DefaultTransactionKey,VirtualTransactionKey
PhotoPrint,Enterprise Activation,,Demo1
PhotoPrint,Lic Model_Nov21_1,,
Prod_new,Embedded Counted,,
```

...

In this example, the product PhotoPrint is linked to two license models (`Enterprise Activation` and `Lic Model_Nov21`). FlexNet Operations structures the CSV output so that a new row appears for each additional license model. On these extra rows, the product name of the product is repeated. Other details are left empty.

The columns `DefaultTransactionKey` and `VirtualTransactionKey` are only applicable to trusted license models.

Sample Output: Product Packaging Data Extract Job - Product Part Number

```
ProductName,ProductVersion,PartNumber,PartNumberDescription,AvailableForTrial,RelativeLicenseModel
PhotoPrint,2,PN_NT,,FALSE,FlexNet Licensing
PhotoPrint,2,PN_T,,TRUE,Enterprise Activation
```

...

For products that are mapped to more than one part number, FlexNet Operations structures the CSV output so that a new row appears for each additional part number. On these extra rows, the product name of the product is repeated. Other details are left empty.

The column `RelativeLicenseModel` indicates the license model that is mapped to the respective part number (optional).

Sample Output: Product Packaging Data Extract Job - Product Relations

ProductName,ProductVersion,ProductType,RelationshipType,RelatedProductName,RelatedProductVersion,RelatedProductType

ExtractMaintenance1556128254153,1,bo.constants.orderable.type.maintenance,bo.constants.orderable.relationType.isMaintenance,P1.32_1,2018-21,bo.constants.orderable.type.licensedProduct

ExtractMaintenance1556128254153,1,bo.constants.orderable.type.maintenance,bo.constants.orderable.relationType.isMaintenance,ExtractProduct1556128254153,1,bo.constants.orderable.type.licensedProduct

Suites_extract1,2019/21,bo.constants.orderable.type.uniform_suite,bo.constants.orderable.relationType.demoOf,Suites_extract1,2019/21,bo.constants.orderable.type.uniform_suite

Suites_extract1,2019/21,bo.constants.orderable.type.uniform_suite,bo.constants.orderable.relationType.ProductionVersionOf,Suites_extract1,2019/21,bo.constants.orderable.type.uniform_suite

PhotoPrint,2,bo.constants.orderable.type.licensedProduct,bo.constants.orderable.relationType.upgradeTo,PhotoPrint,2,bo.constants.orderable.type.licensedProduct

PhotoPrint,2,bo.constants.orderable.type.licensedProduct,bo.constants.orderable.relationType.hasMaintenance,CM,1,bo.constants.orderable.type.maintenance

PhotoPrint,2,bo.constants.orderable.type.licensedProduct,bo.constants.orderable.relationType.upgradeFrom,PhotoPrint,2,bo.constants.orderable.type.licensedProduct

...

For products that are mapped to several other products, FlexNet Operations structures the CSV output so that a new row appears for each additional related product. On these extra rows, the product name of the product is repeated. Other columns are populated as appropriate.

Device Updates Extract

The Device Update Extract job reports on status log updates. It requires that producers configure their application beforehand to send status log updates via the /statusLog REST API. Otherwise, the Device Update Extract job does not return any data. For more information, see the Status Log section in the FlexNet Operations User Guide.

The first time the Device Update Extract job runs it creates a snapshot of device update events from the day prior to the day the job runs. (Devices updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of devices updated; it does not include historical device data.

The first line of the job output contains the header information for the table described by the CSV. If no devices were updated in the job period, the CSV output includes only the header row content. This extract is only available to users who have purchased both the FlexNet Embedded and Updates and Insights features.

*Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** configuration option. For more information, see Configuring System Settings | General Options in the FlexNet Operations User Guide.*

Sample Output: Device Update Data Extract Job

```
DeviceID,DeviceName,AccountID,AccountName,UpdateID,UpdateName,UpdateStatus,UpdateStatusReason,LastActiv
ityDate,Language, Platform,ReleaseTo

HostId1,Device Name 1,AcctID1,Acct Name 1,Notif1,First notification,Download started,,2005-05-13
00:00:00,English,Windows-32,12GB20150911185805390

HostId1,,,,Notif2,Second Notification,Download Complete,,2018-03-05 00:00:00,Japanese,Linux-
32,12GB20150916102421315

HostId1,,,,Notif3,Third Notification,Installing,,2018-03-05 00:00:00

HostId1,,,,Notif4,Fourth Notification,Installation Completed,,2018-03-05 00:00:00
```

Note ▪ This extract is only available upon purchase of the Updates and Insights module for FlexNet Operations.

Updates Extract

The first time the Updates Extract job runs it creates a snapshot of update events from the day prior to the day the job runs. (Products updated from 00:00:00 to 23:59:59, FlexNet Operations server time, on the previous day are captured when the job runs). Subsequently, when this job runs, it creates a snapshot from the end time of the last successful run to the current time.

A successful run of this job creates a comma-separated value (CSV) file. The job output is a snapshot of products created or updated; it does not include historical product data.

The first line of the job output contains the header information for the table described by the CSV. If no devices were updated in the job period, the CSV output includes only the header row content. This extract is only available to users who have purchased the Updates and Insights feature.

*Note ▪ The date/time format of the data extract is controlled by the **Use ISO 8601 time format in extracts** configuration option. For more information, see Configuring System Settings | General Options in the FlexNet Operations User Guide.*

Sample Output: Updates Extract Job

```
Update Name,Update ID,Status,StartDate,EndDate,Description,entitlementCheck,UpdateFromPkgID,UpdateToPkg
ID,Platforms,LanguageName,LangTitle,LangDescription

TestUpdate,TestUpdate,A,2018-09 00:00:00,,Test,1,12GB20150923135734627,12GB2015093010245411,APPLEOSX32,
Italian,italian,italian

TestUpdate,,,,,,,12GB20150923135734627,12GB2015093010245411,LINUX32,Bulgarian,eng,ggg

UIUPdate name,UIUpdate,A,2018-03-14 00:00:00,2018-03-30 00:00:00,UI update change,0,HelloDownloadPkgID,
12GB20150911182728677,APPLEOSX64,Catalan,catalan,catalan

