V19.1

Operator's Guide

February 2021

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About this Manual

This manual describes the basic tasks involved in the operation and maintenance of Open Service Catalog Manager (OSCM).

The manual is structured as follows:

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Getting Started on page 18	Describes how to access the OSCM administration portal, lists the initial steps to be performed after installing OSCM, and shows how to start and stop the OSCM containers.
Configuring OSCM and APP on page 21	Describes how to update the OSCM and APP configuration settings, how to add a currency and a language, how to use and configure timers for automatic task processing, as well as how to manage platform-wide LDAP settings.
Monitoring, Backup and Recovery on page 30	Describes how to retrieve OSCM logging information, how to configure the log level, as well as which data is subject to regular backups. In addition, it describes how to export the audit log data and how to check the load on the JMS queues.
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Readers of this Manual

This manual is directed to operators who maintain and operate OSCM in their environment.

It assumes that you are familiar with the following:

- Container technology, particularly Docker and Docker Compose.
- Administration of the operating systems in use, including the adaption and execution of batch files or shell scripts.
- Java EE technology, particularly as to the deployment on application servers.
- Relational databases and their administration, in particular the PostgreSQL database.
- OSCM concepts as explained in the *Overview* manual.
- Web services concepts.
- Installation and administration of Web servers.
- Certificate-based authentication and communication.

Notational Conventions

This manual uses the following notational conventions:

Add	Names of graphical user interface elements.
`init`	System names, for example command names and text that is entered from the keyboard.
`<variable>`	Variables for which values must be entered.
`[option]`	Optional items, for example optional command parameters.
`one | two`	Alternative entries.
`{one | two}`	Mandatory entries with alternatives.

Abbreviations

This manual uses the following abbreviations:

API	Application Programming Interface
APP	Asynchronous Provisioning Platform
CA	Certification authority
JAX-WS	Java API for XML - Web Services
JMS	Java Message Service
JSP	Java Server Pages
LDAP	Lightweight Directory Access Protocol
OIDC	OpenID Connect
OSCM	Open Service Catalog Manager
PaaS	Platform as a Service
SaaS	Software as a Service
SOAP	Simple Object Access Protocol
SSO	Single Sign-on
STS	Security Token Service
WSDL	Web Services Description Language
WSIT	Web Services Interoperability Technologies
XSD	XML Schema Definition

Available Documentation

The following documentation on OSCM is available:

- *Overview:* A PDF manual introducing OSCM. It is written for everybody interested in OSCM and does not require any special knowledge.
- *Operator's Guide:* A PDF manual for operators describing how to administrate and maintain OSCM.
- *Technology Provider's Guide:* A PDF manual for technology providers describing how to prepare applications for usage in a SaaS model and how to integrate them with OSCM.
- *Supplier's Guide:* A PDF manual for suppliers describing how to define and manage service offerings for applications that have been integrated with OSCM.
- *Reseller's Guide:* A PDF manual for resellers describing how to prepare, offer, and sell services defined by suppliers.
- *Broker's Guide:* A PDF manual for brokers describing how to support suppliers in establishing relationships to customers by offering their services on a marketplace.
- *Marketplace Owner's Guide:* A PDF manual for marketplace owners describing how to administrate and customize marketplaces in OSCM.
- *Microsoft Azure Integration:* A PDF manual for operators describing how to offer and use virtual systems controlled by Microsoft Azure through services in OSCM.
- *Amazon Web Services Integration:* A PDF manual for operators describing how to offer and use virtual servers controlled by the Amazon Elastic Compute Cloud Web service through services in OSCM.

- *OpenStack Integration:* A PDF manual for operators describing how to offer and use virtual systems controlled by OpenStack through services in OSCM.
- *VMware vSphere Integration:* A PDF manual for operators describing how to offer and use virtual machines provisioned on a VMware vSphere server through services in OSCM.
- *Shell Integration:* A PDF manual for operators describing how to use Shell scripts through services in OSCM.
- *Online Help:* Online help pages describing how to work with the administration portal of OSCM. The online help is intended for and available to everybody working with the administration portal.

1 Introduction

Open Service Catalog Manager (OSCM) is a set of services which provide all business-related functions and features required for turning on-premise applications and tools into "as a Service" (aaS) offerings and using them in the Cloud. This includes ready-to-use account and subscription management, online service provisioning, billing and payment services, and reporting facilities.

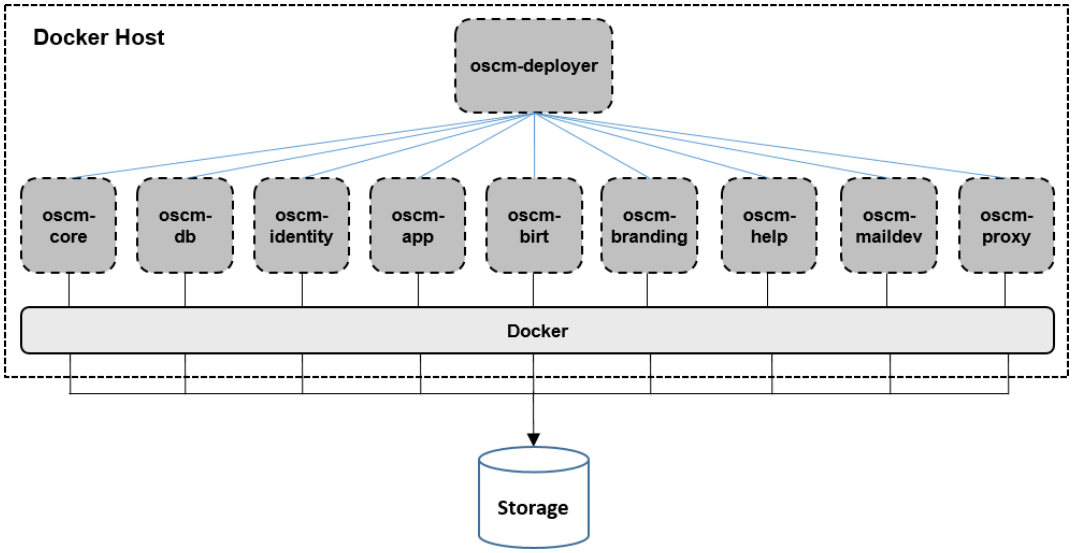
With its components, OSCM supports software vendors as well as their customers in leveraging the advantages of Cloud Computing.

1.1 OSCM Containers

OSCM is provided in Docker containers and deployed in a container environment. The applications integrated with OSCM and their data may be hosted on the same system (Docker host) as OSCM or in different locations.

The `oscm-deployer` container is used for configuring and deploying the following OSCM containers:

- `oscm-core`: The OSCM core application, including the platform services and the REST API.
- `oscm-db`: Database SQL server providing the database schema for OSCM and APP.
- `oscm-identity`: Services for authenticating users against an external authorization server based on OpenID Connect (OIDC) and providing for Web browser single sign-on.
- `oscm-app`: The Asynchronous Provisioning Platform (APP) together with an OpenStack, Amazon Web Services (AWS), Microsoft Azure, VMware, and Shell service controller.
- `oscm-birt`: The report engine that OSCM uses for generating reports.
- `oscm-branding`: A static Web server providing an empty directory structure for customizing the layout and branding of OSCM marketplaces.
- `oscm-help`: A static Web server providing the online help for the OSCM administration portal and marketplaces.
- `oscm-maildev`: A mail mock service for quick start-up and testing purposes when no real mail server is available.
- `oscm-proxy`: A proxy enabling access to all OSCM services and applications by the default HTTPS port (443).



OSCM and APP store their data in PostgreSQL databases. For the databases, a directory on the Docker host where OSCM is deployed is mounted as a volume for persistent storage during the deployment process. In this way, the data is preserved in case of container and database updates.

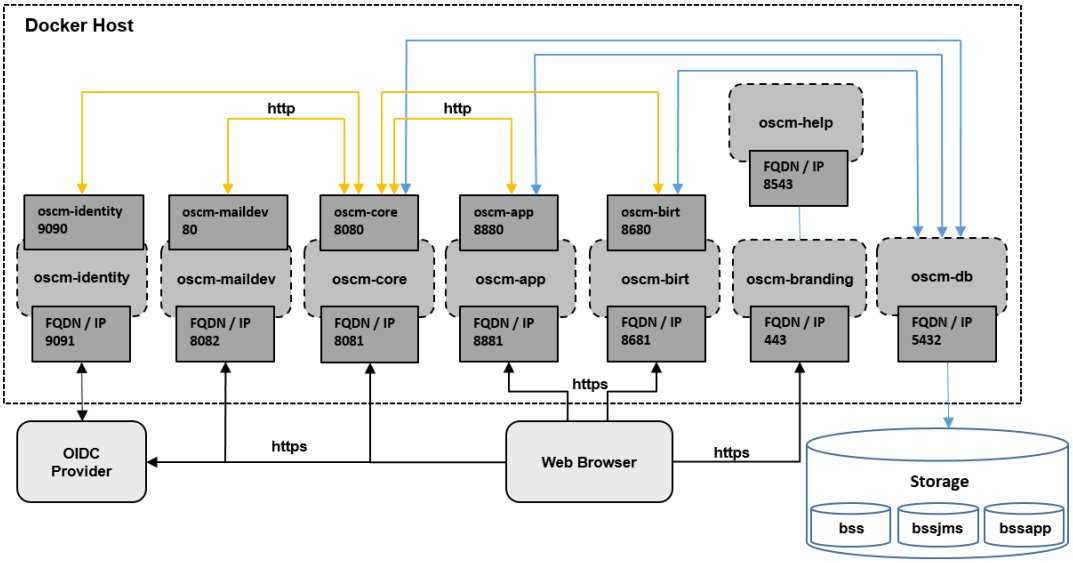
The directory on the Docker host and the path to which it is mounted as a volume in the `oscm-db` container are the following:

`<docker>/data/oscm-db/data:/var/lib/postgresql/data`

`<docker>` is the OSCM data directory on the Docker host specified when OSCM is installed.

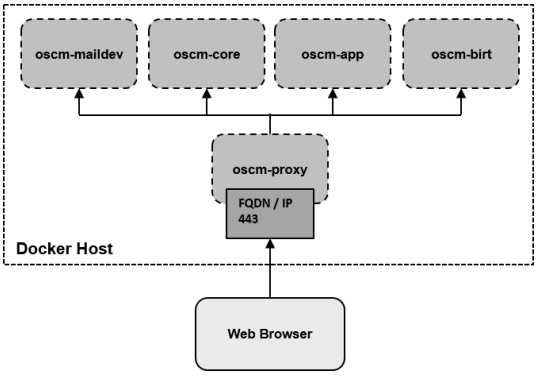
Container Communication

The following figure provides an overview of the container communication on a Docker host:



The internal communication between the Docker containers relies on the HTTP protocol, whereas calls from the outside are secured by HTTPS. The platform operator is responsible for opening the indicated ports. The containers can be addressed by their FQDN or their IP address.

The optional `oscm-proxy` container can be activated as a proxy to enable access to the other containers by the default HTTPS port (443) instead of the ports indicated above.



Logging in to Containers

To look inside a container:

1. List all containers (even stopped ones) to show the container names:

```
docker ps -a
```

2. Log in to a container using the following command:

```
docker exec -it <container name> /bin/bash
```

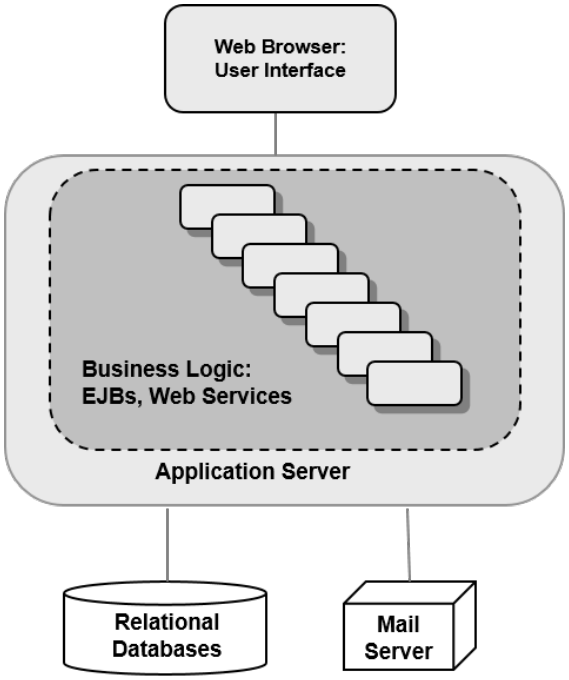
For example:

```
docker exec -it oscm-core /bin/bash
```

1.2 OSCM Architecture

OSCM is implemented in Java, using Java Platform, Enterprise Edition (Java EE) technology. It is deployed on an application server supporting this technology.

The following figure provides an overview of the architecture:



OSCM has a three-tier architecture:

- The **presentation layer** in the application server's Web container includes the **user interface** (administration portal and marketplaces), realized as JavaServer Faces. Users access the user interface in Web browsers.
- The **business logic** is implemented in Enterprise JavaBeans (EJB). Both the Enterprise JavaBeans and the **public Web services** are available in the application server's EJB container. The public Web services and their interfaces are mainly used for integrating applications and external systems with OSCM. However, they can also be employed for accessing OSCM functionality from a Web service client. HTTPS must be used for communication with the public Web services.
- OSCM **persists** its data through the Java Persistence API in **relational databases**.

For informing users about relevant issues (e.g. their registration or assignment to a subscription), OSCM must have access to a mail server.

1.3 Organizations and User Roles

Each user working in OSCM is a member of a specific organization. An organization typically represents a company, but it may also stand for a department of a company or a single person. Each organization in OSCM has a unique account and ID as well as one or more of the following roles: **operator**, **technology provider**, **supplier**, **reseller**, **broker**, **marketplace owner**, **customer**.

Customers can register themselves with OSCM or be registered by a supplier, reseller, broker, or operator. In any case, an organization with the customer role is created. Organizations with other roles can also act as customers, i.e. they are implicitly assigned the customer role. These organizations are created and assigned their roles as follows:

- When OSCM is installed, an organization with the operator role is created.
- Operators can assign the supplier, reseller, broker, and technology provider role to any existing organization or create new organizations with these roles. An organization can have both the supplier and the technology provider role. The reseller and broker roles, however, cannot be combined with each other or with the supplier or technology provider role.
- When operators create a marketplace, they specify an existing organization as its owner. In this way, the organization is assigned the marketplace owner role.

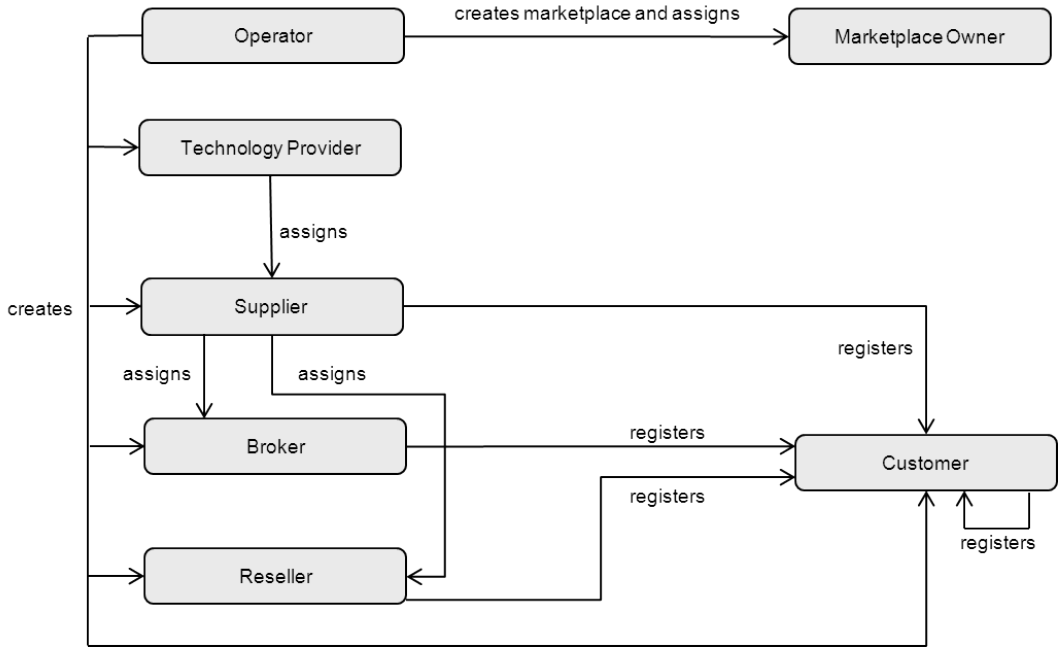
The roles of an organization determine which features are available to its users at the OSCM interfaces and which roles the users can be assigned. These user roles control the actions an individual user is allowed to carry out:

- **Standard user**: Users with this non-privileged role can work with services their organization has subscribed to. Every user registered in OSCM automatically is a standard user. Additional user roles must be assigned explicitly by an administrator.
- **Administrator**: Each organization must have at least one user with this role. An administrator can manage the organization's account and subscriptions as well as its users and their roles. The first administrator of an organization is defined when the organization is created.
- **OU administrator**: The users of an organization can be grouped in organizational units (OUs). The OU administrator role allows a user to manage the organizational units for which he has been appointed as an administrator, to create, modify, and terminate subscriptions for these units, as well as generate reports for cost-controlling purposes.
- **Subscription manager**: This role allows a user to subscribe to services and manage his own subscriptions. Unlike administrators, subscription managers are not permitted to work on subscriptions belonging to others or on subscription data related to billing and payment.
- **Technology manager**: This role allows a user to define technical services. It can be assigned to users of technology provider organizations.
- **Service manager**: This role allows a user to define marketable services and price models as well as publish marketable services. It can be assigned to users of supplier organizations.
- **Reseller**: This role allows a user to publish a supplier's marketable services applying different terms and conditions. It can be assigned to users of reseller organizations.
- **Broker**: This role allows a user to publish a supplier's marketable services without changing the terms and conditions defined by the supplier. It can be assigned to users of broker organizations.
- **Marketplace manager**: This role allows a user to define the organizations who are permitted to access a marketplace and publish services to it as well as update and customize a marketplace. This role can be assigned to users of marketplace owner organizations. It is

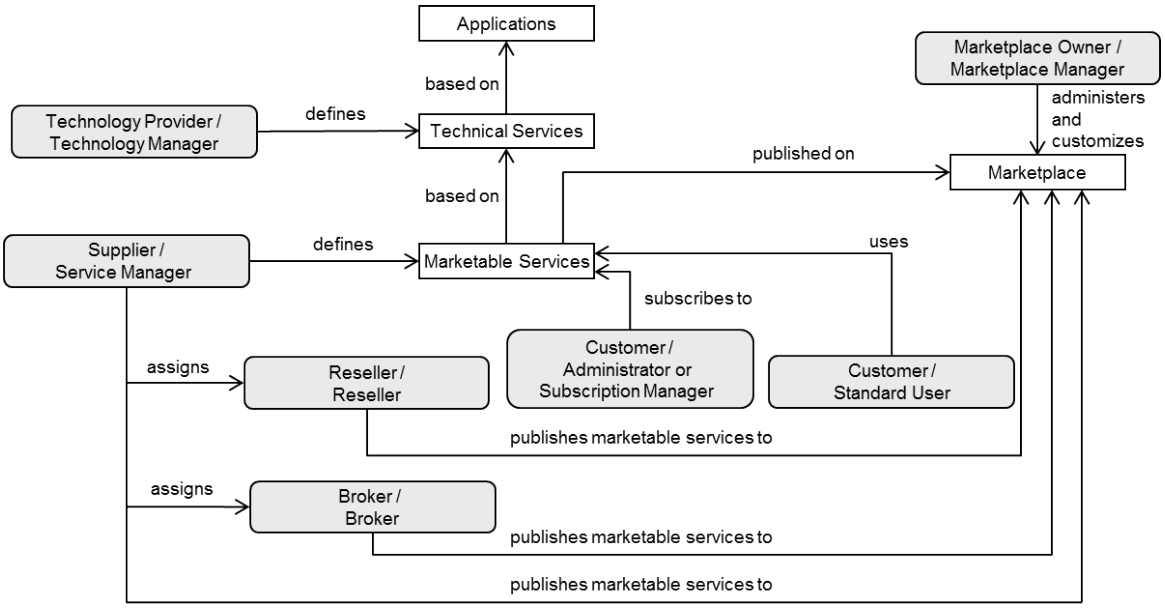
automatically assigned to all administrators of the marketplace owner organization when a marketplace is created.

- **Operator**: This role allows a user to carry out configuration and maintenance tasks, manage organizations, and create marketplaces. The first operator is created together with its operator organization when OSCM is installed.

The following illustration provides an overview of how organizations with the different roles are created and related with each other:



The following illustration provides an overview of the user roles and the main tasks of users with these roles:



1.4 Authentication Modes

OSCM can be installed in one of the following authentication modes:

- INTERNAL
- OIDC

The authentication mode determines how users and Web services are authenticated. It also determines the initial credentials of the first operator created by the installation.

INTERNAL Authentication Mode

OSCM is installed as a platform for public access from anywhere in the Internet. Users are authenticated with OSCM and can be managed in OSCM or an existing LDAP system of an organization. Web service calls are authenticated in OSCM either by providing a user key or ID and a password in their header, or by certificates.

What is accessed?	Authentication by	Initial credentials
Administration portal	User ID Password	User ID: `administrator` Password: `admin123`
Web service by SOAP/WSDL	User key Password	User key: `1000` Password: `admin123`
Web service by REST API	User key Password	User key: `1000` Password: `admin123`

It is recommended that you change the initial password in the OSCM administration portal (**Change Password** page in the **Account** menu).

OIDC Authentication Mode

OpenID Connect (OIDC) is a simple identity layer on top of the OAuth 2.0 protocol, which allows computing clients to verify the identity of a user based on the authentication performed by an authorization server, as well as to obtain basic profile information about the user. The users and their passwords and profiles are maintained at the OIDC provider, for example, Microsoft Azure Active Directory.

When installed in OIDC authentication mode, OSCM acts as an OIDC client. All users and Web services accessing OSCM are authenticated by the OIDC provider. Web-browser single sign-on (SSO) is supported; this means that a user once logged in and verified at the OIDC provider does not need to log in again to use different applications working with that same provider until he closes the browser session and/or logs out.

OIDC Tenants

An OIDC **tenant** in OSCM represents a configuration with all the settings and parameters required to connect to a specific tenant at the OIDC provider, for example, a specific domain and directory in Microsoft Azure Active Directory. The first and **default tenant** is created when OSCM is installed. The platform operator can create additional tenants at any time, if required.

Each organization and marketplace in OSCM is assigned to a specific tenant when it is created. The initial operator organization is associated with the default tenant. Users trying to log in to a marketplace are authenticated by the OIDC provider of the tenant assigned to the marketplace. For access to the OSCM administration portal, the tenant to be used for authentication must be specified in the URL unless it is the default tenant.

Users and Organizations

Every user who is to work in OSCM must exist in the respective OIDC provider system. When the operator creates an organization in OSCM, a corresponding group is automatically created at the given OIDC provider, and the user specified as the organization administrator in OSCM is assigned to it as a member.

Additional group members can be admitted or removed at any time at the OIDC provider. The OSCM organizations are synchronized automatically with the corresponding groups at the OIDC provider at daily intervals or manually by the operator. New group members are registered as OSCM users, where they can be assigned user roles as required.

For OSCM operations to work correctly, a specific user can be assigned to exactly one organization and group at a given time.

Initial Operator Organization and Administrator

Before you can install OSCM in OIDC authentication mode and create the first, default tenant, a number of prerequisites and preparations are necessary in the relevant OIDC provider system. One of these preparatory steps is to create an access group named `OSCM_PLATFORM_OPERATOR`, which will be mapped to the initial operator organization, `PLATFORM_OPERATOR`, in OSCM. The user who is to become the administrator of the initial operator organization must exist at the OIDC provider and be assigned to the `OSCM_PLATFORM_OPERATOR` group. At installation time, you specify this administrator in the `var.env` configuration file and configure the OIDC provider system as the default tenant.

2 Getting Started

After having successfully deployed OSCM, databases have been created containing the initial configuration settings as well as a platform operator organization with the initial administrator. There are no other organizations, users, services, or marketplaces. In order to start working with OSCM, you need to take some basic steps in the administration portal.

The following sections describe how to:

- Access OSCM by its administration portal
- Take the initial steps to get started
- Start and stop OSCM
- Access the OSCM mail mock
- Access the OSCM REST API

2.1 Accessing the OSCM Administration Portal

The administration portal is the Web interface you use to perform all the configuration and administration tasks in OSCM, like creating and managing organizations, roles, and marketplaces.

You can access the administration portal in your Web browser using a URL in the following format:

`https://<host_fqdn>:8081/oscm-portal`

`<host_fqdn>` is the FQDN or IP address to access OSCM as specified in the `HOST_FQDN` setting in the `.env` configuration file, `8081` is the port. Omit the port if OSCM is operated with its proxy. `oscm-portal` is the default context root of OSCM and cannot be changed.

You are prompted for the user ID and password. The login page and the initial credentials depend on the selected authentication mode (`AUTH_MODE` setting in the `var.env` configuration file):

- `INTERNAL` authentication mode:

  Login page of OSCM

  User ID: `administrator`

  Password: `admin123`

  It is recommended that you change the initial password in the OSCM administration portal (**Change Password** page in the **Account** menu).

- `OIDC` authentication mode:

  Login page of the OIDC provider. The page may be skipped if single sign-on is supported and you are already logged in.

  User ID: The ID you specified in the `ADMIN_USER_ID` setting in the `var.env` configuration file

  Password: The password of the user as set in the external authorization system used for authentication. The password can be changed in this system only.

After login, the operator functionality is available in the **Operation** menu.

2.2 Next Steps

The next steps you should take are the following:

1. Complete your personal profile using the **Edit profile** option in the **Account** menu.

2. Add one or several currencies to the system for suppliers to define price models and the OSCM rating and billing engine to calculate usage costs. For details, refer to *Adding a Currency to OSCM* on page 24.
3. Create technology provider and seller organizations (suppliers, resellers, brokers) who will provide and offer services in OSCM. For details, refer to *Managing Organizations and Users* on page 36.
4. Set up marketplaces so that services can be offered to customers. For details, refer to *Managing Marketplaces* on page 40.

2.3 Startup and Shutdown

The OSCM containers can be started, stopped, removed, and restarted using the standard utilities of Docker.

In order to properly execute the `docker-compose*` commands below, change to the OSCM data directory (`<docker>`) specified at installation time.

To **stop** a container, use the following command on your Docker host:

```
docker stop <container-name>
```

For example:

```
docker stop oscm-core
```

To **delete** a container:

1. Stop the container using the above command.
2. Remove the container:

```
docker-compose -f docker-compose-oscm.yml rm <container-name>
```

To **create and start** a container:

```
docker-compose -f docker-compose-oscm.yml up <container-name>
```

To **restart** a container:

```
docker-compose -f docker-compose-oscm.yml restart <container-name>
```

When shutting down the containers, the `oscm-db` container must be the last one to be stopped. When starting or restarting the containers, make sure that the `oscm-db` container is first.

Starting and Stopping the OSCM Proxy

The optional OSCM proxy comes with its own Docker Compose file in the `<docker>/proxy` directory.

To start the proxy:

```
docker-compose -f proxy/docker-compose-proxy.yml up -d
```

To stop the proxy:

```
docker-compose -f proxy/docker-compose-proxy.yml down
```

2.4 Accessing the Mail Mock

OSCM comes with a mail mock (`oscm-maildev` container), which can be used for quick start-up and testing purposes until a real mail server is available. The mail mock is configured in the initial settings in the `var.env` configuration file (see *Initial Configuration Settings* on page 49 for details).

As long as this configuration is not changed, all OSCM mails are collected in the mail mock. They are not forwarded to the specified receivers. Be aware that this also applies to mails containing user IDs and passwords, which needs to be considered from a security and data protection point of view even in staging environments

As the operator, you can access the mail mock with all the mails in the following way:

1. Type the following URL in your Web browser's address bar:

   `http://<host_fqdn>:8082/`

   `<host_fqdn>` is the fully qualified name or IP address of the host used to access OSCM, `8082` is the port. Make sure to use `http`, not `https`.

   If you have activated the OSCM proxy, use the following address:

   `https://<host_fqdn>/mail/`

2. In the login dialog, enter the administrator ID and password as specified during installation in the `ADMIN_USER_ID` and `ADMIN_USER_PWD` settings in the `var.env` configuration file.
3. Confirm your entries.

This opens the user interface of the mail mock with all the existing mails. You can view the mails as well as download and delete them.

2.5 Accessing the REST API

Accessing the OSCM REST API

OSCM provides a REST (Representational State Transfer) API by which you can address and execute the most important functions of the platform services. The REST API and its documentation are accessible and useable in a Web browser by means of the Swagger toolkit:

1. Type the following URL in your Web browser's address bar:

   `https://<host_fqdn>:8081/oscm-rest-api`

   `<host_fqdn>` is the fully qualified name or IP address of the host used to access OSCM, `8081` is the port. Omit the port if OSCM is operated with its proxy.

2. In the login dialog, enter the numeric key for your OSCM user ID and your password.
3. Confirm your entries.

This opens the Swagger UI with the OSCM REST API documentation. From the UI, you can try out and actually execute the individual methods, if you are authorized to do so or specify appropriate user credentials using the **Authorize** option. For more information about Swagger, refer to its documentation in the Internet.

3 Configuring OSCM and APP

This chapter describes:

- How to update configuration settings for OSCM and APP.
- How to add a currency definition to OSCM.
- How to add an additional language to OSCM and how to customize existing texts.
- How to use and configure timers in OSCM.
- How to define and manage system-wide LDAP connection settings.
- How to enable access to the Asynchronous Provisioning Platform (APP) and service controllers.

3.1 Updating OSCM and APP Configuration Settings

Initial Settings

The OSCM software as well as the Asynchronous Provisioning Platform (APP) require a number of settings for configuring their container runtime environment. The mandatory settings have been specified in environment variables in Docker files before deploying the containers. Usually, you needed to adapt the initial settings to your environment, in particular server names, ports, paths, and user IDs.

After the deployment, you can update the configuration settings by editing the following configuration files in the directory on the Docker host where the OSCM and APP data is located:

1. `.env`: Configuration settings for Docker, such as images and the data directory on the Docker host, as well as the fully qualified name (FQDN) or IP address of the host used to access OSCM.
2. `var.env`: Configuration settings for OSCM and APP, such as authentication, mail server, database, and other settings.

The initial, mandatory settings are stored in the `bss` and `bssapp` databases. They are described in detail in *Initial Configuration Settings* on page 49.

Optional Settings for OSCM

There are additional configuration settings whose keys are stored in the `bss` database.
The settings have default values that can be viewed and partly be changed in the OSCM administration portal (**Update configuration settings** in the **Operation** menu).

Note:	Be aware that in the administration portal, the settings should only be changed for testing purposes. Your changes will be lost as soon as OSCM is restarted.

The OSCM configuration settings are described in detail in *OSCM Configuration Settings* on page 55.

Optional Settings for APP

For APP, the configuration settings are stored in the `bssapp` database. You can view and change the settings using the Web interface of APP. To access this interface, use an URL in the following format:

`https://<host_fqdn>:8881/oscm-app`

<host_fqdn> is the fully qualified name or IP address of the host used to access OSCM as specified in the HOST_FQDN setting in the .env configuration file, 8881 is the port of APP. Omit the port if OSCM is operated with its proxy. oscm-app is the default context root of APP and cannot be changed.

The APP configuration settings are described in detail in *APP Configuration Settings* on page 62.

Persistently Updating OSCM Configuration Settings

If you want to persistently update configuration settings in the bss or bssapp database, proceed as follows:

1. On your Docker host, change to the OSCM data directory (<docker>) and execute the following steps from this location.
2. Edit the .env and var.env files located in the data directory as required.
3. If you want to change the default value of a configuration setting that is not included in the var.env file yet:

   Add the key and the value the setting shall take on to the var.env file.

   You can find the keys of the settings on the **Update configuration settings** page or in the APP Web interface. They are described in detail in *OSCM Configuration Settings* on page 55 and *APP Configuration Settings* on page 62. For example:

   ```
   TIMER_INTERVAL_SUBSCRIPTION_EXPIRATION=345600000
   ```

4. Save the var.env file to its original location:

   ```
   <docker>/var.env
   ```

5. Export the variables set in the .env configuration file:

   ```
   set -a
   . ./.env
   set +a
   ```

6. In the docker-compose-initdb.yml file in the same directory, set the OVERWRITE flag in the environment settings of the relevant section to true to change the configuration setting in the database.

   For example, for persistently updating a setting in the bss database, set the flag to true for oscm-initdb-core:

   ```
   oscm-initdb-core:
       image: ${IMAGE_INITDB}
       container_name: oscm-initdb-core
       env_file: var.env
       environment:
         - TARGET=CORE
         - SOURCE=INIT
         - OVERWRITE=true
         - LOG_LEVEL=INFO
       links:
   - oscm-db:oscm-db
   ```

7. Stop and remove all OSCM containers:

   ```
   docker-compose -f docker-compose-oscm.yml stop
   ```

```
docker-compose -f docker-compose-oscm.yml rm -f
```

8. Start the container for initializing the databases, then stop and delete it again:

```
docker-compose -f docker-compose-initdb.yml up -d oscm-db
docker-compose -f docker-compose-initdb.yml up oscm-initdb-core
docker-compose -f docker-compose-initdb.yml up oscm-initdb-jms
docker-compose -f docker-compose-initdb.yml up oscm-initdb-app
docker-compose -f docker-compose-initdb.yml
 up oscm-initdb-controller-openstack
docker-compose -f docker-compose-initdb.yml
 up oscm-initdb-controller-aws
docker-compose -f docker-compose-initdb.yml
 up oscm-initdb-controller-vmware
docker-compose -f docker-compose-initdb.yml
 up oscm-initdb-controller-azure
docker-compose -f docker-compose-initdb.yml
 up oscm-initdb-controller-shell
docker-compose -f docker-compose-initdb.yml stop
docker-compose -f docker-compose-initdb.yml rm -f
```

9. Restart all application containers:

```
docker-compose -f docker-compose-oscm.yml up -d
```

10. In the `docker-compose-initdb.yml` file, set the `OVERWRITE` flag back to `false`.

Updating Controller Configuration Settings

If you want to persistently change common controller settings for all controllers, update the following variables in the `var.env` file as described in the previous section:

- `CONTROLLER_ORG_ID`. The ID of the organization in OSCM which is responsible for the service controller. The organization must have the technology provider role.
- `CONTROLLER_USER_KEY`: The user key for accessing OSCM.

  The user specified here must have the administrator and technology manager role, and belong to the organization specified by the organization ID.
- `CONTROLLER_USER_NAME`: The name of the user specified by the user key for accessing OSCM.
- `CONTROLLER_USER_PASS`: The password of the user specified by the user key for accessing OSCM.

You can persistently change the organization and user responsible for an individual service controller by setting environment variables in the `docker-compose-initdb.yml` file as follows:

1. Edit the `docker-compose-initdb.yml` file.

   In the section for the relevant controller, set the `OVERWRITE` flag in the `environment` settings to `true` to change the configuration settings in the database.

   Specify the controller settings you want to change as additional environment variables. For example, to change the organization and user responsible for the Shell integration controller, add the settings to the `environment` in the `oscm-initdb-controller-shell` section:

```
CONTROLLER_ORG_ID=959c9bf7
CONTROLLER_USER_KEY=10000
CONTROLLER_USER_NAME=supplier@adfs.com
CONTROLLER_USER_PASS=supplier
```

2. Run the following command:

```
docker-compose -f docker-compose-initdb.yml up <controller>
```

   where `<controller>` is one of the following, specifying the database initialization for the relevant controller:

   - `oscm-initdb-controller-openstack`
   - `oscm-initdb-controller-aws`
   - `oscm-initdb-controller-azure`
   - `oscm-initdb-controller-vmware`
   - `oscm-initdb-controller-shell`

3. In the `docker-compose-initdb.yml` file, set the `OVERWRITE` flag back to `false`.

3.2 Adding a Currency to OSCM

After installation, you need to add the currency or currencies to be supported by OSCM. These currencies will be available to suppliers when defining the price models for marketable services. The selected currencies are used by the integrated rating and billing engine of OSCM when calculating subscription usage charges.