UIUPdate name,,,,,,0,HelloDownloadPkgID,12GB20151001103613514,IBM Microsoft Operating System 2,Danish,d
anish,Danish
```

Note ▪ *This extract is only available upon purchase of the Updates and Insights module for FlexNet Operations.*

Application RESTful Services

Version ▪ As of 2018 R2, documentation of application RESTful services has been moved to Swagger. Use the following URL to access the information:

https://<siteID>.flexnetoperations.com/flexnet/swagger-ui.html

where <siteID> is your organization's site ID which is supplied by Revenera. This is usually your organization's DNS name, but can also be the tenant ID that was assigned to your organization when FlexNet Operations was first implemented, and would have the format **flexNNNN***.*

RESTful services information will no longer be maintained in this document.

REST APIs enable an end-user application to retrieve and send product and device information with FlexNet Operations.

API	Description
Entitlement Orders	Returns the activatable line items that match specified criteria
Entitlement Orders Count	Returns the number of activatable line items that match specified criteria.
Devices	Returns the query parameters for a specified device (or all devices if no parameters are specified)
Devices Count	Returns the number of matching devices to one or more query parameters or all devices if no parameters specified.
Consumption	Returns the consumption information for a given account ID.

Note ▪ *All date values use the yyyy-MM-dd format*

Permissions

All REST APIs require the user to be logged into the server and have permissions to execute web services as well as permission for the resource, i.e. View Entitlement, Manage Devices, etc.

Authentication

When calling the API, a producer user must authenticate themselves. Authentication information (in Base64) must be included in the header. The following procedure explains how to provide credentials, including an example for each step.

Task	*To provide credentials*

1. Concatenate the user name and password with a single colon.

   Example: If the user name is "alice" and the password is "password", the resulting concatenated string would be `alice:password`

2. Base64 encode the concatenated user name and password.

   Example: Base64 encode the string `alice:password` to obtain "YWxpY2U6cGFzc3dvcmQ="

3. Add the "Authorization" key to the header of the request, with the Base64-encoded result as the value.

   Example: Add the value "Basic YWxpY2UucGFzc3dvcmQ=" to the Authorization header.

REST Web Services Batch Limits

The following batch-size maximum limits apply for requests issued from application RESTful web services:

● All read services have a maximum batch size of 2000.

● All services that result in a write have a batch size maximum of 25 records.

Specifying a batch size higher than the new cap results in an error.

Entitlement Orders

The Entitlement Orders service returns the activatable line items that match specified criteria.

Note ▪ This operation does not return maintenance line items

Endpoint

<HOST>`/flexnet/operations/entitlementOrders`

Method

POST

URL Params

None

Data Params

None

Example

```
{"activatableItemSearchCriteria":
    {"parentBulkEntitlementId":
        {"value":"[String to match all or part of the entitlement ID of the parent bulk entitlement
```

```
                        of a simple entitlement created when a web register key is redeemed]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "entitlementId":
            {"value":"[String to match all or part of the entitlement ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "activationId":
            {"value":"[String to match all or part of the activation ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "productName":
            {"value":"[String to match all or part of the product name]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "productVersion":
            {"value":"[String to match all or part of the product version]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "productType":[One of the following: LICENSED_PRODUCT, SUITE, or MAINTENANCE],
    "partNumber":
            {"value":"[String to match all or part of the part number]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
    },
    "startDate":
            {"value":"[Date value to compare to the start date value]",
            "searchType":"[One of the following: BEFORE, AFTER or ON]",
    },
    "isPermanent":[Set to true if the entitlement is permanent; false if the entitlement expires],
    "expirationDate":
            {"value":"[Date value to compare to the expiration date value]",
            "searchType":"[One of the following: BEFORE, AFTER or ON]",
    },
    "versionDate":
            {"value":"[Date value to compare to the version date value]",
            "searchType":"[One of the following: BEFORE, AFTER or ON]",
    },
    "licenseTechnology":
            {"value":"[String to match all or part of the entitlement ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
    },
    "orderId":
            {"value":"[String to match all or part of the order ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "withNoOrderId":"[Optional. If true, return only activatable items with no order ID. Since this
                    field is intended to return results without the specified attribute, setting
                    this to false will have no effect on query results.]",
    "restrictToItemsWithCount":"[Optional. If true, return only activatable items that have a
                                non-zero remaining count. Since this field is intended to return
                                results without the specified attribute, setting this to false
                                will have no effect on query results.]",
    "fulfilledAmount":[The number of copies fulfilled],
    "userId":[Set to the user name (login) of a portal user to return the activatable items that
            this user can see if logged in to the portal UI],
    "customAttributes":
```

```
                {"attribute":[{
                    {"attributeName":"[The name of the custom attribute]",
                    [Choose one of the following]
                    "booleanValue":"[Optional. Depending on the attribute type, set either stringValue or
                                     numberValue or booleanValue. Set to true or false if the custom attribute
                                     is of type boolean.]",
                    "dateValue":
                        {"value":"[Optional. Date value to compare to the custom attribute date value]",
                        "searchType":"[One of the following: BEFORE, AFTER, ON]"
                        },
                    "numberValue":
                        {"value":"[Optional. An integer number to match part or all of the custom attribute
                                    value.]",
                        "searchType":"[One of the following: GREATER_THAN, GREATER_THAN_EQUALS, LESS_THAN,
                                       LESS_THAN_EQUALS, EQUALS, or NOT_EQUALS.]"
                        },
                    "stringValue":
                        {"value":"[Optional. A string to match part or all of the custom attribute value]",
                        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
                        }
                    }]
                },
            "soldTo":
                {"value":"[Optional. A string to match part or all of the account that has the right
                           to fulfill or distribute activation IDs from this entitlement.]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
                },
            "parentBulkEntSoldTo":
                {"value":"[A string to match part or all of the account to which the bulk entitlement
                           was sold]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
                },
            "activatableItemType":[One of the following: LINEITEM or WEBREGKEY],
            "allowPortalLogin":[True if the entitlement ID can be used to log in to the self-service portal;
                               otherwise, false],
            "currentOwnerName":
                {"value":"[String to match all or part of the user name of the user who created the
                           entitlement]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
            },
            "lineItemParentLineItemId":
                {"value":"[A string to match part or all of the line item ID (activation ID) of a
                           parent line item]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
                },
            "createdOnDateTime":
                {"value":"[Date value to compare to the created date and time value]",
                "searchType":"[One of the following: BEFORE, AFTER or ON]",
            },
            "lastModifiedDateTime":
                {"value":"[Date value to compare to the last modified date and time value]",
                "searchType":"[One of the following: BEFORE, AFTER or ON]",
            },
            "lineItemAttributes":
                {"attributeName":"[Name of a text-type line item custom attribute by which to search for a
                                   line item.]",
```

```
          "stringValue":"[Value of the text-type line item custom attribute]",
      },
      "accountId":
          {"value":"[The name of the account]",
          "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
          "partnerTier":[Optional. The name of the tier in which the account exists or ANY.
                          If set to a named tier, the format partnerTier is
                          bo.constants.partnertiernames.tier_name. If not specified, the partner
                          tier searched is the End Customer tier.]
      },
      "batchSize":[Required. Maximum number of records to return in the response. e.g. 100],
      "pageNumber":[Defaults to 1. For example: If query returns 100 records and the batch size is
                  set to 50, enter 2 to see the second page.]
}
```

Response

```
{
    "statusInfo":
    {
        "status": "SUCCESS",
        "reason": null
    },
    "activatableItem":
    [
        {
            "activatableItemType": "LINEITEM",
            "parentBulkEntitlementId": null,
            "entitlementId": "K_Ent2",
            "soldTo": "ACME",
            "shipToEmail": "",
            "shipToAddress": "",
            "entitlementState": "DEPLOYED",
            "activatableItemData":
            {
                "activationId":
                {
                    "id": "K_Act2",
                    "autoGenerate": null
                },
                "description": "",
                "product":
                {
                    "uniqueId": "HID-127905",
                    "primaryKeys":
                    {
                        "name": "K_Prod2",
                        "version": "1.0"
                    }
                },
                "partNumber": null,
                "licenseModel":
                {
                    "uniqueId": "HID-224",
                    "primaryKeys":
                    {
```

```
                    "name": "Embedded Counted"
                }
            },
            "alternateLicenseModel1": null,
            "alternateLicenseModel2": null,
            "licenseModelAttributes":
            {
                "attribute":
                [
                    {
                        "attributeName": "NOTICE",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
                    },
                    {
                        "attributeName": "ENTITLEMENT_TYPE",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
                    },
                    {
                        "attributeName": "Num_attr2",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
                    },
                    {
                        "attributeName": "Trial",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
                    },
                    {
                        "attributeName": "flexnet_lm_attr_text",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
                    },
                    {
                        "attributeName": "SERIAL_NUMBER",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
```

```
                    },
                    {
                        "attributeName": "VENDOR_STRING",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": null,
                        "integerValue": null,
                        "arrayValue": null
                    }
                ]
            },
            "policyAttributes":
            {
                "rehostsPolicy": null,
                "returnsPolicy": null,
                "repairsPolicy": null,
                "extraActivationsPolicy": null,
                "cancelLicensePolicy":
                {
                    "isCancelLicense": false
                },
                    "virtualLicensePolicy":
                {
                    "isVirtualLicense": true
                },
                    "reinstallPolicy": null,
                    "acpiGenerationIdLicensePolicy":
                {
                    "useACPIGenerationId": false
                }
            },
                "orderId": null,
                "orderLineNumber": "",
                "numberOfCopies": 100,
                "startDate": 1506495600000,
                "startDateOption": "DEFINE_NOW",
                "isPermanent": false,
                "term":
            {
                "numDuration": 95,
                "durationUnit": "DAYS"
            },
                "expirationDate": 1514707200000,
                "versionDate": null,
                "versionDateAttributes": null,
                "lineItemType": null,
                "entitledProducts":
            {
                "entitledProduct":
                [
                    {
                        "product":
                        {
                            "uniqueId": "HID-127905",
                            "primaryKeys":
                        {
```

```
                                   "name": "K_Prod2",
                                   "version": "1.0"
                               }
                         },
                           "quantity": 1
                   },
                   {
                       "product":
                       {
                           "uniqueId": "HID-127904",
                           "primaryKeys":
                           {
                               "name": "K_Prod1",
                               "version": "1.0"
                           }
                       },
                       "quantity": 1
                   }
               ]
         },
         "lineItemAttributes":
         {
             "attribute":
             [
                 {
                     "attributeName": "Boolean1",
                     "stringValue": null,
                     "dateValue": null,
                     "booleanValue": false,
                     "integerValue": null,
                     "arrayValue": null
                 },
                 {
                     "attributeName": "ENT_LINE_Boolean_B",
                     "stringValue": null,
                     "dateValue": null,
                     "booleanValue": false,
                     "integerValue": null,
                     "arrayValue": null
                 },
                 {
                     "attributeName": "Showa_Line_bool",
                     "stringValue": null,
                     "dateValue": null,
                     "booleanValue": false,
                     "integerValue": null,
                     "arrayValue": null
                 }
             ]
         },
         "numberOfRemainingCopies": 100,
         "availableExtraActivations": 0,
         "isTrustedType": false,
         "state": "DEPLOYED",
         "licenseTechnology":
         {
```

```
                    "uniqueId": "HID-34",
                    "primaryKeys":
                    {
                        "name": "FlexNet Licensing"
                    }
                },
                "parentLineItem": null,
                "createdOnDateTime": 1506497656047,
                "lastModifiedDateTime": 1506497670777,
                "overdraftMax": 0,
                "remainingOverdraftCount": 0,
                "id": 594475,
                "fnptimeZoneValue": null
            },
            "channelPartners":
            {
                "channelPartner":
                [
                    {
                        "tierName": "bo.constants.partnertiernames.endcustomer",
                        "contact":
                        {
                            "uniqueId": "HID-32009",
                            "userName": "A111@gmail.com",
                            "primaryKeys":
                            {
                                "firstName": "NK1",
                                "lastName": "11",
                                "emailAddress": "A111@gmail.com",
                                "phoneNumber": " "
                            }
                        },
                        "currentOwner": true,
                        "account":
                        {
                            "uniqueId": "HID-438",
                            "primaryKeys":
                            {
                                "name": "ACME"
                            }
                        }
                    }
                ]
            },
            "entitlementAttributes":
            {
                "attribute":
                [
                    {
                        "attributeName": "Boolean1",
                        "stringValue": null,
                        "dateValue": null,
                        "booleanValue": false,
                        "integerValue": null,
                        "arrayValue": null
                    },
```

```
                              {
                                  "attributeName": "CA_ENT_Boolean_B",
                                  "stringValue": null,
                                  "dateValue": null,
                                  "booleanValue": false,
                                  "integerValue": null,
                                  "arrayValue": null
                              },
                              {
                                  "attributeName": "Mandate",
                                  "stringValue": null,
                                  "dateValue": null,
                                  "booleanValue": false,
                                  "integerValue": null,
                                  "arrayValue": null
                              },
                              {
                                  "attributeName": "my_ent_attr",
                                  "stringValue": null,
                                  "dateValue": null,
                                  "booleanValue": false,
                                  "integerValue": null,
                                  "arrayValue": null
                              }
                          ]
                      }
                  }
              ]
          }
```

Entitlement Orders Count

The Entitlement Orders Count service returns the number of activatable line items that match specified criteria.

Endpoint

<HOST>/flexnet/operations/entitlementOrders/count

Method

POST

URL Params

None

Data Params

None

Example