To add a currency:

In the OSCM administration portal, choose **Manage currencies** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

3.3 Adding a Language to OSCM and Customizing Texts

OSCM supports multiple languages in which users can work. After installation, English, German, and Japanese language bundles are available. The operator can add additional languages and customize the texts provided in the English, German, and Japanese language bundles. Refer to *Supported Language Codes* on page 98 for the list of languages that can be added.

Adding a language or customizing existing texts comprises the following steps:

1. Translating all resources of a language bundle:
   - The user interface resources are translated or updated in a Microsoft Excel file.
     Refer to *User Interface Resources* on page 94 for details.
   - The online help and FAQ files are translated or updated directly in the HTML files.
     Refer to *Online Help and FAQs* on page 95 for details.
2. For a new language: Registering the language with OSCM.
3. Importing the translated or updated Microsoft Excel file.
4. Deploying the translated or updated online help and FAQ files.
5. For a new language: Activating the language in OSCM. All activated languages are available to users for selection when they edit their user profile.

To add a language:

In the OSCM administration portal, choose **Manage languages** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

3.4 Configuring Timers

Timers are used to handle background tasks, for example to check for expired subscriptions that are to be deleted. Each timer has a time interval specifying when it is executed periodically. The values are indicated in milliseconds.

Time intervals are defined and can be changed in the OSCM configuration settings.

Note: Be aware that several functions in OSCM will not work if you do not enable the timers. For example, if a customer specifies that a subscription is to expire in 10 days, and you did not configure the timer `RESTRICTED_SUBSCRIPTION_USAGE_PERIOD`, the subscription will not expire after 10 days.

The initial expiration time of a timer for which a time interval is defined is calculated based on January 1st, 00:00:00.000, of the current year. For example, if you specify an interval of one week for a timer on January 5th, 14:30:00, the timer will expire for the first time on January 8th at 00:00:00.000, next on the 15th, the 22nd, etc. Or, if you specify an interval of one month for a timer on August 4th, 17:00:00, the timer will expire for the first time on September 1st at 00:00:00.000, next on October 1st, November 1st, etc. To avoid the expiration of several timers at the same time, which would result in heavy load on the system, there is an additional setting: An **offset** for each timer. The offset is added to the expiration time.

Example

For the timer used to remove customer accounts that have not been confirmed, the following configuration settings are defined:

```
PERMITTED_PERIOD_UNCONFIRMED_ORGANIZATIONS=604800000
TIMER_INTERVAL_ORGANIZATION=86400000
TIMER_INTERVAL_ORGANIZATION_OFFSET=300000
```

The first setting indicates how long an organization account is allowed to remain unconfirmed: 7 days. The second setting indicates the time interval at which the check for unconfirmed accounts is executed: every 24 hours. The third setting, the offset, is set to 5 minutes. The timer will expire at 0:05 a.m. every day. The offset is not accumulated, but stays the same every day.

Available Timers

There are the following timers:

- **`ORGANIZATION_UNCONFIRMED`**: Timer to check for organization accounts that have not been confirmed by a login of the initial administrator within a certain period of time. When this timer expires, the respective organization accounts are removed.

  This timer requires the following configuration settings:

  - `TIMER_INTERVAL_ORGANIZATION`
  - `TIMER_INTERVAL_ORGANIZATION_OFFSET`
  - `PERMITTED_PERIOD_UNCONFIRMED_ORGANIZATIONS`

- **`SYNCHRONIZE_USERS`**: Relevant of OIDC authentication mode only. Timer to synchronize users in OSCM organizations with users in the corresponding groups in the OIDC provider system. The interval for this timer is one day and cannot be changed.

  This timer requires the following configuration setting:

  - `TIMER_INTERVAL_SYNCHRONIZE_USERS_OFFSET`

- **`USER_NUM_CHECK`**: Timer to check for the current amount of users registered with the platform.

This timer requires the following configuration setting:

- TIMER_INTERVAL_USER_COUNT

- **RESTRICTED_SUBSCRIPTION_USAGE_PERIOD**: Timer used to ensure that subscriptions can only be used for the time specified in the underlying service's parameters. If this period is exceeded, the timer-related operations must be executed to make sure that the subscription cannot be used anymore unless the supplier upgrades or downgrades the underlying service.

  This timer requires the following configuration settings:

  - TIMER_INTERVAL_SUBSCRIPTION_EXPIRATION
  - TIMER_INTERVAL_SUBSCRIPTION_EXPIRATION_OFFSET

- **TENANT_PROVISIONING_TIMEOUT**: Timer used to check pending subscriptions. When the timeout time is reached, an email is sent to the administrators and the relevant OU administrators and subscription managers of the organizations who created the subscriptions, informing them about the timeout.

  This timer requires the following configuration settings:

  - TIMER_INTERVAL_TENANT_PROVISIONING_TIMEOUT
  - TIMER_INTERVAL_TENANT_PROVISIONING_TIMEOUT_OFFSET

- **BILLING_INVOCATION**: Timer for billing runs calculating subscription usage costs (customer billing data) or revenue share data. The interval for this timer is one day and cannot be changed.

  This timer requires the following configuration setting:

  - TIMER_INTERVAL_BILLING_OFFSET

- **DISCOUNT_END_CHECK**: Timer used to check whether the end date for discounts granted to customers has been reached. The timer interval is one day and cannot be changed.

  This timer requires the following configuration settings:

  - TIMER_INTERVAL_DISCOUNT_END_NOTIFICATION_OFFSET

- **INACTIVE_ON_BEHALF_USERS_REMOVAL**: Timer used to remove non-existing users from the database that were created because an organization acted on behalf of another organization.

  The timer for database cleanup requires the following configuration settings:

  - TIMER_INTERVAL_INACTIVE_ON_BEHALF_USERS
  - TIMER_INTERVAL_INACTIVE_ON_BEHALF_USERS_OFFSET

For a detailed description of the timers, refer to *OSCM Configuration Settings* on page 55.

To configure a timer:

To view the current settings for the available timers, choose **Update configuration settings** in the **Operation** menu in the OSCM administration portal. To persistently update the setting of a timer, proceed as described in *Updating OSCM and APP Configuration Settings* on page 21.

Retrieving Expiration Times

You can check when the currently registered timers expire.

To retrieve the expiration times:

In the OSCM administration portal, choose **Manage timers** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

Re-Initializing Timers

When you set a timer or update the settings for a timer, you need to re-initialize the timers in order to start them.

To re-initialize the timers:

In the OSCM administration portal, choose **Manage timers** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

3.5 Managing LDAP Settings

Note: This section is relevant only if OSCM is installed in INTERNAL authentication mode. Refer to *Authentication Modes* on page 16 for details on authentication modes.

User IDs and passwords of an organization can be created and maintained in the platform or in an existing LDAP system of an organization.

When maintained in the platform, the user data is stored in the platform's database. An organization's administrator can register new users, and, if required, request passwords to be reset by the operator.

When using an LDAP system, an organization does not need to register its users manually with the platform. The organization's administrator can import the users from the LDAP system, thus automatically registering them with the platform. The users are managed in the LDAP system. The platform continuously synchronizes its information on the users. Connection settings have to be defined in a configuration file so that the platform can connect to the LDAP system.

Whether an organization uses an LDAP system for user management is determined when the organization is created in the platform. An organization can be created in several ways:

- A customer registers himself. In this way, an organization with the customer role is created. Users are always managed in the platform, and an LDAP system cannot be used.
- A seller (supplier, reseller, or broker) registers a customer. In this way, an organization with the customer role is created. The seller can specify whether user management in an external LDAP system is to be used.
- You as the platform operator create an organization of any role. For any organization, you can specify whether user management in an external LDAP system is to be used. For details, refer to *Creating an Organization* on page 36.

A mixture of maintaining users in the platform and in the LDAP system is not supported. In addition, the type of user management can no longer be changed once an organization has been created.

The operator organization cannot use an external LDAP system. So you can always log in to the platform and change connection settings, for example if the LDAP system of an organization is not available and thus authentication against it is not possible.

As an operator, you can define default LDAP configuration settings for the entire platform. These settings apply as long as no organization-specific LDAP settings are specified. You can also check an organization's connection to its LDAP system.

Defining Default LDAP Settings

Defining default LDAP settings for the entire platform is useful if settings are to be reused for several organizations. If organization-specific LDAP settings exist, they overrule the default LDAP settings.

To define default LDAP settings:

In the OSCM administration portal, choose **Manage LDAP settings** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help. For a list of LDAP keys, refer to *LDAP Keys* on page 68.

Checking the Connection to an LDAP System

If for some reason an organization's LDAP system cannot be reached, you can check and restore the connection so that user authentication is possible again.

To check an LDAP connection:

In the OSCM administration portal, choose **Manage LDAP settings** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help. For a list of LDAP keys, refer to *LDAP Keys* on page 68.

3.6 Configuring Access to APP and Service Controllers

When integrating applications with OSCM, the instance provisioning can be done in two provisioning modes: synchronous or asynchronous mode.

Asynchronous provisioning is required if provisioning operations take a long time because long-running processes or manual steps are involved. This is the case, for example, when provisioning virtual machines on a virtual machine server. OSCM supports the integration of such applications with its asynchronous provisioning platform (APP). This is a framework which provides a provisioning service as well as functions, data persistence, and notification features which are always required for integrating applications in asynchronous mode.

After you have deployed the `oscm-app` container, the following service controllers are registered with OSCM and initialized:

- AWS service controller: Can be used for integrating the Amazon Elastic Compute Cloud Web service with OSCM. Refer to the *AWS Integration* guide for details.
- OpenStack service controller: Can be used for integrating OpenStack services with OSCM. Refer to the *OpenStack Integration* guide for details.
- VMware service controller: Can be used for integrating VMware vSphere services and using virtual machines provisioned on a VMware vSphere server with OSCM. Refer to the *VMware vSphere Integration* guide for details.
- Azure service controller: Can be used for integrating Microsoft Azure services with OSCM. Refer to the *Microsoft Azure Integration* guide for details.
- Shell service controller: Can be used for executing Shell scripts through services in OSCM. Refer to the *Shell Integration* guide for details.

Before technology providers can use the service controllers, they must be entered as responsible organizations in APP as well as in the service controllers.

To register an organization that is to be responsible for a service controller:

1. Login to the OSCM administration portal, and choose **Create organization** in the **Operation** menu.

   Make sure to set the **Technology provider** role for the organization. Refer to the online help for details.

2. Access the Web interface (base URL) of APP. The URL has the following format:

   `https://<host_fqdn>:8881/oscm-app`

`<host_fqdn>` is the FQDN or IP address to access OSCM as specified in the `HOST_FQDN` setting in the `.env` configuration file, `8881` is the port of APP. Omit the port if OSCM is operated with its proxy. `oscm-app` is the default context root of APP and cannot be changed.

3. Log in with your operator user ID and password.
4. Specify the ID of the technology provider organization that is to be responsible for the respective service controller (`ess.openstack`, `ess.aws`, `ess.azureARM`, or `ess.vmware`).
5. Click **Save Configuration** to save the settings.

4 Monitoring, Backup and Recovery

Regular system operation and maintenance includes the monitoring of the system and its processes as well as the backup of the databases, configuration settings, and log files.

This chapter describes:

- The monitoring of OSCM.
- How to configure the log level.
- How to export audit log data.
- The backup of the databases, configuration settings, and log files.
- The monitoring of the JMS queues.

4.1 Monitoring OSCM

In addition to entries in the standard application server log file, OSCM provides a log file of its own that helps you detect problems and identify, for example, illegal access to the system.

The logging of OSCM is based on the `log4j` tool.

4.1.1 Retrieving Logging Information

For each running container, OSCM writes its logging information to a dedicated log file. New messages are continually appended to the log file at runtime.

By default, Docker uses the `json-file` driver to record the logs of your containers. The log output in JSON format can be found in the following files on the Docker host:

`/var/lib/docker/containers/<container-id>/<container-id>-json.log`

In addition, the OSCM deployer creates empty log files for each container in the OSCM data directory on the Docker host:

`<docker>/logs/<container_name>/<container_name>.out.log`

However, log information is output to these files only if you configure `docker-compose` and `syslog` on the Docker host to write the container logs to them.

To show all running containers, execute the following command on the Docker host where OSCM has been deployed:

```
docker ps
```

To show the logs of a specific container:

```
docker logs -f <container name>
```

For example:

```
docker logs -f oscm-core
```

For more information on log handling in Docker, refer to the Docker documentation.

Application Server Logs

In addition to entries in the OSCM log files on the Docker host, you can find application server-specific log entries by logging in to the individual containers. Be aware that these are

available only if you set the TOMEE_DEBUG configuration setting in the var.env configuration file to true.

To view the logs, log in to the respective container as follows:

```
docker exec -it <container name> /bin/bash
```

For example:

```
docker exec -it oscm-core /bin/bash
```

You can find the logs in the following directory:

/opt/apache-tomee/logs

4.1.2 Configuring the Log Level

OSCM supports the following types of log information with their corresponding log level:

- **ERROR**: Problems that do not allow to continue working with OSCM in the current transaction or that indicate an issue which must be solved. With the ERROR log level set, the log file contains all exceptions that occurred at runtime with a complete stack trace.
- **WARN**: Problems that allow for the completion of an operation, irrespective of whether the operation is completed fully or only partially. For example, an email could not be sent. With the WARN log level set, the log file comprises all messages of type WARN and ERROR.
- **INFO**: Basic information such as the state of the server, whether it was started or stopped, whether a user logged in. With the INFO log level set, the log file comprises all messages of type INFO, WARN, and ERROR.
- **DEBUG**: Detailed information with references to the OSCM implementation, mainly start and exit of methods as well as proposals of how to solve the problem. With the DEBUG log level set, the log file comprises all messages.

To change the log level:

Proceed as described in *Updating OSCM and APP Configuration Settings* on page 21 and add the LOG_LEVEL configuration setting to the var.env file. You can set its value to INFO, DEBUG, WARNING, or ERROR respectively.

4.2 Exporting Audit Log Data

You can export information on all kinds of user operations related to subscriptions and marketable services including their price model. The data represents an audit log. Exporting this data may be useful, for example to check when and by whom a price model was changed or when subscriptions were created.

You can export information on subscription-related operations performed by administrators or standard users, as well as information on service and price model-related operations performed by service managers of supplier organizations. Administrator operations include actions performed by OU administrators and subscription managers. Service manager operations include actions performed by resellers and brokers.

Note: The system records user operations only if the AUDIT_LOG_ENABLED configuration setting is set to true.

You can specify the start and end date of the time period for which you want to export the log data. The dates must be specified in the format YYYY-MM-DD.

To export the audit log:

In the OSCM administration portal, choose **Export audit log** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

You can choose to view the exported data or save it to a file. For details on the content, refer to *Audit Log* on page 70.

4.3 Backup and Recovery

OSCM does not offer integrated backup and recovery mechanisms. Use the standard file system, application server, and database mechanisms instead.

It is recommended to create a regular backup of all data persisted in the OSCM data directory you created on the Docker host:

- The `.env` and `var.env` configuration files.
- `/config`: Certificates, customized brandings, tenant configurations, etc.
- `/data`: OSCM databases (`bss`, `bssapp`, `bssjms`). The frequency of database backups depends on the amount of changes and on the availability of time slots with low load. PostgreSQL supports database backups without previous shutdown. For details, refer to the PostgreSQL documentation.
- `/logs`: OSCM log files.
- The Docker Compose `.yml` files.
- Customizations made to marketplaces, especially style sheets and localized texts presented at the user interface.

Note: When preparing for an update installation of your current OSCM release, always create a backup of all data mentioned above.

Below you find some **example procedures** for backing up and restoring the OSCM and APP databases. In the examples, `/docker` is used as the OSCM data directory on the Docker host.

Backup

1. Log in to the Docker host where OSCM is deployed.

```
ssh root@<host>
```

2. Access the OSCM configuration file, `var.env`, and look up the database superuser password set in the `DB_SUPERPWD` variable:

```
less /docker/var.env
```

3. Create a directory where the database backups are to be stored. For example:

```
mkdir /docker/data/backup
```

4. Start a temporary Docker container with access to the databases for which you want to create backups. For example:

```
docker run -it --name dbbackup --rm --network docker_default -v
   /docker/data/backup:/backup servicecatalog/oscm-db:latest /bin/bash
```

If you use a custom Docker registry, you need to replace the `servicecatalog/oscm-db:latest` image name with your image name.

To list the local image names, execute the following command:

```
docker images
```

5. Export the database superuser password in your environment:

```
export PGPASSWORD="<your DB_SUPERPWD>"
```

6. Create SQL dumps of the OSCM databases:

```
pg_dumpall -g -c --if-exists -f /backup/globals.sql -h
   oscm-db -U postgres

pg_dump -c --if-exists -C --quote-all-identifiers -f
   /backup/bss.sql -h oscm-db -U postgres bss

pg_dump -c --if-exists -C --quote-all-identifiers -f
   /backup/bssapp.sql -h oscm-db -U postgres bssapp

pg_dump -c --if-exists -C --quote-all-identifiers -f
   /backup/bssjms.sql -h oscm-db -U postgres bssjms
```

7. Exit the temporary Docker container:

```
exit
```

Restore

1. Login to the Docker host where OSCM is deployed.

```
 ssh root@<host>
```

2. Access the OSCM configuration file, `var.env`, and look up the database superuser password set in the `DB_SUPERPWD` variable:

```
less /docker/var.env
```

3. Change to the OSCM data directory:

```
cd /docker
```

4. Stop and remove all running containers:

```
docker-compose -f docker-compose-oscm.yml stop
docker-compose -f docker-compose-oscm.yml rm -f
```

Optionally, completely delete the existing database files and re-create the corresponding directory:

```
rm -rf /docker/data/oscm-db/data
mkdir /docker/data/oscm-db/data
```

5. Start the OSCM database container:

```
docker-compose -f docker-compose-oscm.yml up -d oscm-db
```

6. Start a temporary Docker container with access to the database from which you can restore the data. For example:

```
docker run -it --name dbrestore --rm --network docker_default -v
   /docker/data/backup:/backup servicecatalog/oscm-db:latest /bin/bash
```

   If you use a custom Docker registry, you need to replace the `servicecatalog/oscm-db:latest` image name with your image name.