```
{"queryParams":
    {"parentBulkEntitlementId":
```

```
            {"value":"[String to match all or part of the entitlement ID of the parent bulk entitlement
                    of a simple entitlement created when a web register key is redeemed]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
        },
        "entitlementId":
            {"value":"[String to match all or part of the entitlement ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
        },
        "activationId":
            {"value":"[String to match all or part of the activation ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
        },
        "productName":
            {"value":"[String to match all or part of the product name]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
        },
        "productVersion":
            {"value":"[String to match all or part of the product version]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
        },
        "productType":[One of the following: LICENSED_PRODUCT, SUITE, or MAINTENANCE],
        "partNumber":
            {"value":"[String to match all or part of the part number]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
        },
        "startDate":
            {"value":"[Date value to compare to the start date value]",
            "searchType":"[One of the following: BEFORE, AFTER or ON]",
        },
        "isPermanent":[Set to true if the entitlement is permanent; false if the entitlement expires],
        "expirationDate":
            {"value":"[Date value to compare to the expiration date value]",
            "searchType":"[One of the following: BEFORE, AFTER or ON]",
        },
        "versionDate":
            {"value":"[Date value to compare to the version date value]",
            "searchType":"[One of the following: BEFORE, AFTER or ON]",
        },
        "licenseTechnology":
            {"value":"[String to match all or part of the entitlement ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
        },
        "orderId":
            {"value":"[String to match all or part of the order ID]",
            "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
        },
        "withNoOrderId":[Optional. If true, return only activatable items with no order ID. Since this
                    field is intended to return results without the specified attribute, setting
                    this to false will have no effect on query results.],
        "restrictToItemsWithCount":[Optional. If true, return only activatable items that have a
                            non-zero remaining count. Since this field is intended to return
                            results without the specified attribute, setting this to false will
                            have no effect on query results.],
        "fulfilledAmount":[The number of copies fulfilled],
        "userId":[Set to the user name (login) of a portal user to return the activatable items that
            this user can see if logged in to the portal UI],
```

```
            "customAttributes":
                {"attribute":[{
                    {"attributeName":"[The name of the custom attribute]",
                    [Choose one of the following]
                    "booleanValue":"[Optional. Depending on the attribute type, set either stringValue or
                                    numberValue or booleanValue. Set to true or false if the custom attribute
                                    is of type boolean.]",
                    "dateValue":
                        {"value":"[Optional. Date value to compare to the custom attribute date value]",
                        "searchType":"[One of the following: BEFORE, AFTER, ON]"
                    },
                    "numberValue":
                        {"value":"[Optional. An integer number to match part or all of the custom attribute
                                    value.]",
                        "searchType":"[One of the following: GREATER_THAN, GREATER_THAN_EQUALS, LESS_THAN,
                                    LESS_THAN_EQUALS, EQUALS, or NOT_EQUALS.]"
                    },
                    "stringValue":
                        {"value":"[Optional. A string to match part or all of the custom attribute value]",
                        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
                    }
                }]
            },
            "soldTo":
                {"value":"[Optional. A string to match part or all of the account that has the right to fulfill
                            or distribute activation IDs from this entitlement.]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "parentBulkEntSoldTo":
                {"value":"[A string to match part or all of the account to which the bulk entitlement
                            was sold]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "activatableItemType":[One of the following: LINEITEM or WEBREGKEY],
            "allowPortalLogin":[True if the entitlement ID can be used to log in to the self-service portal;
                            otherwise, false],
            "currentOwnerName":
                {"value":"[String to match all or part of the user name of the user who created the
                            entitlement]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
            },
            "lineItemParentLineItemId":
                {"value":"[A string to match part or all of the line item ID (activation ID) of a
                            parent line item]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "createdOnDateTime":
                {"value":"[Date value to compare to the created date and time value]",
                "searchType":"[One of the following: BEFORE, AFTER or ON]",
            },
            "lastModifiedDateTime":
                {"value":"[Date value to compare to the last modified date and time value]",
                "searchType":"[One of the following: BEFORE, AFTER or ON]",
            },
            "lineItemAttributes":
                {"attributeName":"[Name of a text-type line item custom attribute by which to search for a
```

```
                                line item.]",
"stringValue":"[Value of the text-type line item custom attribute]",
    },
    "accountId":
        {"value":"[The name of the account]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]",
        "partnerTier":[Optional. The name of the tier in which the account exists or ANY.
                     If set to a named tier, the format partnerTier is
                     bo.constants.partnertiernames.tier_name. If not specified, the partner
                     tier searched is the End Customer tier.]
    },
    "restrictToItemsReadyToActivate":[Optional. Restricts the search to only items ready to activate.
                                    One of the following: True or False.]
}
```

Response

```
{
    "statusInfo":    {
        "status": "SUCCESS",
        "reason": null
    },
    "count": 1869
}
```

Devices

The Devices Query operation takes one or more query parameters to return the matching devices. If no specific query parameters are provided in the queryParams element, all devices are returned

---

Note ▪ Some elements apply only to served client devices while others apply only to server devices and client devices. Elements that start with feature are specific to served clients. Elements that start with addOn or preBuilt are specifc to server devices and client devices.

Query results can be restricted to one or more device types listed in the deviceTypes element. If deviceTypes is not defined, the query results depend upon whether or not isServer is set and, if so, what that setting is. If isServer is set to true, the query results include only server devices. If isServer is set to false, the query results include only client devices. If neither deviceTypes nor isServer is set, query results include all three types of devices.

Endpoint

<HOST>/flexnet/operations/manageDevice/devices

Method

POST

URL Params

None

Data Params

None

Example

```
{"queryParams":
    {"alias":
        {"value":"[Optional. A string to match part or all of the alias value]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "deviceId":
        {"value":"[Optional. A string to match part or all of the device ID]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "deviceIdType":
        {"value":"[A string to match part or all of the device ID Type value. For
                  example: UNKNOWN, STRING, ETHERNET, FLEXID9, FLEXID10, INTERNET, INTERNET6,
                  USER, TOLERANT, CONTAINER_ID, or VM_UUID.
                  When using a deviceType of SERVER, this field is mandatory.]",
        "searchType":"[One of the following: EQUALS or NOT_EQUALS]"
    },
    "parentId":
        {"value":"[Optional. A string to match part or all of the parentId which corresponds to the
                  Served By value for a served client in the admin console UI; it identifies the
                  served client's parent FlexNet Embedded server device.]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "hostTypeName":
        {"value":"[Optional. A string to match part or all of the hostTypeName]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "soldTo":
        {"value":"[Optional. A string, in the form of the account ID, to match part or all of the
                  soldTo value]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "soldToOrgId":
        {"value":"[Optional. A string, in the form of the account ID, to match part or all of the
                  soldToOrgID value.]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "description":
        {"value":"[Optional. A string to match part or all of the description value]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "status":[The status of the device. One of the following: ACTIVE, OBSOLETE, or RETURNED],
    "addOnActivationId":
        {"value":"[Optional. A string to match part or all of the addOnActivationID value]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "addOnProductName":
        {"value":"[Optional. A string to match part or all of the addOnProductName value]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "addOnProductVersion":
```