   To list the local image names, execute the following command:

```
docker images
```

7. Export the database superuser password in your environment:

```
export PGPASSWORD="<your DB_SUPERPWD>"
```

8. Restore the SQL dumps:

```
psql -h oscm-db -U postgres < /backup/globals.sql
psql -h oscm-db -U postgres < /backup/bss.sql
psql -h oscm-db -U postgres < /backup/bssapp.sql
psql -h oscm-db -U postgres < /backup/bssjms.sql
```

9. Exit the temporary Docker container:

```
exit
```

10. Change to the OSCM data directory:

```
cd /docker
```

11. Start all OSCM containers:

```
docker-compose -f docker-compose-oscm.yml up -d
```

4.4 Checking the Load on the JMS Queues

OSCM uses JMS queues for asynchronous processing of requests of different types:

- The **trigger queue** handles calls to the notification service of an external process control system.
- The **task queue** handles requests from the Java Mail session for sending notification emails to OSCM users.

The requests are stored in the relevant JMS queues before they are actually executed.

It is recommended to check the load on the JMS queues on a regular basis using the application server administration console. If the load is too high, you may want to set up more cluster nodes or take another appropriate action.

Note:	In case a restart of the database used for JMS data (`bssjms`) is required, make sure to also restart the `oscm-core` container in order to speed up the JMS recovery.

5 Managing Organizations and Users

This chapter describes how to:

- Create an organization.
- Maintain the address data of organizations.
- Add a role to an organization.
- Manage user accounts: lock and unlock user accounts, and reset the password for a user.
- Register multiple users for organizations.
- Create and manage tenants connecting to OIDC providers.

5.1 Creating an Organization

You can create an organization and specify its roles (technology provider, supplier, reseller, broker, or - implicitly - customer). For every new organization, you must define a user who is to become its first administrator. This user can later register new users and/or assign roles to them.

If OSCM is operated in OIDC authentication mode, you need to select the tenant to be associated with the new organization. Be aware that you cannot change this assignment later. The user specified as the first administrator must exist in the OIDC provider system represented by the tenant. Together with the organization in OSCM, a corresponding group is created in the OIDC provider system and the user is assigned to it as a member. Additional group members can be added at any time in the OIDC provider system. The OSCM organization is synchronized automatically with the corresponding group at the OIDC provider at daily intervals or manually by the operator. New group members are registered as OSCM users, where they can be assigned user roles as required.

To create an organization:

In the OSCM administration portal, choose **Create organization** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

5.2 Changing the Address Data of an Organization

As an operator, you can at any time update the address data of an organization.

To update the address data of an organization:

In the OSCM administration portal, choose **Manage organization** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

5.3 Adding a Role to an Organization

As an operator, you can add a role to an organization (technology provider, supplier, reseller and/or broker).

To add a role:

In the OSCM administration portal, choose **Manage organization** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

5.4 Managing User Accounts

As an operator, you can at any time view the number of users registered with OSCM as well as the configured maximum number of registered users (default: 1000). At regular intervals (default:

12 hours), the system checks the number of registered users. You are informed by email when this check returns that the allowed number of registered users is exceeded.

You can lock the account of a specific user, for example when you assume unauthorized access. You can also unlock an account, for example in case it was locked because the user tried to log in using a wrong password for the configured number of times (default: 3). If OSCM is installed in INTERNAL authentication mode and you do not use an external LDAP system for user management, you can initiate the generation of a new password for a user. In all cases, the user is notified by email.

To manage user accounts:

In the OSCM administration portal, choose **Manage users** in the **Operation** menu and click the appropriate button. For detailed step-by-step instructions, refer to the online help.

5.5 Registering Multiple Users for Organizations

Note: This section is relevant only if OSCM is installed in INTERNAL authentication mode. Refer to *Authentication Modes* on page 16 for details on authentication modes.

Users who are to work for an organization are usually registered by the organization's administrator.

As an operator, you can register multiple users on behalf of organizations that do not use an external system for user authentication. The data of the users must be specified in a user data file which can then be imported into OSCM.

The user data file must be in `csv` (comma-separated values) format. For details, refer to *User Data File for Multiple User Import* on page 101.

To register multiple users for an organization:

In the OSCM administration portal, choose **Manage users** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

5.6 Managing Tenants

Note: This section is relevant only if OSCM is installed in OIDC authentication mode. Refer to *Authentication Modes* on page 16 for details on authentication modes.

When you install OSCM in OIDC authentication mode, you define the first, default tenant to connect to a specific OIDC provider. The default tenant can be assigned to any number of organizations and marketplaces for authentication.

As an operator, you can create additional tenants to use different OIDC provider systems for the users of individual organizations or marketplaces. To do so:

1. Take the required preparations in the OIDC provider system. For details, refer to *Prerequisites at the OIDC Provider* on page 38.
2. Create a tenant in the OSCM administration portal.
3. Download and fill in the template of the configuration file for the new tenant. For details on tenant configuration files, refer to *OIDC Tenant Configurations* on page 65.
4. Store the configuration file on the Docker host where OSCM is deployed:

   `<docker>/config/oscm-identity/tenants/tenant-<id>.properties`

   `<docker>` is the OSCM data directory specified at installation time. `<id>` is the ID of the tenant created in OSCM.

Users are authenticated against the OIDC provider of the tenant associated with the respective marketplace or administration portal. User names do not need to be unique in OSCM, but only within the scope of each tenant.

Note: As the platform operator, you are responsible for the correct configuration of tenants.

Be aware that although a marketplace is associated with a tenant, it is, by default, still open for publishing and subscribing to services. To avoid this, marketplace owners need to configure the marketplace in a way to restrict the access to it to specific sellers (authorized sellers only) and/or to specific customer organizations (closed marketplace).

To create a tenant, choose the following option:

In the OSCM administration portal, choose **Manage tenants** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

5.6.1 Prerequisites at the OIDC Provider

Before you can install OSCM in OIDC authentication mode and/or create a tenant, a number of prerequisites and preparations are required in the relevant OIDC provider system.

The prerequisites are specific to the OIDC provider. The following descriptions use Microsoft Azure Active Directory (Azure AD) as an example. If you intend to work with a different OIDC provider, please contact your OSCM support organization for details.

The following prerequisites and preparations are required at the OIDC provider:

1. An account and domain must exist to which you have access as an administrator.

   Azure AD example: domain `mydomain.onmicrosoft.com`

2. A directory must exist in the domain, which contains at least all the users who are to work with OSCM.

   Azure AD example: directory `OSCMOrg`

3. Relevant only for the first deployment of OSCM: Create an access group named `OSCM_PLATFORM_OPERATOR` in the directory, and add the user who is to become the initial OSCM administrator as a member to the group.

   Azure AD example: Create a security group, `OSCM_PLATFORM_OPERATOR`, in the directory `OSCMOrg`. Add the initial administrator, e.g. `oscmadmin@mydomain.onmicrosoft.com`, as a member.

Note: Organizations in OSCM are mapped to groups at the OIDC provider. Each user can be a member of exactly one group only.

4. Register your OSCM installation as an application that connects to the OIDC provider directory.

   Azure AD example: In the directory under **App registrations**, create a new registration with the following properties:

   - A name and supported account types of your choice.
   - Redirect URI: `https://<host_fqdn>:9091/oscm-identity/callback`

     `<host_fqdn>` is the fully qualified name or IP address of the host to access your OSCM installation, `9091` is the port. Omit the port if OSCM is operated with its proxy.

5. Copy the ID of the new application for later use in OSCM.

   Azure AD example: `ef29bb22-369c-424d-9e72-6800ad24239e`

6. Grant the application read and write permissions for the directory, users, and groups.

Azure AD example: In the properties of the new app, under **API permissions**:

a. Add the following permissions for the Microsoft Graph API as both, **Delegated permissions** and **Application permissions**: `User.Read.All`, `Group.ReadWrite.All`, `Directory.ReadWrite.All`.

b. **Grant admin consent** for the directory, `OSCMOrg`, for the new permissions.

7. Obtain a client certificate or secret string for OSCM to access the directory.

   Azure AD example: In the properties of the new app, under **Certificates and secrets**, add a new client secret. Copy the new secret for later use in OSCM.

8. Allow OSCM to obtain tokens for authentication from the OIDC provider.

   Azure AD example: In the properties of the new app, under **Authentication**, enable **Access tokens** and **ID tokens** to be issued by the authorization endpoint.

You can now create and configure a tenant in in OSCM based on the items and settings in the OIDC provider system.

5.6.2 Synchronizing OSCM and OIDC Users

Every user who is to work in OSCM must exist in the respective OIDC provider system. When the operator creates an organization in OSCM, a corresponding group is automatically created at the given OIDC provider, and the user specified as the organization administrator in OSCM is assigned to it as a member.

Additional group members can be admitted or removed at any time at the OIDC provider. The OSCM organizations are synchronized automatically with the corresponding groups at the OIDC provider at daily intervals at the time specified by the `TIMER_INTERVAL_SYNCHRONIZE_USERS_OFFSET` configuration setting. As an operator, you can manually synchronize the organizations with the groups at any time.

The synchronization registers new group members at the OIDC provider as OSCM users, where they can be assigned roles as required. Obsolete members are removed from the OSCM organizations, if possible.

Note:	For OSCM operations to work correctly, a specific user can be assigned to exactly one organization and group at a given time. In OSCM, users can be manually added to or removed from organizations. However, such changes will be undone with the next synchronization with the OIDC provider system.

To manually synchronize OSCM organizations with groups at the OIDC provider:

In the OSCM administration portal, choose **Manage users** in the **Operation** menu and click the appropriate button. For detailed step-by-step instructions, refer to the online help.

6 Managing Marketplaces

This chapter describes

- How to create marketplaces.
- How to change the owner of a marketplace.
- How to delete a marketplace.
- How to configure marketplaces.
- How to apply customizations by a marketplace owner to a marketplace.

For details on administrating and customizing marketplaces, refer to the *Marketplace Owner's Guide*.

Use the OSCM reporting facilities, for example, to retrieve information on the services published to your marketplace. For details, refer to *Reporting* on page 42.

6.1 Creating a Marketplace

You are responsible for creating marketplaces for the organizations that want to authorize suppliers, brokers, and resellers to publish their services using the facilities of OSCM.

Creating a marketplace includes defining the marketplace properties and assigning an organization as the owner of the marketplace. All administrators of the assigned owner organization automatically receive the marketplace manager role. The marketplace manager role enables them to administrate and customize the marketplace. As a prerequisite for creating a marketplace, the organization to be assigned as the marketplace owner must already exist.

If OSCM is operated in OIDC authentication mode, you need to select the tenant to be associated with the new marketplace. Users logging in to the marketplace will be authenticated by the OIDC provider system represented by the tenant.

To create a marketplace:

In the OSCM administration portal, choose **Create marketplace** in the **Marketplace** menu. For detailed step-by-step instructions, refer to the online help.

6.2 Changing the Owner of a Marketplace

The owner of a marketplace is responsible for administrating and customizing the marketplace to which suppliers, brokers, and resellers can publish their services. Assigning a new owner to a marketplace may remove the marketplace owner role from the previous owner organization and the marketplace manager role from its users. This is the case if the marketplace for which you change the owner is the last one owned by the organization.

To assign another owner to a marketplace:

In the OSCM administration portal, choose **Update marketplace** in the **Marketplace** menu. For detailed step-by-step instructions, refer to the online help.

6.3 Deleting a Marketplace

When deleting a marketplace with activated services, these services are automatically deactivated. Customers can no longer subscribe to them. Existing subscriptions, however, are not affected.

To delete a marketplace:

In the OSCM administration portal, choose **Delete marketplace** in the **Marketplace** menu. For detailed step-by-step instructions, refer to the online help.

6.4 Configuring Marketplaces

OSCM provides several configuration settings that influence the behavior of marketplaces. For example:

- `CUSTOMER_SELF_REGISTRATION_ENABLED`: Specifies whether customer organizations can register on a marketplace.
- `MP_ERROR_REDIRECT_HTTP` or `MP_ERROR_REDIRECT_HTTPS` : URL specifying a Web page that is to be displayed in case a visitor tries to access a marketplace without a valid marketplace ID. Note that this URL is used platform-wide. It is not tenant-specific.
- `TAGGING_MAX_TAGS`: The maximum number of tags composing the tag cloud.
- `TAGGING_MIN_SCORE`: The minimum number of times a tag must be used in services to be shown in the tag cloud.

For details on the settings, refer to *OSCM Configuration Settings* on page 55.

For details on how to change configuration settings, refer to *Updating OSCM and APP Configuration Settings* on page 21.

6.5 Customizing the Layout of Marketplaces

After deployment, OSCM provides a neutral branding for marketplaces. Marketplace owners can download the source files of this branding as a `branding-package.zip` file and use it as a basis for customizing the layout and branding of their marketplaces. Once a marketplace owner has finished his customizations, you are responsible for making the changes available in OSCM in the `oscm-branding` container.

To upload and deploy a customized branding, proceed as follows:

1. Log in to the Docker host as a superuser.
2. Extract the archive file provided by the marketplace owner (`<folder-name>.zip` file) to the following folder on your Docker host:

   `<docker>/config/oscm-branding/brandings/`

   `<docker>` is the OSCM data directory specified at installation time.
3. Provide the URL pointing to the customized files to the respective marketplace owner.

   The URL has the following format:

   `https://<host_fqdn>:8443/<folder-name>/css/mp.css`

   `<host_fqdn>` is the FQDN or IP address of the host to access OSCM, `8443` is the port. Omit the port if OSCM is operated with its proxy. `<folder-name>` is the name of the folder containing the customized branding files.

7 Reporting

OSCM offers comprehensive reports for different purposes and at different levels of detail. You can choose from various predefined reports.

The following reports are available for operators:

- **Supplier revenue report**: Shows the accumulated revenues of all suppliers and resellers registered with the platform.

  A time frame can be specified. Dates are to be entered in the format `YYYY-MM-DD`.

  The report shows the name, ID, and revenue of each supplier and reseller, and one accumulated value per currency. A supplier's revenue includes all revenues generated by his authorized brokers.

- **External services report**: Shows all sellers (suppliers, brokers, resellers) who have published services with the external access type to a marketplace on the platform.

  For each seller, the report shows the corresponding marketable services with their activation and deactivation time. If the services were activated and deactivated several times, all timestamps are listed.

- **Supplier revenue share report**: Shows the revenue share data for all suppliers registered with the platform for a specified month.

  For each marketplace, the revenue share data is calculated from the accumulated charges for subscriptions which were due during the past calendar month, irrespective of supplier-specific billing periods. For each supplier, the data is broken down to the organizations which generated the revenue as well as to the individual services. The suppliers' liabilities to the other participating parties are calculated. Discounts granted by a supplier to his customers are deducted from the revenue shares. The operator can specify the month for which to generate the report. The month is to be entered in the format `MM`, the year in the format `YYYY`.

- **Broker/reseller revenue share report**: Shows the revenue share data for all brokers and resellers registered with the platform.

  For each marketplace, the revenue share data is calculated from the accumulated charges for subscriptions which were due during the past calendar month. For each broker and reseller, the data is broken down to the suppliers who are providing the services to the brokers and resellers. The operator can specify the month for which to generate the report. The month is to be entered in the format `MM`, the year in the format `YYYY`.

- **Service report (of a supplier)**: Shows all marketable services of a supplier with their existing subscriptions. Subscriptions to services offered by brokers are also listed. The operator selects the supplier by specifying the supplier organization ID.
- **Customer report (of a supplier)**: Shows all customers of a supplier and his brokers with their organization ID and the services they have subscribed to. The report outputs whether a subscription is still active or has already ended. The operator selects the supplier by specifying the supplier organization ID.
- **Billing report (of a supplier)**: Shows a summary of all billing data for each customer of a supplier and his brokers.

  The operator selects the supplier by specifying the supplier organization ID. The billing data includes the billing data key of each subscription.

- **Detailed billing report for an existing invoice of a supplier's customer**: Shows the billing data of the current billing period for a selected subscription of a supplier's customer.

With pro rata cost calculation, the costs for the real service usage are calculated based on milliseconds. With per time unit calculation, the report contains the subscription costs for the time units that ended in the billing period. The operator selects the subscription by specifying a billing data key. The billing data key of each subscription is output by the **Billing report (of a supplier)**.

To create a report:

In the OSCM administration portal, choose **Create report** in the **Account** menu, and select the supplier revenue report. For detailed step-by-step instructions, refer to the online help.

The generated report is instantly displayed at the OSCM administration portal. You can choose to print the report or save it in several formats using the icons in the pane where the report is displayed.

8 Managing Billing and Payment

This chapter describes concepts and tasks of the operator related to billing and payment. It explains what billing runs are and how to:

- Define revenue shares.
- Handle billing data, including how to manually start a billing run or payment processing and retry failed payment processes, as well as how to preview or export billing data to an XML file.

8.1 Billing Runs

At daily intervals, the database content is checked for organizations which have produced billing-relevant data, the billing data is calculated, and the data is collected and stored in the database. These checks and calculations are called "billing runs for customer billing data".

Each supplier and reseller can define his preferred start day of the monthly billing periods. When a billing period ends, the costs for all customer subscriptions that were produced in the course of this period are calculated. This is done in the billing run that is executed on the start day of the next billing period plus the offset defined by the `TIMER_INTERVAL_BILLING_OFFSET` configuration setting. For example: A supplier defines that his billing period is to start on the 8th of a month. The `TIMER_INTERVAL_BILLING_OFFSET` is set to 5 days and 4 hours. The billing run calculating the costs for the supplier's customers is executed on the 13th of each month at 04:00:00.000.

You should check at regular intervals whether billing runs or payment processing fail, and, if yes, explicitly execute them.

8.2 Defining Revenue Shares

Suppliers may involve brokers and resellers in selling their services. The brokers and resellers as well as the platform operator and the owners of the marketplaces on which the services are published, usually receive a share of the revenue for the services. OSCM calculates these revenue shares based on the billing data for the customers who use the services. The operator revenue share applies irrespective of whether services are sold by the supplier or by his resellers and brokers. Discounts granted by a supplier to his customers are deducted from the operator revenue share.

Suppliers, brokers, resellers, and marketplace owners can generate reports for their revenue shares and export the revenue share data for a specific month. As an operator, you can export the data for all the suppliers, brokers, resellers, or marketplace owners known to your platform installation. The exported data can be forwarded, for example, to an accounting system which continues to process it. For details, refer to *Handling Billing Data* on page 45.