```
                  {"value":"[Optional. A string to match part or all of the addOnProductVersion value]",
                  "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "featureName":
                  {"value":"[Optional. A string to match part or all of the featureName value]",
                  "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "isServer":[Optional. True if the device is a FlexNet Embedded server device, otherwise
                        False. See Note about isServer and device types.],
            "deviceTypes":[Optional. The deviceTypes element contains one or more WSDeviceType elements.
                        One of the following: CLIENT, SERVER, SERVED_CLIENT. See Note about isServer
                        and device types.],
            "userString":[Allows users to request devices with matching Device User. Results for this
                        request depend on how the tenant has configured Device User Option. If the Device
                        User Option is set to Off, the userString field is ignored, and the response
                        states that this criteria is not supported. If the Device User Option is set to
                        On with no validation, the userString is matched with string value of the Device
                        User. If the Device User Option is set to On with validation, the userString is
                        matched with the email of the Device User.],
            "deviceResponseConfig":
                  {"alias":[true or false],
                  "description":[true or false],
                  "status":[true or false],
                  "servedStatus":[true or false],
                  "hostTypeName":[true or false],
                  "soldTo":[true or false],
                  "soldToOrgId":[true or false],
                  "channelPartners":[true or false],
                  "preBuiltLicense":[true or false],
                  "addOnActivationId":[true or false],
                  "addOnCounts":[true or false],
                  "addOnProduct":[true or false],
                  "addOnLicense":[true or false],
                  "publisherIdentity":[true or false],
                  "parent":[true or false],
                  "machineType":[true or false],
                  "vmDetails":[true or false],
                  "vmInfo":[true or false],
                  "vendorDictionary":[true or false],
                  "deviceUser":[true or false]},
                  "updates":[true or false]},
            "batchSize":[Required. Maximum number of records to return in the response. e.g. 100],
            "pageNumber":[Defaults to 1. For example: If query returns 100 records and the batch size is
                        set to 50, enter 2 to see the second page.]
}
```

Response

```
{
    "statusInfo":     {
        "status": "SUCCESS",
        "reason": null
    },
    "failedData": null,
    "responseData": {"device": [    {
        "deviceIdentifier":        {
```

```
                    "deviceType": "SERVER",
                    "uniqueId": null,
                    "deviceId": "HV195HYU9F92",
                    "serverIds": {"serverId":          [
                       "HV195HYU9F92",
                       null
                    ]},
                    "deviceIdType": "STRING",
                    "publisherName": "fnedemo"
                },
                "alias": null,
                "description": null,
                "hostTypeName": null,
                "deviceStatus": null,
                "deviceServedStatus": null,
                "channelPartners": null,
                "soldTo":          {
                    "displayName": "ACC-ANU-MY19-1",
                    "id": "ACC-ANU-MY19-1",
                    "name": "ACC-ANU-MY19-1"
                },
                "soldToOrgId":          {
                    "displayName": "ACC-ANU-MY19-1",
                    "id": "ACC-ANU-MY19-1",
                    "name": "ACC-ANU-MY19-1"
                },
                "hasPrebuiltLicense": null,
                "prebuiltLicense": null,
                "hasAddonLicense": null,
                "addonLicense": null,
                "publisherIdName": null,
                "addonLineItemData": [],
                "featureData": null,
                "parentIdentifier": null,
                "machineType": null,
                "vmInfo": null,
                "updates": [
                    {
                        "updateId": "Notif4",
                        "downloadPackageId": "12",
                        "platform": "Windows",
                        "language": "English"
                    }
                ],
                "vendorDictionary": null,
                "deviceUser": null,
                "deviceUserIdentifier": null
            }]}
        }
    }
```

Devices Count

The Devices Count operation takes one or more query parameters to return the number of matching devices. If no specific query parameters are provided in the <queryParams> element, the total number of devices is returned.

Note • *Some elements apply only to served client devices while others apply only to server devices and client devices. Elements that start with feature are specific to served clients. Elements that start with addOn or preBuilt are specific to server devices and client devices.*

Query results can be restricted to one or more device types listed in the deviceTypes element. If deviceTypes is not defined, the query results depend upon whether or not isServer is set and, if so, what that setting is. If isServer is set to true, the query results include only server devices. If isServer is set to false, the query results include only client devices. If neither deviceTypes nor isServer is set, query results include all three types of devices.

Endpoint

<HOST>/flexnet/operations/manageDevice/devicesCount

Method

POST

URL Params

None

Data Params

None

Example

```
{"queryParams":
    {"alias":
        {"value":"[Optional. A string to match part or all of the alias value]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "deviceId":
        {"value":"[Optional. A string to match part or all of the device ID]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "deviceIdType":
        {"value":"[Optional. A string to match part or all of the device ID Type value. For
                  example: UNKNOWN, STRING, ETHERNET, FLEXID9, FLEXID10, INTERNET, INTERNET6,
                  USER, TOLERANT, CONTAINER_ID, or VM_UUID]",
        "searchType":"[One of the following: EQUALS or NOT_EQUALS]"
    },
    "parentId":
        {"value":"[Optional. A string to match part or all of the parentId which corresponds to the
                  Served By value for a served client in the admin console UI; it identifies the
                  served client's parent FlexNet Embedded server device.]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
    "hostTypeName":
        {"value":"[Optional. A string to match part or all of the hostTypeName]",
        "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
    },
```

```
            "soldTo":
                {"value":"[Optional. A string, in the form of the account ID, to match part or all of the
                        soldTo value]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "soldToOrgId":
                {"value":"[Optional. A string, in the form of the account ID, to match part or all of the
                        soldToOrgID value.]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "description":
                {"value":"[Optional. A string to match part or all of the description value]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "status":[The status of the device. One of the following: ACTIVE, OBSOLETE, or RETURNED],
            "addOnActivationId":
                {"value":"[Optional. A string to match part or all of the addOnActivationID value]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "addOnProductName":
                {"value":"[Optional. A string to match part or all of the addOnProductName value]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "addOnProductVersion":
                {"value":"[Optional. A string to match part or all of the addOnProductVersion value]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "featureName":
                {"value":"[Optional. A string to match part or all of the featureName value]",
                "searchType":"[One of the following: STARTS_WITH, CONTAINS, ENDS_WITH, or EQUALS]"
            },
            "isServer":[Optional. True if the device is a FlexNet Embedded server device, otherwise
                        False. See Note about isServer and device types.],
            "deviceTypes":[Optional. The deviceTypes element contains one or more WSDeviceType elements.
                        One of the following: CLIENT, SERVER, SERVED_CLIENT. See Note about isServer
                        and device types.],
            "userString":[Allows users to request devices with matching Device User. Results for this
                        request depend on how the tenant has configured Device User Option. If the Device
                        User Option is set to Off, the userString field is ignored, and the response
                        states that this criteria is not supported. If the Device User Option is set to
                        On with no validation, the userString is matched with string value of the Device
                        User. If the Device User Option is set to On with validation, the userString is
                        matched with the email of the Device User.]
        }
    }
```

Response