As an operator, you are responsible for defining the revenue shares. You can define the following:

- Operator revenue share to be paid by each supplier for using the platform.
- Marketplace owner revenue share to be paid by a supplier for publishing services on a specific marketplace.
- Revenue shares for broker and reseller organizations to be paid by a supplier for selling his services.

The revenue shares specify the percentage of the revenue the operator, marketplace owners, brokers, or resellers are entitled to.

The values you enter for revenue share percentages are based on agreed conditions between the operator, marketplace owners, suppliers, resellers, and brokers. You as the operator are

responsible for setting correct values. It is possible to set the percentages to a total of over 100%. This might be intentional. For example, a supplier who wants to strongly promote a service for a limited period of time may grant a broker or reseller a revenue share of 80%. In addition, the supplier may need to pay 30% of the revenue to the marketplace owner and 10% to the operator. This results in a total revenue share percentage of 120 and thus in a negative revenue for the supplier.

Revenue shares can be defined on the following levels:

1. **Operator revenue share**. It is defined for every supplier organization that wants to sell its services on your platform. The default operator revenue share is specified when you create a supplier organization. It is independent of the marketplace to which a service is published, and whether the supplier sells services himself or authorizes resellers and brokers to do so. Discounts granted by a supplier to his customers are deducted from the operator revenue share. The default operator revenue share applies to all services of a supplier as long as you do not define service-specific operator revenue shares. A service-specific operator revenue share applies to a specific marketable service and overrules the default operator revenue share defined for the respective supplier organization.
2. **Marketplace-specific revenue shares**. They are defined for one marketplace and comprise a percentage for the marketplace owner as well as a default for all broker and reseller organizations. Discounts granted by a supplier to his customers are deducted from the revenue share for the marketplace owner.
3. **Service-specific revenue shares**. For every marketable service a supplier offers to brokers or resellers for publishing, a service-specific revenue share can be defined. This revenue share applies irrespective of the marketplace the service is published to. It overrules any defined marketplace-specific revenue shares.
4. **Individual broker or reseller revenue shares**. An individual revenue share can be defined for each broker and reseller organization. This revenue share definition overrules the service-specific and marketplace-specific revenue share definitions.

To define operator revenue shares, proceed as follows:

- Default operator revenue share for a supplier organization:

  In the OSCM administration portal, choose **Create organization** in the **Operation** menu for a new supplier organization or **Manage organization** in the **Operation** menu for an existing supplier organization.

- To define a service-specific operator revenue share:

  In the OSCM administration portal, choose **Manage operator revenue share** in the **Operation** menu.

  For detailed step-by-step instructions, refer to the online help.

To define marketplace-specific revenue shares:

In the OSCM administration portal, choose **Update marketplace** in the **Marketplace** menu. For detailed step-by-step instructions, refer to the online help.

To define revenue shares for specific services, brokers, or resellers:

In the OSCM administration portal, choose **Manage broker revenue share** or **Manage reseller revenue share** in the **Marketplace** menu, respectively. For detailed step-by-step instructions, refer to the online help.

8.3 Handling Billing Data

This section describes how you can check whether billing runs have failed, re-invoke payment processes, or explicitly start a billing run. In addition, you can preview customer billing data for a specific period or export revenue share data to an XML file.

Use the OSCM reporting facilities to retrieve detailed information on all billing-relevant data of the suppliers, resellers, brokers, and marketplace owners managed on your platform. For details, refer to *Reporting* on page 42.

8.3.1 Start Billing Run

You can explicitly start a billing run for calculating the customer billing data for a billing period. The billing period for which the data is generated depends on the day when you start the billing run and on the `TIMER_INTERVAL_BILLING_OFFSET` configuration setting.

If you start a billing run on the first day of a month plus the day(s) defined in the `TIMER_INTERVAL_BILLING_OFFSET` setting, the revenue share data is also calculated and stored.

To start a billing run:

In the OSCM administration portal, choose **Execute billing tasks** in the **Operation** menu, and click **Execute** in the respective section of the Web page. For detailed step-by-step instructions, refer to the online help.

8.3.2 Retry Failed Payment Processes

When communication problems caused the automatic payment processing for an organization to fail, you can re-invoke these payment processes manually.

To retry failed payment processes:

In the OSCM administration portal, choose **Execute billing tasks** in the **Operation** menu, and click **Execute** in the respective section of the Web page. For detailed step-by-step instructions, refer to the online help.

8.3.3 Preview Billing Data

You can preview the billing data for a customer's subscriptions for a specified time frame. The billing data can be saved to an XML file or opened in an editor of your choice. You can edit the billing data and work with it as required, for example when forwarding the data to an accounting system.

The billing data preview collects the billing-relevant data for the specified customer and accumulates it for every day within the specified time frame. The data is not stored in the database; the result is just a cost projection for the customer organization.

To preview billing data:

In the OSCM administration portal, choose **Billing data preview** in the **Operation** menu. For detailed step-by-step instructions, refer to the online help.

The billing data is saved to an XML file (`<date>BillingData.xml`).

Refer to *Customer Billing Data* on page 103 for a detailed description of the XML file elements.

8.3.4 Export Revenue Share Data

You can export the revenue share data for all organizations with a specific role for a specific time frame. Based on the customer billing data calculated for the given time frame, the costs

are analyzed to determine the revenue shares for the operator, marketplace owners, brokers, and resellers and their effects on the suppliers' revenues. Discounts granted by a supplier to his customers are deducted from the revenue shares.

You can use the data to get an overview of who is to receive which revenue shares. The exported data can be forwarded, for example, to an accounting system which continues to process it. For example, you can invoice your revenue share to marketplace owners or suppliers. For details on defining revenue shares, refer to *Defining Revenue Shares* on page 44.

To export billing data:

In the OSCM administration portal, choose **Export billing data** in the **Account** menu. For detailed step-by-step instructions, refer to the online help.

The billing data can be saved to an XML file (`<date>BillingData.xml`) and opened in an editor of your choice. You can edit the data and work with it as required.

Refer to *Defining Revenue Shares* on page 44 for a detailed description of the XML file elements.

9 Integrating Custom SSL Certificates and Key Files

Certificates are required for OSCM to allow for trusted communication between OSCM and the Asynchronous Provisioning Platform (APP), an application underlying a technical service, or an external authorization server. The OSCM deployment creates an appropriate directory structure and Docker Compose configuration, and inserts default certificates for the individual containers, thus allowing for secure communication between OSCM and APP or standard authorization systems such as Microsoft Azure.

In addition, you can import individual certificates to the OSCM containers or make use of custom SSL key pairs for the application listeners. All you need to do is place the certificates and/or key files into the appropriate directories on the Docker host as described in more detail below. The certificates may be self-signed or official. Privacy Enhanced Mail (PEM) format is mandatory. This is a container format that may include just a public certificate or an entire certificate chain with public key, private key, and root certificates.

9.1 Importing Trusted SSL Certificates

If you want OSCM or your applications to trust certain, possibly self-signed SSL certificates, put them in PEM format into the following directory on your Docker host:

`<docker>/config/certs`

`<docker>` is the OSCM data directory on the Docker host specified at installation time.

The `<docker>/config/certs` directory is shared by all OSCM containers. However, you need to restart each container that is to use a new certificate you copy to the directory.

For example, if you want to use the VMware service controller, you need to export the vSphere certificate in PEM format and copy it to the `<docker>/config/certs` directory. Since the VMware service controller is running in the `oscm-app` container, a restart of this container is required.

9.2 Importing SSL Key Pairs for Application Listeners

If you want to use your own SSL key pairs for OSCM and your applications, replace the default key pairs by your PEM files in the following directories on your Docker host:

- Private key: `<docker>/config/<container-name>/ssl/privkey`
- Public certificate: `<docker>/config/<container-name>/ssl/cert`
- Intermediates / chain (optional): `<docker>/config/<container-name>/ssl/chain`

`<docker>` is the OSCM data directory on the Docker host specified at installation time. `<container-name>` is the name of the relevant OSCM container, for example, `oscm-core` or `oscm-app`.

The certificate must also be placed into the following directory shared by all containers so that a trusted relationship between the containers is established:

`<docker>/config/certs`

For example, if you have a custom SSL keypair for the `oscm-core` container, you need to place the private key into the `<docker>/config/oscm-core/ssl/privkey` directory, and the public certificate into the `<docker>/config/oscm-core/ssl/cert` directory. Additionally, you need to place the public certificate into the `<docker>/config/certs` directory. In this case, a restart of the `oscm-core`, `oscm-app`, and `oscm-identity` containers is required.

Appendix A: Configuration Settings

The OSCM software as well as the Asynchronous Provisioning Platform (APP) require a number of settings for configuring their container runtime environment. The mandatory settings have already been specified in environment variables in Docker files before deploying the containers. Usually, you needed to adapt the initial settings to your environment, in particular server names, ports, paths, and user IDs.

Store the configuration file on the Docker host where OSCM is deployed:

`<docker>/config/oscm-identity/tenants/tenant-<id>.properties`

`<docker>` is the OSCM data directory specified at installation time. `<id>` is the ID of the tenant created in OSCM.

After the deployment, you can update the configuration settings by editing the following configuration files in the OSCM data directory on the Docker host:

1. `.env`: Configuration settings for Docker, such as images and the data directory on the Docker host, as well as the fully qualified name (FQDN) or IP address of the host used to access OSCM
2. `var.env`: Configuration settings for OSCM and APP, such as authentication, mail server, database and other settings.

Refer to *Updating OSCM and APP Configuration Settings* on page 21 for details on updating configuration settings.

This appendix describes all settings that can be specified in detail.

A.1 Initial Configuration Settings

.env File

The following configuration settings must be set in the `.env` file:

- The Docker images to use and the registry from which they are to be fetched:
  - `IMAGE_DB`: image for the `oscm-db` container
  - `IMAGE_CORE`: image for the `oscm-core` container
  - `IMAGE_APP`: image for the `oscm-app` container
  - `IMAGE_BIRT`: image for the `oscm-birt` container
  - `IMAGE_BRANDING`: image for the `oscm-branding` container
  - `IMAGE_INITDB`: image for the temporary, stateless `oscm-initdb` container
  - `IMAGE_HELP`: image for the `oscm-help` container
  - `IMAGE_IDENTITY`: image for the `oscm-identity` container
  - `IMAGE_MAILDEV`: image for the `oscm-maildev` container
  - `IMAGE_PROXY`: image for the `oscm-proxy` container
- `DOCKER_PATH`: The directory where OSCM data is persisted on your Docker host. The name of the directory must be **`docker`**. It may be located in the root directory or in any subdirectory. The default directory is `/docker`.
- `HOST_FQDN`: The fully qualified name or IP address of the host used to access OSCM, for example, `host.mydomain.org`.

- COMPOSE_HTTP_TIMEOUT: The HTTP timeout for Docker Compose. You need to adjust this value if you get timeout errors during high load or network congestion.

var.env File

The following configuration settings must be set in the var.env file:

Settings for Connecting to the Databases

- DB_PORT_CORE

  The port of the PostgreSQL database (bss) where the configuration settings for the oscm-core container are stored.

  Must be set to 5432.

- DB_PORT_JMS

  The port of the PostgreSQL database (bssjms) where the JMS messages are stored.

  Must be set to 5432.

- DB_PORT_APP

  The port of the PostgreSQL database (bssapp) where the configuration settings for the oscm-app container are stored.

  Must be set to 5432.

- DB_PWD_CORE

  The password of the user to connect to the bss database.

  Default: bssuser

- DB_PWD_APP

  The password of the user to connect to the bssapp database.

  Default: bssappuser

- DB_SUPERPWD

  The password of the PostgreSQL database superuser.

  Default: postgres

Settings for Authentication

- AUTH_MODE

  The authentication mode. The value can be one of the following:

  - INTERNAL: Users are managed and authenticated by OSCM or an existing LDAP system of an organization.
  - OIDC: Users are managed and authenticated by an external provider such as Microsoft Azure Active Directory based on OpenID Connect.

  The authentication mode cannot be changed after the first database initialization of OSCM.

- ADMIN_USER_ID

  The initial administrator account, depending on the authentication mode:

  - INTERNAL: administrator
  - OIDC: A user existing in the OIDC provider system configured as the default tenant and assigned to the OSCM_PLATFORM_OPERATOR group in this system.

- `ADMIN_USER_PWD`

  The password of the initial administrator specified in `ADMIN_USER_ID`, depending on the authentication mode:

  - `INTERNAL`: `admin123`
  - `OIDC`: The password of the initial administrator as set in the OIDC provider system.

Settings for Connecting to the Mail Server

For sending emails to the OSCM users, a mail server is required. For quick start-up and testing purposes, OSCM comes with a mail mock (`oscm-maildev` container), for which the initial mail settings are configured. Change these settings to a real mail server as soon as possible.

- `SMTP_HOST`

  The host name or IP address of your mail server used for notifications by OSCM.

- `SMTP_PORT`

  The port used by your mail server.

- `SMTP_FROM`

  The email address to be used for emails sent by OSCM.

- `SMTP_USER`

  If your mail server requires authentication, the name of the user allowed to access the mail server. If no authentication is required, set to `none`.

- `SMTP_PWD`

  If your mail server requires authentication, the password of the user allowed to access the mail server. If no authentication is required, set to `none`.

- `SMTP_AUTH`

  Defines whether your mail server requires authentication. Can be set to `true` or `false`.

- `SMTP_TLS`

  Defines if TLS (Transport Layer Security) is to be used for mail server communication. Can be set to `true` or `false`.

- `APP_ADMIN_MAIL_ADDRESS`

  The email address used for emails sent by the Asynchronous Provisioning Platform (APP). For example, this is the email address of the administrator of the technology provider organization responsible for the OpenStack service controller.

Settings for Connecting with APP

- `APP_USER_NAME`

  The user for accessing OSCM from APP. The user specified here must have the administrator role for a technology provider organization in OSCM. The user account is used for carrying out actions on behalf of APP in OSCM and for registering service controllers.

  For the first deployment of OSCM, the value must be set as follows depending on the authentication mode (`AUTH_MODE` setting):

  - `INTERNAL`: `administrator`
  - `OIDC`: The initial administrator specified in the `ADMIN_USER_ID` setting

- `APP_USER_PWD`

The password of the user specified in APP_USER_NAME. The password is encrypted when it is stored in the database.

For the first deployment of OSCM, the value must be set as follows depending on the authentication mode (AUTH_MODE setting):

- INTERNAL: admin123
- OIDC: The password of the initial administrator specified in the ADMIN_USER_ID setting. It must be identical to the user's password in the OIDC provider system.

Settings for Connecting to the Service Controllers

- CONTROLLER_ORG_ID

  The ID of the organization in OSCM responsible for the service controller. The organization must have the technology provider role.

  For the first deployment of OSCM, the value must be set to PLATFORM_OPERATOR. The operator can then log in to the service controller and define the technology provider organization that is to be responsible.

- CONTROLLER_USER_KEY

  The identifier of the user for accessing the service controller specified in CONTROLLER_USER_NAME.

  For the first deployment of OSCM, the value must be set to 1000.

- CONTROLLER_USER_NAME

  The name of the user for accessing the service controller. The user specified here must have the technology manager role in OSCM and belong to the organization specified in the CONTROLLER_ORG_ID setting. It is recommended that the user account is used only for carrying out actions on behalf of the service controller in OSCM.

  For the first deployment of OSCM, the value must be set as follows depending on the authentication mode (AUTH_MODE setting):

  - INTERNAL: administrator
  - OIDC: The initial administrator specified in the ADMIN_USER_ID setting

- CONTROLLER_USER_PASS

  The password of the user for accessing the service controller. The password is encrypted when it is stored in the database.

  For the first deployment of OSCM, the value must be set as follows depending on the authentication mode (AUTH_MODE setting):

  - INTERNAL: admin123
  - OIDC: The password of the initial administrator specified in the ADMIN_USER_ID setting. It must be identical to the user's password in the OIDC provider system.

Settings for Connecting the VMware Service Controller with the vSphere Server

The VMware service controller requires the following additional settings:

- DB_USER_VMWARE

  The name of the user to connect to the vmware database. This database stores the vSphere configuration.

- `DB_PWD_VMWARE`

  The password of the user to connect to the `vmware` database. This database stores the vSphere configuration.

- `VCENTER_NAME`

  The name of the vCenter running on the vSphere server.

- `DATACENTER_NAME`

  The name of data center managed by the vCenter specified above.

- `CLUSTER_NAME`

  The name of the cluster where VMs are to be provisioned.

- `LOADBALANCER_NAME`

  The name of the load balancer used by vSphere. Usually, you can use the name of the VM Network in vSphere: `VM Network`.

Note: Be aware that the configuration of an entire vSphere environment including, for example, various data centers and clusters, requires the uploading of `.csv` files using the instance status interface of the VMware service controller. Refer to the *VMware vSphere Integration* guide for details. The initial configuration settings specified in the `var.env` file set up a connection to one vSphere vCenter, with one data center and one cluster only where the VMs will be provisioned.

Additional Settings

- `KEY_SECRET`

  A string which will be used in the `bss` database as a seed for encryption and decryption of service parameters with data type `PWD` and custom attributes marked for encryption. Make sure not to forget this string so that your database is persisted.

Note: Be aware that you must use the same key when updating the database. Otherwise, encryption and decryption is no longer possible after an update.

- `TOMEE_DEBUG`

  Defines if the application server is to generate log files for OSCM. Can be set to `true` or `false`.

- `LOG_LEVEL`

  Specifies the log level for OSCM. Allowed values are `ERROR`, `WARN`, `INFO`, and `DEBUG`.

Base URL Settings

The following settings provide base URLs for accessing OSCM and its components. If you are operating OSCM with its proxy, you do not need to change anything in these URLs. For working without the proxy, you must specify the appropriate port in each of the URLs following the string `${HOST_FQDN}` and separated by a colon, for example, `https://${HOST_FQDN}:8081/oscm-portal`.

IMPORTANT: Do not change or remove the string `${HOST_FQDN}` in the URLs. It is automatically replaced by the value of the `HOST-FQDN` variable defined in the `.env` configuration file when the settings are written to the `bss` database.

- `OSCM_CORE_URL`

The base URL used to access OSCM and to create the URLs for accessing services via HTTPS.

- Without port: `https://${HOST_FQDN}/oscm-portal`
- With port: `https://${HOST_FQDN}:8081/oscm-portal`

- `OSCM_APP_URL`

  The URL used to access APP and its web interface.

  - Without port: `https://${HOST_FQDN}/oscm-app`
  - With port: `https://${HOST_FQDN}:8881/oscm-app`

- `OSCM_IDENTITY_URL`

  Required with OIDC authentication mode. The URL of the OSCM identity service. The URL is used for redirecting and forwarding requests to the OIDC provider

  - Without port: `https://${HOST_FQDN}/oscm-identity`
  - With port: `https://${HOST_FQDN}:9091/oscm-identity`

- `OSCM_BIRT_URL`

  The URL of the report engine used to generate the OSCM reports. If you do not specify a correct URL template, OSCM will not be able to generate any reports, since the Report Web service cannot be called correctly.

  - Without port: `https://${HOST_FQDN}/frameset?__report=\${reportname}.rptdesign&SessionId=\${sessionid}&__locale=\${locale}&WSDLURL=\${wsdlurl}&SOAPEndPoint=\${soapendpoint}&wsname=Report&wsport=ReportPort`
  - With port: `https://${HOST_FQDN}:8681/frameset?__report=\${reportname}.rptdesign&SessionId=\${sessionid}&__locale=\${locale}&WSDLURL=\${wsdlurl}&SOAPEndPoint=\${soapendpoint} &wsname=Report&wsport=ReportPort`

- `MP_ERROR_REDIRECT_HTTPS`

  The URL of a Web page that is to be displayed in case a visitor tries to access a marketplace without a valid marketplace ID. This Web page will be shown instead of the default error message. Note that this URL is used platform-wide.

  The initial value in the configuration file is the URL of the first marketplace that is created.

  - Without port: `https://${HOST_FQDN}/oscm-portal/marketplace?mId=959c9bf7`
  - With port: `https://${HOST_FQDN}:8081/oscm-portal/marketplace?mId=959c9bf7`

Application Server Settings

- `CONTAINER_CALLBACK_THREADS`

  The number of threads for constructing and destroying beans. Required for the stateless `init-db` container.

  Default: `50`

- `CONTAINER_MAX_SIZE`

  The size of the instance pool for the stateless `init-db` container.

  Default: `50`

The following settings are used for the Docker environment, which needs access to the Docker registry, as well as for the OSCM containers which access the Internet. They are also used for the `oscm-app` container, which means that every HTTP request made by APP is processed using

these settings. This is independent on whether you have activated the OSCM proxy (`oscm-proxy` container).

- `PROXY_ENABLED`
  Defines whether the proxy is enabled in the containers. Can be set to `true` or `false`.
- `PROXY_HTTP_HOST`
  Host of the proxy used for HTTP connections
- `PROXY_HTTP_PORT`
  Port of the proxy used for HTTP connections
- `PROXY_HTTPS_HOST`
  Host of the proxy used for HTTPS connections
- `PROXY_HTTPS_PORT`
  Port of the proxy used for HTTPS connections
- `PROXY_NOPROXY`
  Pipe-separated list of hosts for which the proxy is to be bypassed. By default, this list already contains localhost, 127.0.0.1, and the IP address of the OSCM installation.

A.2 OSCM Configuration Settings

This section describes the OSCM configuration settings.

AUDIT_LOG_ENABLED

Optional. Specifies whether user operations related to subscriptions, marketable services, and price models are logged and stored in the database. If set to `true`, the operator can export audit log data to retrieve information on the user operations.

Allowed values: `true`, `false`

Default: `false`

AUDIT_LOG_MAX_ENTRIES_RETRIEVED

Optional. Specifies how many log entries are retrieved in one export of audit log data. If this number is exceeded, a warning is displayed asking the operator to change his filter criteria and start the export again. This setting is required to keep the number of SQL requests to the database low when audit log data is exported. Too many requests may lead to a decrease in system performance.

Allowed values: Any value between `1` and `1000`

Default: `100`

AUTH_MODE

Specifies the way users are managed and authenticated. The value can be one of the following:

- `INTERNAL`: Users are managed and authenticated by OSCM or an existing LDAP system of an organization.
- `OIDC`: Users are managed and authenticated by an external provider such as Microsoft Azure Active Directory based on OpenID Connect.

The authentication mode is evaluated at the first database initialization of OSCM and cannot be changed.

Default: `INTERNAL`

BASE_URL_HTTPS

The base URL is used to access OSCM and to create the URL for accessing services via HTTPS.

Syntax: `https://<host_fqdn>:8081/oscm-portal`

`<host_fqdn>` is the FQDN or IP address of the host to access OSCM, `8081` is the port. Omit the port if OSCM is operated with its proxy. `oscm-portal` is the context root of OSCM and cannot be changed.

This setting corresponds to the `OSCM_CORE_URL` setting in the `var.env` configuration file.

CUSTOMER_SELF_REGISTRATION_ENABLED

Optional. Specifies whether customer organizations can register on a marketplace. If set to `false`, the operator needs to create an organization for the customer who wants to register, or a seller (supplier, broker, reseller) needs to register the customer.

Allowed values: `true`, `false`

Default: `false`

DECIMAL_PLACES

Optional. Specifies the number of decimal places in which usage charges are calculated.

Allowed values: `2`, `3`, `4`, `5`, `6`

Default: `2`

HIDDEN_UI_ELEMENTS

Optional. Specifies user interface elements to be hidden from the OSCM administration portal and the marketplaces operated on your platform. You can use this setting to hide user interface elements both from the marketplaces and the administration portal.

Marketplaces

If you want to hide a menu option from the **Account** menu of the marketplaces operated on your platform, enter one of the following values:

- `marketplace.navigation.Profile`: **Profile** menu
- `marketplace.navigation.Payment`: **Payment** menu
- `marketplace.navigation.Subscriptions`: **Subscriptions** menu
- `marketplace.navigation.Users`: **Users & Units** menu
- `marketplace.navigation.Reports`: **Reports** menu
- `marketplace.navigation.Processes`: **Processes** menu
- `marketplace.navigation.Operations`: **Operations** menu

To hide several options from the **Account** menu, separate the options by a comma.

Administration Portal

If you want to hide a specific page from the OSCM administration portal, you can find out which value needs to be specified here as follows:

1. Open the respective page at the administration portal.
2. Display the online help for this page.

3. Have a look at the name of the online help HTML page.
4. Omit the file extension `.htm` and replace the underscore by a dot.

Example:

You want to hide the **Manage VAT rates** page. The online help HTML page name is `organization_manageVats.htm`. Thus, the respective administration portal page is `organization.manageVats`. You need to set the configuration setting as follows:

```
HIDDEN_UI_ELEMENTS=organization.manageVats
```

To hide several pages from the administration portal, separate the entries by a comma.

Below, you find some more examples of values that can be used to hide a specific page. The list is not complete.

- `organization.edit`: **Edit profile** page
- `shop.editSkin`: **Customize layout** page
- `techService.edit`: **Update service definition** page

To hide a complete menu from the administration portal, enter one of the following values:

- `navigation.myAccount`: **Account** menu
- `navigation.customer`: **Customer** menu
- `navigation.operator`: **Operation** menu
- `navigation.techService`: **Technical service** menu
- `navigation.service`: **Marketable service** menu
- `navigation.priceModel`: **Price model** menu
- `navigation.marketplace`: **Marketplace** menu

Note:	The **Update configuration settings** page in the **Operation** menu is the default page the operator is directed to when logging in. If you hide the page from the menu or hide the complete menu, you are still directed to the **Update configuration settings** page where you can make changes, if required.

KEY_FILE_PATH

The path to the file containing the key required for encryption and decryption of service parameters with data type `PWD` and custom attributes marked for encryption:
`/opt/apache-tomee/bin/key`

This setting cannot be changed.

LOG_LEVEL

The log level for OSCM.

Allowed values: `ERROR`, `WARN`, `INFO`, `DEBUG`

Default: `INFO`

MAIL_JA_CHARSET

Optional. Special character encoding for emails sent in Japanese.

Default: `UTF-8`

MAX_NUMBER_ALLOWED_USERS

The maximum number of users that can be registered within the OSCM installation.

Allowed values: Any value between `1` and `9223372036854775807`

Default: `1000`

MAX_NUMBER_LOGIN_ATTEMPTS

Optional. The maximum number of allowed login attempts to OSCM. If a user does not log in successfully with this number of attempts, his account is locked.

Allowed values: Any value between `1` and `9223372036854775807`

Default: `3`

MP_ERROR_REDIRECT_HTTPS

Optional. The URL of a Web page that is to be displayed in case a visitor tries to access a marketplace without a valid marketplace ID by HTTPS. This Web page will be shown instead of the default error message. Note that this URL is used platform-wide.

Syntax: `https://<your Web page>`

Make sure to specify a valid URL that does not exceed a maximum of 255 characters.

OSCM_IDENTITY_SERVICE_URL

Only required with OIDC authentication mode. The URL of the OSCM identity service. The URL is used for redirecting and forwarding requests to the OIDC provider.

Syntax: `https://<host_fqdn>:9091/oscm-identity`

`<host_fqdn>` is the FQDN or IP address of the host to access OSCM, `9091` is the port. Omit the port if OSCM is operated with its proxy. `oscm-identity` is the context root of the identity service and cannot be changed.

This setting corresponds to the `OSCM_IDENTITY_URL` setting in the `var.env` configuration file.

PERMITTED_PERIOD_INACTIVE_ON_BEHALF_USERS

The time in milliseconds after which a user who logged in on behalf of a customer and was inactive will be removed from the system: `604800000`, i.e. 7 days.

This setting cannot be changed.

PERMITTED_PERIOD_UNCONFIRMED_ORGANIZATIONS

Optional. The maximum time in milliseconds until an organization's initial administrative account must be confirmed. When this time has passed, the account is removed.

Allowed values: Any value between `1` and `9223372036854775807`

Default: `604800000`, i.e. 7 days

REPORT_ENGINEURL

The URL of the report engine used to generate the OSCM reports. If you do not specify a correct URL template, OSCM will not be able to generate any reports, since the Report Web service cannot be called correctly.

The setting must be as follows:

```
https://<host_fqdn>:8681/birt/frameset?
```

```
__report=\${reportname}.rptdesign&SessionId=\${sessionid}&
__locale=\${locale}&WSDLURL=\${wsdlurl}&SOAPEndPoint=\
${soapendpoint}&wsname=Report&wsport=ReportPort
```

<host_fqdn> is the FQDN or IP address of the host to access OSCM. Omit the port if OSCM is operated with its proxy.

This setting corresponds to the OSCM_BIRT_URL setting in the var.env configuration file.

REPORT_SOAP_ENDPOINT

The SOAP end point of the Report Web service. All report data is retrieved via a call to the Report Web service. If you do not specify a correct value, OSCM will not be able to generate any reports, since the Report Web service cannot be called correctly.

The required value is:

`https://oscm-core:8081/oscm-reporting/ReportingServiceBean`

The port is omitted if OSCM is operated with its proxy. This setting cannot be changed.

REPORT_WSDLURL

URL of the WSDL file of the Report Web service. All report data is retrieved via a call to the Report Web service. If you do not specify a correct value, OSCM will not be able to generate any reports, since the Report Web service cannot be called correctly.

The required value is:

`https://oscm-core:8081/oscm-reporting/ReportingServiceBean?wsdl`

The port is omitted if OSCM is operated with its proxy. This setting cannot be changed.

SSO_SIGNING_KEY_ALIAS

The alias of the private key of OSCM to be used for signing requests.

Requests are signed for the communication with Web pages or applications from custom tabs in subscriptions. The application server used for the Web page or Web application needs the corresponding certificate of OSCM in its truststore for verifying the signature.

Default: s1as

This setting cannot be changed.

SSO_SIGNING_KEYSTORE

The path and name of the application server's keystore where the private key of OSCM specified in the SSO_SIGNING_KEY_ALIAS setting is stored.

Default: ./keystore.jks

This setting cannot be changed.

SSO_SIGNING_KEYSTORE_PASS

The password for accessing the keystore specified in the SSO_SIGNING_KEYSTORE setting.

Default: changeit

This setting cannot be changed.

SUPPLIER_SETS_INVOICE_AS_DEFAULT

Specifies whether invoice is to be used as the default payment type for all customers.

Default: `false`

This setting cannot be changed.

TAGGING_MAX_TAGS

The maximum number of tags composing the tag cloud.

The tag cloud is the area of a marketplace containing defined search terms (tags). The more often a tag is used in services, the bigger the characters of the tag are displayed. Customers can use the tags to search for services, provided that the tag cloud is enabled for the marketplace by the marketplace owner.

Allowed values: Any value between `0` and `2147483647`

Default: `20`

TAGGING_MIN_SCORE

The minimum number of times a tag must be used in services to be shown in the tag cloud.

The tag cloud is the area of a marketplace containing defined search terms (tags). The more often a tag is used in services, the bigger the characters of the tag are displayed. Customers can use the tags to search for services, provided that the tag cloud is enabled for the marketplace by the marketplace owner.

Allowed values: Any value between `1` and `2147483647`

Default: `1`, i.e. a tag must have been used at least once so that it is shown in the tag cloud.

TIME_ZONE_ID

Specifies that the `GMT` time zone is used for display.

This setting cannot be changed.

TIMER_INTERVAL_BILLING_OFFSET

Optional. The offset in milliseconds for the timer for billing runs calculating subscription usage costs (customer billing data) or revenue share data. The interval for this timer is one day and cannot be changed. If no offset is defined, the default offset of 4 days is applied.

Customer billing data is calculated for a period of one month (billing period). Suppliers and resellers can define individual start days for their billing periods. Revenue share data is always calculated for the past month on the first day of a month.

The offset for the billing run timer defines the following:

- Number of days after which the billing run calculating the customer billing data or the revenue share data is executed.
- Time the timer for the daily billing runs expires on the current day.

Example:

A supplier defines the 10th of a month as the billing period start date. The offset is set to 4 days and 4 hours. The billing run that calculates the customer billing data for the past billing period of this supplier is started on the 14th of the following month at 04:00:00.000. The revenue share data is calculated on the 5th of the following month at 04:00:00.000. The daily check whether a billing period of any supplier has ended is started at 04:00:00.000 every day.

Allowed values: Any value between `0` and `2419200000` (28 days)

Default: `345600000`, i.e. 4 days.

TIMER_INTERVAL_DISCOUNT_END_NOTIFICATION_OFFSET

Optional. The offset in milliseconds for the timer for terminating the discounts for all organizations. The timer interval is one day and cannot be changed.

Allowed values: Any value between `0` and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_INACTIVE_ON_BEHALF_USERS

Optional. The time interval in milliseconds at which a check for non-existing users acting on behalf of another organization is executed. A value of 0 indicates that this timer is disabled.

A technical service definition may contain a flag (`allowingOnBehalfActing`) to indicate that an organization can act in the name of another organization. The organization must be a customer of the other organization, which must have both the technology provider and supplier role. Additionally, the customer organization must have allowed the other organization to log in on its behalf. This is achieved via a subscription whose underlying technical service has the `allowingOnBehalfActing` flag set to `true`.

When an organization acts in the name of another organization, an artificial user ID is generated.

Cleaning up the OSCM database from time to time to remove such users who no longer exist might be required since it cannot be ensured that a technical service always removes such users itself.

Allowed values: `0` and any value between `10000` (10 seconds) and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_INACTIVE_ON_BEHALF_USERS_OFFSET

Optional. The offset in milliseconds for the timer for removing inactive "on behalf" users.

Allowed values: Any value between `0` and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_ORGANIZATION

Optional. The time interval in milliseconds at which tasks related to organizations are executed. A value of 0 indicates that this timer is disabled.

Allowed values: `0` and any value between `10000` (10 seconds) and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_ORGANIZATION_OFFSET

Optional. The offset in milliseconds for the timer for organization-related tasks.

Allowed values: Any value between `0` and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_SUBSCRIPTION_EXPIRATION

Optional. The time interval in milliseconds at which a check for expired subscriptions is executed. This timer cannot be disabled, i.e. it cannot be set to 0.

Allowed values: Any value between `10000` (10 seconds) and `9223372036854775807`

Default: `86400000`, i.e. 1 day

TIMER_INTERVAL_SUBSCRIPTION_EXPIRATION_OFFSET

Optional. The offset in milliseconds for the timer for subscription expiration checks.

Allowed values: Any value between `0` and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_SYNCHRONIZE_USERS_OFFSET

Optional and relevant of OIDC authentication mode only. The offset in milliseconds for the timer to synchronize OSCM users in organizations with users in the corresponding groups in the OIDC provider system. The timer interval is one day and cannot be changed.

Allowed values: Any value between `0` and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_TENANT_PROVISIONING_TIMEOUT

Optional. The time interval in milliseconds at which a check for timed-out subscriptions is executed. A value of 0 indicates that this timer is disabled.

Allowed values: `0` and any value between `10000` (10 seconds) and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_TENANT_PROVISIONING_TIMEOUT_OFFSET

Optional. The offset in milliseconds for the timer for pending subscription checks.

Allowed values: Any value between `0` and `9223372036854775807`

Default: `0`

TIMER_INTERVAL_USER_COUNT

The time interval in milliseconds at which the amount of users registered with the platform is checked. This timer cannot be disabled, i.e. it cannot be set to 0.

Allowed values: Any value between `1` and `9223372036854775807`

Default: `43200000`, i.e. 12 hours

WS_TIMEOUT

The timeout for outgoing Web service calls in milliseconds. After this time has passed, a timeout exception is thrown by the JAX-WS framework.

An outgoing Web service call is a call initiated by OSCM. A typical example is the invocation of the `createUsers` method of the `ProvisioningService` interface, which is implemented by an application. If the timeout is reached before the Web service call returns, the operation is aborted and an exception is thrown.

Allowed values: Any value between `1` and `9223372036854775807`

Default: `30000`, i.e. 30 seconds

A.3 APP Configuration Settings

This section describes the configuration settings that are written to the `bssapp` database during deployment.

APP_BASE_URL

The URL for accessing the Web interface of APP

Syntax: `https://<host_fqdn>:8881/oscm-app`

`<host_fqdn>` is the FQDN or IP address of the host to access OSCM, `8881` is the port. Omit the port if OSCM is operated with its proxy. `oscm-app` is the context root of APP and cannot be changed.