```
{
    "statusInfo":     {
        "status": "SUCCESS",
        "reason": null
    },
    "failedData": null,
    "responseData": {"count": 1}
}
```

Consumption

The consumption REST API provides feature consumption information for a given account ID.

Endpoint

<HOST>/flexnet/operations/consumption

Method

GET

URL Params

accountID=[*alphanumeric*]

Data Params

None

Example

<HOST>/flexnet/operations/health/consumption?accountId=ACME

Response

```
{
   "statusInfo":    {
      "status": "SUCCESS",
      "reason": null
   },
   "consumption":    [
         {
         "accountId": "ACME",
         "activationId": "ACT-ceda-610B-0E39-f41",
         "productName": "pP_030915_2",
         "productVersion": "1.0",
         "featureName": "",
         "featureVersion": "",
         "consumed": 0,
         "total": 50,
      },
         {
         "accountId": "ACME",
         "activationId": "E-SEP303-LNM1",
         "productName": "FC_1",
         "productVersion": "1.0",
         "featureName": "",
         "featureVersion": "",
         "consumed": 37,
         "total": 100,
      },
         {
         "accountId": "ACME",
         "activationId": "4322-b6af-cd28-4415-9a33-92ef-7e53-0997",
         "productName": "Pt-Anu-AutoUpgrade-1",
```

```
                    "productVersion": "1.0",
                    "featureName": "",
                    "featureVersion": "",
                    "consumed": 0,
                    "total": 123,
                },
                    {
                    "accountId": "ACME",
                    "activationId": "PFEBFC-bb53-8577-DD9f-251",
                    "productName": "P-FEB191",
                    "productVersion": "1.0",
                    "featureName": "",
                    "featureVersion": "",
                    "consumed": 0,
                    "total": 100,
                },
        .
        .
        .