This setting corresponds to the `OSCM_APP_URL` setting in the `var.env` configuration file.

APP_TIMER_INTERVAL

The interval (in milliseconds) at which APP polls the status of instances.

Default: `15000`.

APP_TIMER_REFRESH_SUBSCRIPTIONS

The interval (in milliseconds) at which APP polls the status of instances and updates the number of virtual machines (VMs) provisioned for subscriptions to IaaS services, for example in OpenStack. The number is updated only in case the technical service definition specifies a `VMS_NUMBER` parameter.

Default: `86400000` (once a day).

APP_TIMER_REFRESH_USAGEDATA

The interval (in milliseconds) at which APP triggers the execution of a Shell script for collecting events that caused usage costs in the cloud. As prerequisites, a script defining which events are to be collected must exist, the technical service definition must contain the definition of these events, and specify the execution of the usage data script.

Default: `86400000` (once a day).

APP_ADMIN_MAIL_ADDRESS

The email address to which email notifications are sent.

BSS_USER_KEY

The key of the user for accessing OSCM from APP.

The user specified here must have the administrator role for a technology provider organization in OSCM. The user account is used for carrying out actions on behalf of APP in OSCM and for registering service controllers.

Default: `1000`

Note:	To persistently change the key, you need to add the `APP_USER_KEY` setting to the `var.env` file.

BSS_USER_ID

The identifier of the user specified in `BSS_USER_KEY` for accessing OSCM.

Default: The user specified in the `APP_USER_NAME` setting in the `var.env` file at installation time.

Note:	To persistently change the user name, you need to use the `APP_USER_NAME` setting in the `var.env` file.

BSS_USER_PWD

The password of the user specified in `BSS_USER_KEY` for accessing OSCM.

Default: The password specified in the `APP_USER_PWD` setting in the `var.env` file at installation time.

Note: To persistently change the password, you need to use the `APP_USER_PWD` setting in the `var.env` file.

Appendix B: OIDC Tenant Configurations

The following sections describe the settings for configuring a tenant to connect to a specific OIDC provider, for example, a specific domain and directory in Microsoft Azure Active Directory (Azure AD).

The settings are specific to the OIDC provider and require *preparations in the OIDC provider system*. The following descriptions use Azure AD as an example. If you intend to work with a different OIDC provider, please contact your OSCM support organization for details.

When you define a tenant in OSCM, you can download a template with the settings. The final tenant configurations are stored in `.properties` files on the Docker host where OSCM is deployed:

`<docker>/config/oscm-identity/tenants/tenant-<id>.properties`

`<docker>` is the OSCM data directory specified at installation time. `<id>` is the ID of a tenant created in OSCM, or `default` for the default tenant defined at installation time.

oidc.provider

The implementation of OIDC in OSCM. The value must be set to `default`.

Example:

```
oidc.provider=default
```

oidc.clientId

The identifier of the application by which your OSCM installation is registered with the OIDC provider directory.

Azure AD example:

```
oidc.clientId=ef29bb22-369c-424d-9e72-6800ad24239e
```

oidc.clientSecret

The secret string generated at the OIDC provider that OSCM uses to prove its identity when requesting a token.

Azure AD example:

```
oidc.clientSecret=m2:bYmmlN6[Z:A:jqqO95nHi39.o0?pF
```

oidc.authUrl

The authorization endpoint at the OIDC provider to which OSCM sends single sign-on authentication requests.

Azure AD example:

```
oidc.authUrl=https://login.microsoftonline.com/mydomain.onmicrosoft.com/oauth2/
v2.0/authorize
```

In the URL, replace `mydomain` by the name of your domain.

oidc.authUrlScope

The permissions set for the OSCM application at the OIDC provider.

Azure AD example:

```
oidc.authUrlScope=openid profile offline_access https://graph.microsoft.com/
user.read.all https://graph.microsoft.com/directory.readwrite.all https://
graph.microsoft.com/group.readwrite.all
```

oidc.logoutUrl

The endpoint at the OIDC provider to which OSCM sends logout requests.

Azure AD example:

```
oidc.logoutUrl=https://login.microsoftonline.com/mydomain.onmicrosoft.com/
oauth2/v2.0/logout
```

In the URL, replace `mydomain` by the name of your domain.

oidc.tokenUrl

The endpoint at the OIDC provider to which OSCM sends requests related to tokens, such as token retrieval, refreshment, or validation.

Azure AD example:

```
oidc.tokenUrl=https://login.microsoftonline.com/mydomain.onmicrosoft.com/oauth2/
v2.0/token
```

In the URL, replace `mydomain` by the name of your domain.

oidc.redirectUrl

The redirect URL of your OSCM installation to which the OIDC provider sends its responses.

Azure AD example:

```
oidc.redirectUrl=https://myhost:9091/oscm-identity/callback
```

In the URL, replace `myhost` by the FQDN or IP address of the host to access your OSCM installation.

oidc.configurationUrl

The URL of the OpenID layer configuration for your domain at the OIDC provider.

Azure AD example:

```
oidc.configurationUrl=https://login.microsoftonline.com/
mydomain.onmicrosoft.com/v2.0/ .well-known/openid-configuration
```

In the URL, replace `mydomain` by the name of your domain.

oidc.idpApiUri

The URL of the main entry point to the API of the OIDC provider.

Azure AD example:

```
oidc.idpApiUri=https://graph.microsoft.com
```

oidc.usersEndpoint

The entry point to the API for users at the OIDC provider.

Azure AD example:

```
oidc.usersEndpoint=https://graph.microsoft.com/v1.0/users
```

oidc.groupsEndpoint

The entry point to the API for groups at the OIDC provider.

Azure AD example:

```
oidc.groupsEndpoint=https://graph.microsoft.com/v1.0/groups
```

Appendix C: LDAP Keys

The following keys must be defined in a configuration file for enabling access to an organization's LDAP system:

Key	Description
LDAP_URL	Mandatory. Provider URL of the LDAP server. This LDAP server is used for user authentication. Example: `LDAP_URL=ldap://myldapserver.lan.est.company.de:389`
LDAP_BASE_DN	Mandatory. Position in the LDAP directory tree at which to start looking for users. Example: `LDAP_BASE_DN=ou=people,dc=est,dc=mycompany,dc=de`
LDAP_PRINCIPAL	Optional. Name of the user who is allowed to query the LDAP server. Example: `LDAP_PRINCIPAL=uid=admin,ou=system`
LDAP_CREDENTIALS	Optional. Password of the user who is allowed to query the LDAP server. Example: `LDAP_CREDENTIALS=secret`
LDAP_ATTR_UID	Mandatory. LDAP attribute from which a user ID is read. The default used when an organization is created is `uid` unless the operator has defined a different value in the platform LDAP settings. Example: `LDAP_ATTR_UID=uid`
LDAP_ATTR_EMAIL	Optional. LDAP attribute from which the email address of a user is read. Example: `LDAP_ATTR_EMAIL=scalixEmailAddress`
LDAP_ATTR_FIRST_NAME	Optional. LDAP attribute from which the first name of a user is read. Example: `LDAP_ATTR_FIRST_NAME=givenName`
LDAP_ATTR_LAST_NAME	Optional. LDAP attribute from which the last name of a user is read. Example: `LDAP_ATTR_LAST_NAME=sn`
LDAP_ATTR_ADDITIONAL_NAME	Currently not used.
LDAP_ATTR_LOCALE	Optional. LDAP attribute from which the default language to be stored for a user is read. Example: `LDAP_ATTR_LOCALE=locale`

LDAP_CONTEXT_FACTORY	Mandatory. Context factory which provides the API to query the LDAP server. The default used when an organization is created is `com.sun.jndi.ldap.LdapCtxFactory` unless the operator has defined a different value in the platform LDAP settings. Example: `LDAP_CONTEXT_FACTORY=com.sun.jndi.ldap.LdapCtxFactory`
LDAP_ATTR_REFERRAL	Optional. Property defining how LDAP referrals are to be processed. If an organization uses an Active Directory with sub-domains from which users are to be imported into OSCM, the sub-domains can be modeled as referrals. In this sense, a referral is a reference to another directory partition or sub-domain. By default, values from referrals are not retrieved. This property can take on the following values: `follow`: Referrals are followed, i.e. users are imported from all referenced directory partitions or sub-domains. `ignore`: Referrals are ignored (default), i.e. users are imported from the current domain directory only. Example: `LDAP_ATTR_REFERRAL=ignore`

Appendix D: Audit Log

The operator can view and export audit log data on all kinds of user operations related to subscriptions and marketable services including their price models. This may be useful, for example, to check when and by whom a price model was changed, when subscriptions were created, when and by whom a license description was changed.

Single entries of the audit log consist of a **header** and a **message**, separated by a comma.

The header consists of the following elements, separated by a blank:

- `MM/DD/YYYY_hh:mm:ss.SSS`: The local server date and time.
- `FSP_SW/CT-MG_CTMG-BSS`: The predefined log label for log entries resulting from user operations on your platform. This label cannot be changed.
- `INFO`: The default log level. This level cannot be changed.
- `3<nnnn>`: The ID of the operation that was logged. This is a number between 30000 and 39999. The ID is unique for each operation. For example, the ID of the `Define service` operation is 30090, the ID of the `Subscribe to service` operation is 30000.
- `<operation>`: The operation that was logged, for example, `Define service`.

Following the header, the detailed log message is appended. It consists of name-value pairs with additional information, separated by vertical bars (|).

Every message starts with the following name-value pairs:

- `userId=<user ID>`: The ID of the user who executed the operation.
- `orgId=<organization ID>`: The ID of the organization the user belongs to.
- `orgName=<organization name>`: The name of the organization the user belongs to.
- `<additional name-value pairs>`: Additional name-value pairs specific to the logged operation, separated by vertical bars (|).

The log entries are categorized by the role of the user who executed an operation:

- *User Operations* on page 70
- *Administrator Operations* on page 71
- *Service Manager Operations* on page 77

The log entries show the information as stored in the database. If there are updated values, the initial values are not contained in the audit log file.

D.1 User Operations

This section explains the messages that are output in the audit log for operations executed by standard users on a marketplace.

The following `<additional name-value pairs>` are appended to the header and the name-value pairs common to all log entries:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.

Additional name-value pairs may be appended depending on the logged operation.

Operation: **Execute service operation**

Description: A user selected an operation to be executed for the service he subscribed to. The operations and their parameters are defined in the technical service underlying the marketable service.

Additional name-value pairs:

- `serviceOperation=<operation>`: The ID of the service operation executed by the user.
- `<parameter ID>=<parameter value>`: List of operation parameters, separated by vertical bars (|). For every parameter, its ID and its corresponding value are indicated.

D.2 Administrator Operations

This section explains the messages that are output in the audit log for operations executed by an administrator of an organization with any role on a marketplace. Most of these operations can also be executed by OU administrators and subscription managers.

`<additional name-value pairs>` are appended depending on the logged operation.

Operation: **Assign service role**

Description: An administrator, OU administrator, or subscription manager set or changed a service role for a user assigned to a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `user=<user ID>`: The ID of the user who was assigned the service role.
- `userRole=<service role>`: The name of the service role as defined in the underlying technical service.

Operation: **Assign user to organizational unit**

Description: An administrator or OU administrator added one or more users to an organizational unit.

Additional name-value pairs:

- `user=<user ID>`: The IDs of the users who were assigned to the organizational unit, separated by commas.
- `organizationalUnit=<organizational unit name>`: The name of the organizational unit to which the users were added.

Operation: **Assign user to subscription**

Description: An administrator, OU administrator, or subscription manager assigned a user to a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `user=<user ID>`: The ID of the user who was assigned to the subscription.

Operation: **Deassign service role**

Description: An administrator, OU administrator, or subscription manager removed a service role from a user assigned to a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `user=<user ID>`: The ID of the user who was deassigned the service role.
- `userRole=<service role>`: The name of the service role as defined in the underlying technical service.

Operation: **Deassign user from subscription**

Description: An administrator, OU administrator, or subscription manager removed the assignment of a user to a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `user=<user ID>`: The ID of the user who was deassigned from the subscription.

Operation: **Disable access to services**

Description: An administrator or OU administrator specified the services that can no longer be accessed by the members of an organizational unit. For every service, a separate log entry is written.

Additional name-value pairs:

- `organizationalUnit=<organizational unit name>`: The name of the organizational unit whose members cannot access the service.
- `marketplaceId=<marketplace ID>`: The ID of the marketplace on which the members of the organizational unit were able to access the service.
- `marketplaceName=<marketplace name>`: The name of the marketplace on which the members of the organizational unit were able to access the service.
- `serviceID=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `sellerID=<seller ID>`: The organization ID of the supplier, broker, or reseller who offers the service.

Operation: **Edit customer attribute by customer**

Description: An administrator or subscription manager defined or changed an attribute value for a customer attribute. For every attribute value, a separate log entry is written.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `attributeName=<attribute name>`: The name of the customer attribute.
- `attributeValue=<attribute value>`: The value of the customer attribute.

Operation: **Edit subscription attribute by customer**

Description: An administrator, OU administrator, or subscription manager defined or changed an attribute value for a custom subscription attribute. For every attribute value, a separate log entry is written.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `attributeName=<attribute name>`: The name of the custom attribute.
- `attributeValue=<attribute value>`: The value of the custom attribute.

Operation: **Edit subscription owner**

Description: An administrator or OU administrator set or changed the owner of a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `subscriptionOwner=<user ID>`: The ID of the administrator, OU administrator, or subscription manager who was set as the new owner of the subscription.

Operation: **Edit subscription parameter configuration**

Description: An administrator, OU administrator, or subscription manager changed the parameter options for a subscription. For every parameter option, a separate log entry is written.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `parameterName=<option name>`: The name of the parameter option.
- `parameterValue=<option value>`: The new option value. For boolean parameter options, `ON` or `OFF` (`ON`: the option has been selected, `OFF`: the option has not been selected). For enumerations, the value set for the parameter option.

Operation: **Enable access to services**

Description: An administrator or OU administrator specified the services that can be accessed by the members of an organizational unit. For every service, a separate log entry is written.

Additional name-value pairs:

- `organizationalUnit=<organizational unit name>`: The name of the organizational unit whose members can access the service.
- `marketplaceId=<marketplace ID>`: The ID of the marketplace on which the members of the organizational unit can access the service.
- `marketplaceName=<marketplace name>`: The name of the marketplace on which the members of the organizational unit can access the service.
- `serviceID=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `sellerID=<seller ID>`: The organization ID of the supplier, broker, or reseller who offers the service.

Operation: **Remove user from organizational unit**

Description: An administrator or OU administrator removed one or more users from an organizational unit.

Additional name-value pairs:

- `user=<user IDs>`: The IDs of the users who were removed from the organizational unit, separated by commas.
- `organizationalUnit=<organizational unit name>`: The name of the organizational unit from which the users were removed.

Operation: **Report issue**

Description: An administrator, OU administrator, or subscription manager reported an issue on a subscription to the responsible supplier or reseller.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `issue=<text>`: The subject of the issue as entered by the administrator, OU administrator, or subscription manager.

Operation: **Set subscription billing address**

Description: An administrator, OU administrator, or subscription manager set or changed the billing address for a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `address=<display name>`: The name of the billing address as shown to the user.
- `addressDetails=<address details>`: The name of the organization, email, and postal address to which invoices are to be sent.

Operation: **Set subscription payment type**

Description: An administrator, OU administrator, or subscription manager set or changed the payment type for a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `paymentName=<display name>`: The name of the payment type as shown to the user.
- `paymentType=<payment type>`: The payment type name as offered by the supplier.

Operation: **Subscribe to service**

Description: An administrator, OU administrator, or subscription manager completed subscribing to a marketable service offered on a marketplace.

Additional name-value pairs.

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.

Operation: **Unsubscribe from service**

Description: An administrator, OU administrator, or subscription manager terminated a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.

Operation: **Up/downgrade subscription**

Description: An administrator, OU administrator, or subscription manager upgraded or downgraded a subscription.

Additional name-value pairs:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.
- `subscriptionName=<subscription name>`: The name of a subscription as entered when subscribing to a service.
- `newServiceId=<service ID>`: The ID of the marketable service to which the subscription was upgraded or downgraded.
- `newServiceName=<service name>`: The service name for customers of the service to which the subscription was upgraded or downgraded.

D.3 Service Manager Operations

This section explains the messages that are output in the audit log for operations that can be executed in the administration portal by a service manager of an organization with the supplier role. Some of these operations can also be executed by brokers or resellers.

The following `<additional name-value pairs>` are appended to the header and the name-value pairs common to all log entries:

- `serviceId=<service ID>`: The ID of a marketable service as entered during its creation.
- `serviceName=<service name>`: The service name for customers of a marketable service as entered during its creation.

Additional name-value pairs may be appended depending on the logged operation.

Operation: **Activate/deactivate service**

Description: A service manager, broker, or reseller activated or deactivated a marketable service.

Additional name-value pairs:

- `marketplaceId=<ID>`: The ID of the marketplace to which the service is published.
- `marketplaceName=<name>`: The name of the marketplace to which the service is published.
- `activation=<on or off>`: Specifies whether the service was activated or deactivated. Can be `ON` or `OFF`.
- `inCatalog=<on or off>`: Specifies whether the service is to be displayed in the service catalog. Can be `ON` or `OFF`.

Operation: **Assign brokers**

Description: In the publishing options, a service manager authorized a broker to sell the supplier's services.

Additional name-value pair:

`BrokerId=<ID>`: The organization ID of the assigned broker.

Operation: **Assign categories**

Description: In the publishing options, a service manager, broker, or reseller assigned or deassigned one or several categories to/from a marketable service.

Additional name-value pair:

`listOfCategories=<names>`: The categories that are assigned, separated by commas.

Operation: **Assign resellers**

Description: In the publishing options, a service manager authorized a reseller to sell the supplier's services.

Additional name-value pair:

`ResellerId=<ID>`: The organization ID of the assigned reseller.

Operation: **Assign service to marketplace**

Description: In the publishing options, a service manager, broker, or reseller specified or changed the marketplace to which a marketable service is to be published.

Additional name-value pairs:

- `marketplaceId=<ID>`: The ID of the marketplace.
- `marketplaceName=<name>`: The name of the marketplace.

Operation: **Copy service**

Description: A service manager created a copy of a marketable service.