                    {
                    "accountId": "ACME",
                    "activationId": "ACT-725a-fe79-4241-551",
                    "productName": "18353_custom_1",
                    "productVersion": "1",
                    "featureName": "",
                    "featureVersion": "",
                    "consumed": 0,
                    "total": 11,
                }
            ]
        }
```

5

External Web Services

Producers can create external services to customize aspects of FlexNet Operations behavior, and Revenera provides sample code and other resources to facilitate these customization efforts.

The ways in which these external services can be implemented depends on how the FlexNet Operations component to be customized is exposed to be thus extended or altered. Some components can be customized via SOAP-based web services, others by REST-based web services, and some are only customizable via Java classes added to the class path on the machines that host FlexNet Operations.

This chapter covers the components that are customizable by users.

Table 5-1 ▪ External Web Services Information

Topic	Description
Sample Source and Other Resources	Describes how producers can obtain sample code and other resources for implementing external services.
Using External Services	Provides an overview of how FlexNet Operations interacts with external services.
Customizable Features	Describes the interfaces that allow producers to customize FlexNet Operations behavior. ● Renewals ● ID Generator ● License Generator ● Capability Request Callout

Sample Source and Other Resources

Sample source code and other resources are available from the Product and License Center. There are two archives that contain samples:

- `extgenservice.zip` contains sample source for most customizable FlexNet Operations core components, like license generation, filename generation, ID generation, and renewal request handling.

- `flexnet-lfs-callout.war` contains sample source for customizing the handling of capability requests and responses.

Obtaining External Service Samples

Download `extgenservice.zip` and `flexnet-lfs-callout.war` from the Product and License Center.

- You can find `extgenservice.zip` on the Product and License Center in
  Product List > **FlexNet Operations Cloud** > **FlexNet Operations Cloud Documentation** > **FlexNet Operations ID Generator Callout Samples**.

- You can find `flexnet-lfs-callout.war` on the Product and License Center in
  Product List > **FlexNet Operations Cloud** > **FlexNet Operations Cloud Documentation** > **Sample Implementation of FlexNet Operations Callouts for FlexNet Embedded Licensing**.

Using External Services

Producers can use Revenera-provided interfaces to deploy external services that provide customized functionality within FlexNet Operations. For example,

- License keys can be generated by an external SOAP service that implements the **LicenseGeneratorService** WSDL.

- Custom IDs can be generated by an external SOAP service that implements the **IdGeneratorService** WSDL.

- Custom handling of renewal requests can be supported using an external SOAP service that implements the RenewalService WSDL.

- Capability request handling can be customized through an external REST service that processes JSON requests and produces JSON responses that dictate what actions to perform.

The server that implements an external service is hosted separately from the one that runs FlexNet Operations. It operates independently of FlexNet Operations, as shown in the figure below. The external service is accessed by FlexNet Operations at run time for operations such as capability request handling, ID generation, and license generation.
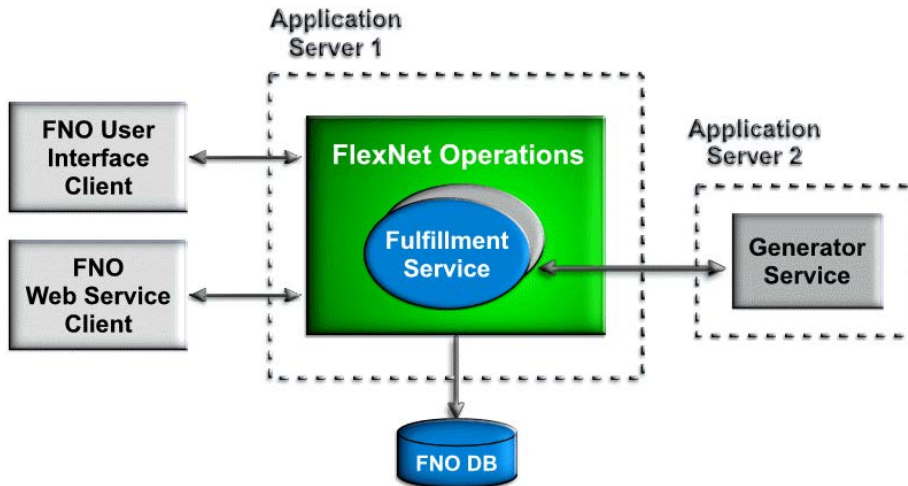
> 📄
> ---
> *Note ▪ The availability of certain operations for customization varies with your FlexNet Operations license and other factors. This guide covers the operations producers can customize via web services.*

Customizable Features

The following customizable features are described here:

- Renewals

- ID Generator

- License Generator

- Capability Request Callout

Renewals

Two samples are provided in `extgenservice.zip`:

- `RenewalServiceImpl.java` – Shows how to access values from input parameters if the producer needs to make an entry into their own system.

- `RenewalRedirectServiceImpl.java` – Shows how to access values from input parameters if the producer needs to use an external application/portal with few parameters from FlexNet Operations.

These samples are contained in `extgenservice.zip` at

`extgenservice\src\com\flexnet\external\webservice\renewal`

Using code like that shown in these samples enables a producer to configure their End-User Portal to directly send renewal requests to their back-office system for processing.

When you create a SOAP endpoint that implements the **RenewalService** interface, specify the endpoint location in the FlexNet Operations system configuration settings. In the Producer Portal, click **System** > **Configure** > **FlexNet Operations** > **Renewals** and then type the location in **Renewal Callout**. The End-User Portal uses this endpoint when an end user clicks the **Request** button on the End-User Portal's **Expiring Entitlements** page.

For more information on renewal management, see the FlexNet Operations User Guide, sections Getting Started with FlexNet Customer Growth and Configuring FlexNet Operations.

ID Generator

Customized IDs can be implemented using an ID generator webapp hosted in Tomcat in the cloud. The generation of following types of IDs can be customized:

- Entitlement IDs

- Line Item IDs

- Web Register Keys

- Maintenance Line Item IDs

- Fulfillment IDs

- Consolidated License IDs

A sample class, `IdGeneratorServiceImpl.java`, can be found in `extgenservice.zip` in

`extgenservice\src\com\flexnet\external\webservice\idgenerator`

When you create a SOAP endpoint that implements the **IdGenerator** interface, specify the endpoint location in the FlexNet Operations system configuration settings. In the Producer Portal, click **System** > **Configure** > **FlexNet Operations** > **General Options** and then type the location in **ID Generator Classname** or **Fulfillment ID Generator Classname**.

License Generator

The license generator service includes support for validating a product, validating a license model, generating a license, consolidating fulfillments, generating license file names, generating consolidated license file names, and generating custom host IDs.

Sample implementations are in `LicenseGeneratorServiceImpl.java` in `extgenservice.zip` in

`extgenservice\src\com\flexnet\external\webservice\keygenerator`

See Using External Services with License Technologies in the section Administrator Reference in the FlexNet Operations User Guide for more information.

Capability Request Callout

Customized handling of capability requests can be implemented using a RESTful external service.

A sample implementation (`flexnet-lfs-callout.war`) can be downloaded from the Product and License Center in **Product List** > **FlexNet Operations Cloud** > **FlexNet Operations Cloud Documentation** > **Sample Implementation of FlexNet Operations Callouts for FlexNet Embedded Licensing**.

There are several trigger points during the capability request handling at which you can apply custom behavior. See Actions for a list of possible customizations.

Usage

Always use standard ways of configuring the license before using this callout. It might be tempting to put a lot of functionality in this callout. However, since all this logic is in the callout code, there is no way to analyze its workings through Producer Portal. This can hamper Revenera support and engineering's ability to analyze problems.

Avoid unnecessary web service calls during capability request handling. The callout is running remotely (meaning on a server other than the FlexNet Operations application) and is called in the middle of the capability request handling. Although it is possible to call FlexNet Operations public web services from the callout (or public web services hosted anywhere else), the performance impact on capability request processing would be significant and is strongly discouraged.

Trigger Points

The following trigger points can be enabled. When enabled, the trigger points allow FlexNet Operations to make a callout in which you can code additional functionality:

- **Finalize host**: just before creating an unknown host

- **Check access**: before proceeding with processing an off-line request

- **Finalize response**: after an incoming host request has been validated, but before the capability response has been generated

The trigger point being invoked is encoded in the URL to which the JSON is posted. These path parameters are appended to the configured URL to indicate which trigger point is active: /finalizeHost, /checkAccess, or /finalizeResponse. You can look at the example servlet class to see how this is used when invoking the callout.

Actions

The capability request callout supports a number of different actions. Use only actions within their approved trigger points. Although it would be possible to call FlexNet Operations public web services from the callout to take any action that the web services API supports, the performance impact on capability request processing can be significant; hence, the use of public web services at any trigger point is strongly discouraged.

The following table lists the kinds of custom actions that producers can implement and the trigger points at which the action can be applied.

Table 5-2 ▪ Actions and trigger points

Action	Possible Trigger Points
Set the capability response lifetime	Finalize response only
Add status list items to a capability response	All: Finalize host, check access, and finalize response
Add vendor dictionary to a capability response	Finalize response only
Add vendor dictionary entries to a target host instance	Finalize host and finalize response

Table 5-2 ▪ Actions and trigger points

Action	Possible Trigger Points
Remove vendor dictionary entries from a target host instance	Finalize host and finalize response
Deny the creation of an unknown host	Finalize host only
Deny access to a target host (return an error instead)	Check access only
Set the host type of a target host	Finalize host only
Set an owner (enterprise ID) of a target host	Finalize host and finalize response
Skip confirmation when reducing add-on copies	Finalize response only
Deny mapping of an add-on or inclusion of a mapped add-on in a generated license	Finalize response only
Set an add-on mapping expiration date override	Finalize response only

Sample Implementation

The following notes provide guidance on how to implement the capability request callout.

Since the callout mechanism is fairly complex, and no official API is provided to aid in implementation, Revenera includes a sample Java implementation with FlexNet Operations resources: `flexnet-lfs-callout.war`. This WAR file includes a servlet suitable for deployment in a servlet container like Tomcat. The sample code shows one way to parse the request and prepare the response (using Jackson). It demonstrates some of the most common actions such as adding vendor dictionary entries to the response.

Tip ▪ Instructions for obtaining `flexnet-lfs-callout.war` are in Sample Source and Other Resources.

Use the general steps below to guide you through the implementation process.

Task   ***To implement the capability request callout for FlexNet Operations***

1. Download the sample implementation: `flexnet-lfs-callout.war`. (See Sample Source and Other Resources for instructions.)

2. Adapt the sample code for your specific needs.

   In `flexnet-lfs-callout.war`, review the example implementation code, generate the javadocs for the com.flexnet.lfs.callout package, and modify the CustomCapabilityCallout implementation to suit your needs. (You need a Java development environment to change and build the callout and to generate the javadoc.) The `build.xml` file inside the WAR file has information about the targets.

3. Test the callout code locally.

Test the callout locally using the JSON input and output. Once you have your servlet deployed, you can use a JSON client to POST a sample JSON message and verify the expected JSON is returned.

For example, with the supplied sample callout, if this JSON request is POSTed to `<servletBaseURL>/` `finalizeResponse`:

```
{ "requestInfo" : { "offline" : false }, "hostInfo" : { "enterpriseId" : 4 }, "addOnInfo" : [ {
"activationId" : "a1" } ] }
```

then the servlet response looks like the following:

```
{"responseActions" : { "vendorDictionary" : { "SERIAL_NUMBER" : "S12345678", "CHANNELS" : 20 },
"lifetime" : 30 }, "hostActions" : { "addToVendorDictionary" : { "FINALIZE_RESPONSE" : "Fri Oct 06
14:50:26 PDT 2017" }, "denyCreate" : false, "denyAccess" : false }, "addOnActions" : [ {
"activationId" : "a1", "skipConfirmation" : true, "denied" : false } ] }
```

You can experiment with other requests that trigger your callout's specific behaviors.

4. Contact Revenera Support to load your implementation for your organization's tenant.

5. Apply system configuration settings in the FlexNet Operations Producer Portal and specify details about your implementation. See Related System Configurations for details.

Related System Configurations

Because the callout will, in many cases, be running remotely without direct access to the database, it must be passed all the information needed by the callout logic up front. As this could be quite a lot of data, and will happen for every request, the performance penalty could be significant. To allow customers to minimize the impact, a number of configuration settings control when the callout is invoked, and what data will be include in the request body sent to the callout.

The related configurations are in the section: **System** > **Configure** > **Embedded Devices** > **Capability Request Handling**.

Callout Location

The system configuration setting, **Capability Request Callout**, sets location where FlexNet Operations can find the callout:

● a URL for an external service implementing the callout

● a fully qualified class name of a class added to the LFS class path that implements the callout.

If the value starts with http:// or https:// the setting is interpreted as a URL, otherwise it is assumed to be a class name.

Enabling Trigger Points

The following system configuration settings determine which trigger points are active.

● **Capability Request Finalize Host Callout**—If true, invoke callout just before creating an unknown host. Additional attributes may be defined before it is persisted. It can also be used to cancel creation of the new host instance.

● **Capability Request Access Check Callout**—If true, invoke callout after (optionally) creating an unknown host, before proceeding with processing an off-line request. The return value can be used to deny access to the targeted host.

- **Capability Request Finalize Response Callout**—If true, invoke callout after an incoming host request has been validated, but before the capability response has been generated.

See Trigger Points for more information about trigger points. See Actions to find out which actions can be implemented at each trigger point.

Data to Send in the Request

The following system configuration settings determine how much data is included in the capability request.

- **Callout Includes Host Details**—If true, send details about the target host in the callout request body, otherwise just the host id and id type, host class, host type and alias.

- **Callout Includes Add-on Details**—If true, send add-on details in the callout request body, otherwise just send list of activation IDs.

JSON Reference

The following examples show the syntax of the request body and response body.

JSON Request Body

The JSON message POSTed to the callout URL (or passed to the invoke() method if class name used) contains several top-level fields.

Field	Description
requestInfo	contains information from the capability request.
hostInfo	contains information from the target host of the capability request; the attributes in *italics* are only included if the system configuration setting, **Callout Includes Host Details** (capabilityService.callout.includeHostDetails) is enabled.
addOnInfo	contains information about the add-ons mapped to the host; the attributes in *italics* are only included if the system configuration setting, **Callout Includes Add-on Details** (capabilityService.callout.includeAddOnDetails) is enabled.
statusList	contains status list items that are pending for including in the capability response.

Below is a sample request body:

```
{
    "requestInfo" : {

        "activationIds" : [
            { "id" : "a1", "copies" : 1, "partial" : false },
            { "id" : "a2", "copies" : 1000, "partial" : true }
        ],
        "vendorDictionary" : {
            "somekey" : 10,
            "anotherkey" : "anothervalue"
        },
        "lastResponseTime", 1502906444,
    }
```

```
    "hostInfo" : {
        "id" : "dev1",
        "idType" : "STRING",
        "hostClass" : "CLIENT",
        "hostType" : "FLX_CLIENT",
        "alias" : "My device",
        "identityName" : "id1",
        "publisherName" : "demo",
        "status" : "ACTIVE",
        "vendorDictionary" : {
            "somekey" : 10,
            "anotherkey" : "anothervalue"
        },
        "firstActivated" : "2017-08-09T12:34:56Z",
        "machineType" : "PHYSICAL",
        "vmName" : "Amazon EC2",
        "baseProductId" : "baseprod1",
        "enterpriseId" : 101,
        "user" : "joe@blow.com",
        "userId" : 19
    },

    "addOnInfo" : [
        {
            "activationId" : "a1",
            "requested" : 1,
            "consumed" : 2,
            "waitingForConfirmation" : true,
            "expirationOveride" : null,
            "licenseModel" : "Embedded Counted",
            "vendorString" : "some vendor string",
            "notice" : null,
            "serialNumber" : null,
            "issuer" : null,
        }, ...
    ],

    "statusList" : [
        {
            "code" : 1,
            "detail" : "a9"
        }, ...
    ]
}
```

JSON Response Body

The JSON message returned from the callout can contain several top level fields. responseActions defines action to apply to the capability response such as adding vendor dictionary entries, changing the status list entries, or the response lifetime. hostActions defines actions to apply to the target host instance, such as modifying the vendor dictionary entries, denying host creation, and setting the host type or the host owner. addOnActions defines actions to apply to the add-ons mapped to the host, such as skipping removal confirmation, denying an add-on from being mapped or included in the response, and overriding the expiration date.

Here is a sample response body:

```
{
    "responseActions" : {
        "vendorDictionary" : {
            "somekey" : 1,
            "anotherkey" : "anothervalue",
        },
        "addToStatusList" : [ { "code" : 5, "detail" : "a2" }, ... ],
        "lifetime" : 0
    },

    "hostActions" : {
        "addToVendorDictionary" : { "key" : "value", ... },
        "removeFromVendorDictionary" : [ "key", ... ],
        "denyCreate" : true,
        "hostType" : "CustomHostType",
        "enterpriseId" : 20
    },

    "addOnActions" : [
        {
            "activationId" : "a1",
            "skipConfirmation" : true,
            "denied" : true,
            "expiration" : null
        }, ...
    ]
}
```