Additional name-value pairs:

- `copyId=<service ID>`: The ID of the marketable service copy as stored in the database.
- `copyName=<service name>`: The name of the marketable service copy as entered when the copy was created.

Operation: **Deassign brokers**

Description: In the publishing options, a service manager removed a broker's right to sell the supplier's services.

Additional name-value pair:

`BrokerId=<ID>`: The organization ID of the deassigned broker.

Operation: **Deassign resellers**

Description: In the publishing options, a service manager removed a reseller's right to sell the supplier's services.

Additional name-value pair:

`ResellerId=<ID>`: The organization ID of the deassigned reseller.

Operation: **Define service**

Description: A service manager defined a marketable service. One additional **Update service parameter** log entry is created for each parameter and parameter option defined in the service.

Additional name-value pairs:

- `technServiceName=<name>`: The name of the technical service the marketable service is based on.
- `shortDescription=<yes or no>`: Specifies whether the short description of the marketable service was entered. Can be `YES` or `NO`.
- `description=<yes or no>`: Specifies whether the description of the marketable service was entered. Can be `YES` or `NO`.
- `locale=<language code>`: The code of the language in which the descriptions were saved.
- `autoAssignUser=<yes or no>`: Specifies whether the user subscribing to the service is automatically assigned to the subscription. Can be `YES` or `NO`.

Operation: **Define up/downgrade options**

Description: A service manager defined options to which a subscription can be upgraded or downgraded, or he removed a service from the list of up/downgrade options.

Additional name-value pairs:

- `targetId=<service ID>`: The ID of the marketable service to which subscriptions can be up/downgraded as stored in the database.
- `targetName=<service name>`: The name of the marketable service to which subscriptions can be up/downgraded.
- `upDownGrade=<on or off>`: Specifies whether the service was added or removed as an up/downgrade option. Can be `ON` or `OFF`.

Operation: **Delete customer price model**

Description: A service manager deleted a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.

Operation: **Delete service**

Description: A service manager deleted a marketable service.

No additional name-value pairs.

Operation: **Edit event price in customer price model**

Description: A service manager defined or changed the price for an event in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `eventName=<name>`: The name of the event as defined in the underlying technical service.
- `range=<value>`: If stepped prices are defined, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit event price in service price model**

Description: A service manager defined or changed the price for an event in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `eventName=<name>`: The name of the event as defined in the underlying technical service.
- `range=<value>`: If stepped prices are defined, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit event price in subscription price model**

Description: A service manager defined or changed the price for an event in a subscription-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `eventName=<name>`: The name of the event as defined in the underlying technical service.
- `range=<value>`: If stepped prices are defined, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit one time fee in customer price model**

Description: A service manager defined or changed a one-time fee in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `oneTimeFee=<fee>`: The one-time fee for a subscription.

Operation: **Edit one time fee in service price model**

Description: A service manager defined or changed a one-time fee in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `oneTimeFee=<fee>`: The one-time fee for a subscription.

Operation: **Edit customer price model**

Description: A service manager defined or changed the currency, time unit, calculation mode, and/or a free trial period of a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit for recurring charges and per time unit calculation. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `calculationMode=<calculation option>`: The way charges for using a service are calculated. Can be `PRO_RATA` or `PER_UNIT`.
- `trialPeriod=<on or off>`: Specifies whether a free trial period has been defined in the price model. Can be `ON` or `OFF`.
- `daysOfTrial=<Number of days>`: The number of days defined for the free trial period.

Operation: **Edit service price model**

Description: A service manager defined or changed the currency, time unit, calculation mode and/or a free trial period of a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit for recurring charges and per time unit calculation. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `calculationMode=<calculation option>`: The way charges for using a service are calculated. Can be `PRO_RATA` or `PER_UNIT`.
- `trialPeriod=<on or off>`: Specifies whether a free trial period has been defined in the price model. Can be `ON` or `OFF`.
- `daysOfTrial=<Number of days>`: The number of days defined for the free trial period.

Operation: **Edit price model type to free of charge for customer**

Description: A service manager defined or changed a free-of-charge, customer-specific price model so that no costs are charged for using the service.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.

Operation: **Edit price model type to free of charge for service**

Description: A service manager defined or changed a free-of-charge service price model so that no costs are charged for using the service.

No additional name-value pairs.

Operation: **Edit price per subscription parameter in customer price model**

Description: A service manager defined or changed the price per subscription for a parameter or a parameter option in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `range=<value>`: For numeric parameters, stepped prices can be defined. If this is the case, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per subscription parameter in service price model**

Description: A service manager defined or changed the price per subscription for a parameter or a parameter option in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `range=<value>`: For numeric parameters, stepped prices can be defined. If this is the case, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per subscription parameter in subscription price model**

Description: A service manager defined or changed the price per subscription for a parameter or a parameter option in a subscription-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `range=<value>`: For numeric parameters, stepped prices can be defined. If this is the case, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per user parameter in customer price model**

Description: A service manager defined or changed the price per user for a parameter or a parameter option in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per user parameter in service price model**

Description: A service manager defined or changed the price per user for a parameter or a parameter option in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per user parameter in subscription price model**

Description: A service manager defined or changed the price per user for a parameter or a parameter option in a subscription-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per user role parameter in customer price model**

Description: A service manager defined or changed the price per user with a specific service role for a parameter or a parameter option in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `userRole=<role name>`: The name of the service role as defined in the underlying technical service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per user role parameter in service price model**

Description: A service manager defined or changed the price per user with a specific service role for a parameter or a parameter option in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `userRole=<role name>`: The name of the service role as defined in the underlying technical service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit price per user role parameter in subscription price model**

Description: A service manager defined or changed the price per user with a specific service role for a parameter or a parameter option in a subscription-specific specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `userRole=<role name>`: The name of the service role as defined in the underlying technical service.
- `parameterName=<name>`: The name of the parameter as defined in the underlying technical service.
- `optionName=<name>`: The name of the parameter option as defined in the underlying technical service.
- `price=<price>`: The price as defined in the price model.

Operation: **Edit recurring charge for subscription in customer price model**

Description: A service manager defined or changed the recurring charge per subscription in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `oneTimeFee=<fee>`: The one-time fee for a subscription.
- `recurringCharge=<charge>`: The recurring charge per subscription.

Operation: **Edit recurring charge for subscription in service price model**

Description: A service manager defined or changed the recurring charge per subscription in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `oneTimeFee=<fee>`: The one-time fee for a subscription.
- `recurringCharge=<charge>`: The recurring charge per subscription.

Operation: **Edit recurring charge for subscription in subscription price model**

Description: A service manager defined or changed the recurring charge per subscription in a subscription-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `oneTimeFee=<fee>`: The one-time fee for a subscription.
- `recurringCharge=<charge>`: The recurring charge per subscription.

Operation: **Edit recurring charge for users in customer price model**

Description: A service manager defined or changed the recurring charge for users in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `range=<value>`: If stepped prices are defined, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `recurringCharge=<charge>`: The recurring charge for users.

Operation: **Edit recurring charge for users in service price model**

Description: A service manager defined or changed the recurring charge for users in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `range=<value>`: If stepped prices are defined, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `recurringCharge=<charge>`: The recurring charge for users.

Operation: **Edit recurring charge for users in subscription price model**

Description: A service manager defined or changed the recurring charge for users in a subscription-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `range=<value>`: If stepped prices are defined, this is the step limit up to which the price applies. If no stepped prices are defined, the value is `1-ANY`.
- `action=<action>`: If stepped prices are defined, action that was executed. Can be `INSERT` (when a new stepped price was defined), `UPDATE` (when a stepped price was updated), or `DELETE` (when a stepped price was deleted. If no stepped prices are defined, the `action` parameter is not written to the audit log.
- `recurringCharge=<charge>`: The recurring charge for users.

Operation: **Edit service role prices for customer price model**

Description: A service manager defined or changed the recurring charge for users with a given service role in a customer-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `userRole=<role name>`: The name of the service role as defined in the underlying technical service.
- `price=<price>`: The recurring charge for users having the selected role.

Operation: **Edit service role prices for service price model**

Description: A service manager defined or changed the recurring charge for users with a given service role in a service price model.

Additional name-value pairs:

- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `userRole=<role name>`: The name of the service role as defined in the underlying technical service.
- `price=<price>`: The recurring charge for users having the selected role.

Operation: **Edit service role prices for subscription price model**

Description: A service manager defined or changed the recurring charge for users with a given service role in a subscription-specific price model.

Additional name-value pairs:

- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `currency=<currency code>`: The ISO code of the currency in which a customer is charged for using the service.
- `timeUnit=<time unit>`: The time unit defined for recurring charges. Can be `MONTH`, `WEEK`, `DAY`, or `HOUR`.
- `userRole=<role name>`: The name of the service role as defined in the underlying technical service.
- `price=<price>`: The recurring charge for users having the selected role.

Operation: **Edit subscription attribute by service manager**

Description: A service manager defined or changed an attribute value for a custom subscription attribute. For every attribute value, a separate log entry is written.

Additional name-value pairs:

- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `attributeName=<attribute name>`: The name of the custom attribute.
- `attributeValue=<attribute value>`: The value of the custom attribute.

Operation: **Localize price model for customer**

Description: A service manager translated the price model elements for a customer into a given language.

Additional name-value pairs:

- `customerKey=<ID>`: The ID of the customer organization.
- `customerName=<name>`: The name of the customer organization.
- `locale=<language code>`: The code of the language in which the texts were saved.
- `description=<yes or no>`: Specifies whether the description of the price model was changed. Can be `YES` or `NO`.
- `license=<yes or no>`: Specifies whether the license information was changed. Can be `YES` or `NO`.

Operation: **Localize price model for service**

Description: A service manager translated the price model elements for a service into a given language.

Additional name-value pairs:

- `locale=<language code>`: The code of the language in which the texts were saved.
- `description=<yes or no>`: Specifies whether the description of the price model was changed. Can be `YES` or `NO`.
- `license=<yes or no>`: Specifies whether the license information was changed. Can be `YES` or `NO`.

Operation: **Localize price model for subscription**

Description: A service manager translated the price model elements for a subscription into a given language.

Additional name-value pairs:

- `customerKey=<ID>`: The ID of the customer organization.
- `customerName=<name>`: The name of the customer organization.
- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `locale=<language code>`: The code of the language in which the texts were saved.
- `description=<yes or no>`: Specifies whether the description of the price model was changed. Can be `YES` or `NO`.
- `license=<yes or no>`: Specifies whether the license information was changed. Can be `YES` or `NO`.

Operation: **Localize service**

Description: A service manager added a service description or short description in another language.

Additional name-value pairs:

- `shortDescription=<yes or no>`: Specifies whether the short description of the marketable service was changed. Can be `YES` or `NO`.
- `description=<yes or no>`: Specifies whether the description of the marketable service was changed. Can be `YES` or `NO`.
- `locale=<language code>`: The code of the language in which the descriptions were saved.

Operation: **Set service as public**

Description: In the publishing options, a service manager, broker, or reseller specified that a marketable service is to be public or that a public marketable service is no longer to be public.

Additional name-value pair:

`public=<true or false>`: Specifies whether the service has been marked as public. Can be `true` (service is public) or `false` (service is not public).

Operation: **Terminate subscription**

Description: A service manager or reseller explicitly terminated a customer's subscription.

Additional name-value pairs:

- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `reason=<termination reason>`: Text explaining the reason for terminating the subscription.

Operation: **Update service**

Description: A service manager changed a marketable service.

Additional name-value pairs:

- `shortDescription=<yes or no>`: Specifies whether the short description of the marketable service was changed. Can be `YES` or `NO`.
- `description=<yes or no>`: Specifies whether the description of the marketable service was changed. Can be `YES` or `NO`.
- `locale=<language code>`: The code of the language in which the descriptions were saved.
- `autoAssignUser=<yes or no>`: Specifies whether the user subscribing to the service is automatically assigned to the subscription. Can be `YES` or `NO`.

Operation: **Update service parameter**

Description: A service manager defined or changed a parameter or parameter option.

Additional name-value pairs:

- `parameterName=<name>`: Name of the parameter as defined in the underlying technical service.
- `userOption=<on or off>`: Specifies whether the parameter is offered as an option to customers who subscribe to the marketable service. Can be `ON` or `OFF`.
- `parameterValue=<value>`: For a parameter, the actual string or number; for a parameter option, this can be `YES` or `NO`.

Operation: **View subscription**

Description: A service manager, broker, or reseller displayed the details of a subscription.

Additional name-value pairs:

- `subscriptionName=<subscription name>`: The name of the subscription as entered when subscribing to a service.
- `customerKey=<organization ID>`: The ID of the customer organization.
- `customerName=<organization name>`: The name of the customer organization.

Appendix E: Language Resource Bundles

A language bundle consists of the following resources:

- **User interface resources**: All texts that appear on the user interface or in generated emails.
- **Online help** and **FAQ** HTML files: The online help topics are available in the administration portal, the FAQs are available on the marketplaces.

This appendix provides details on how to translate the language resources and how to provide them to the system so that a new language is available to users to set it in their user profile. Refer to *Adding a Language to OSCM and Customizing Texts* on page 24 for details on how to add a language to OSCM.

E.1 User Interface Resources

The user interface resources are translated or updated in a Microsoft Excel file generated with the **Export** function on the **Manage languages** page.

The exported Microsoft Excel file contains three worksheets:

- **User interface**: All texts, labels, and messages that appear on the user interface of the platform's administration portal and the marketplaces.
- **Email**: The subject and body texts of all email messages which are generated automatically by the platform.
- **Platform objects**: The names of service parameters and events, report titles and names of payment types provided by the platform. The parameter and event names are visible to suppliers when defining a marketable service as well as to users subscribing to a service.

Each worksheet contains five columns:

- **Key** used by the platform to identify the label or string. The keys must not be changed.
- **de system**, **en system**, **ja system**: The system default names and labels provided with the language bundles after installation (German, English, Japanese). The system default strings are for your reference when providing translations.
- **Add your language code here** or ***<Language Code>***: In this column, the strings of the new language to be supported are to be entered.

  Add your language code here is shown if you did not select a language on the **Manage languages** page before exporting the data. In this case, you usually want to provide a new language. The column is empty.

  If you selected a language on the **Manage languages** page, the column is headed by the code of this language. In this case, you usually update existing translations of the selected language. You can also select the system default languages (de, en, or jp) if you want to customize the system default strings.

  The strings can be also be changed by marketplace managers using the **Marketplace** --> **Customize texts** menu function. Their changes apply to the marketplaces owned by the organization of the marketplace managers.

Proceed as follows to translate the file:

1. **On the three worksheets**, enter the ISO language code of the language you want to provide in the header of the fifth column.
2. For each key, enter your translation in the fifth column.

If a translation is missing, the English label or string is used. If the English label or string is not defined either, the language-independent technical key is displayed.

Be aware of the following:

- You can use HTML markups in the texts for all keys which represent a descriptive text (keys ending with `.description`). For example, you can use `<b>` for bold text, `<br>` for line breaks, and so on.
- You can use the complete Unicode character set.
- You can remove the text from the table cells which you do not want to change. This may be useful for managing and tracking your changes to the user interface.
- You must make sure that HTML fields contain valid data and do not break the page layout. For example, text which is too long will be broken into multiple lines on the user interface. Use a separate test environment for testing your translations.

3. Save the Microsoft Excel file in `.xls` format.
4. Import the file on the **Manage languages** page.

   By importing the file, existing labels and strings in the language with the code entered in the fifth column are overwritten. The language can be used instantly after its activation. Users who have set the language in their profile will instantly see your customizations.

Note: Make sure that all cells on all worksheets of the Excel file are formatted as text.

E.2 Online Help and FAQs

In the administration portal, online help is available in the language the user has set in his profile. The same applies to the FAQs that can be opened on a marketplace.

The online help and FAQ files are provided after installation in a separate container: `oscm-help`.

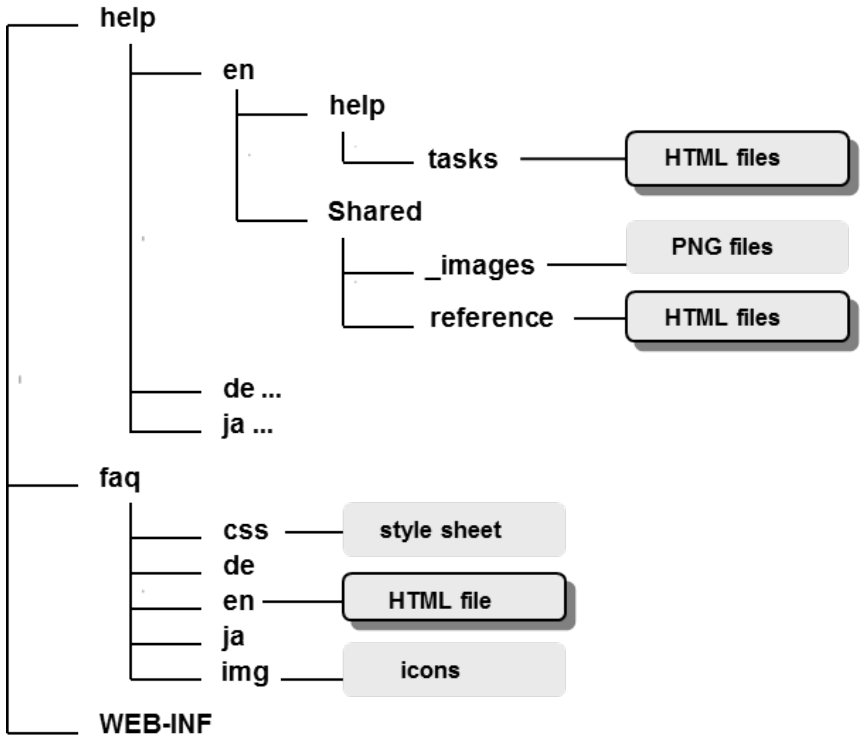
You can update the existing online help and FAQ files and/or provide the files in another language. Refer to *Adding a Language to OSCM and Customizing Texts* on page 24 for details on how to add a language to OSCM.

1. Log in to the Docker host where OSCM is deployed.
2. Log in to the `oscm-help` container:

```
docker exec –it oscm-help /bin/bash
```

3. Copy the `/opt/oscm-portal-help.war` archive file to a temporary directory on the Docker host.
4. Extract the `oscm-portal-help.war` file on the Docker host.

   You see the following directory structure:



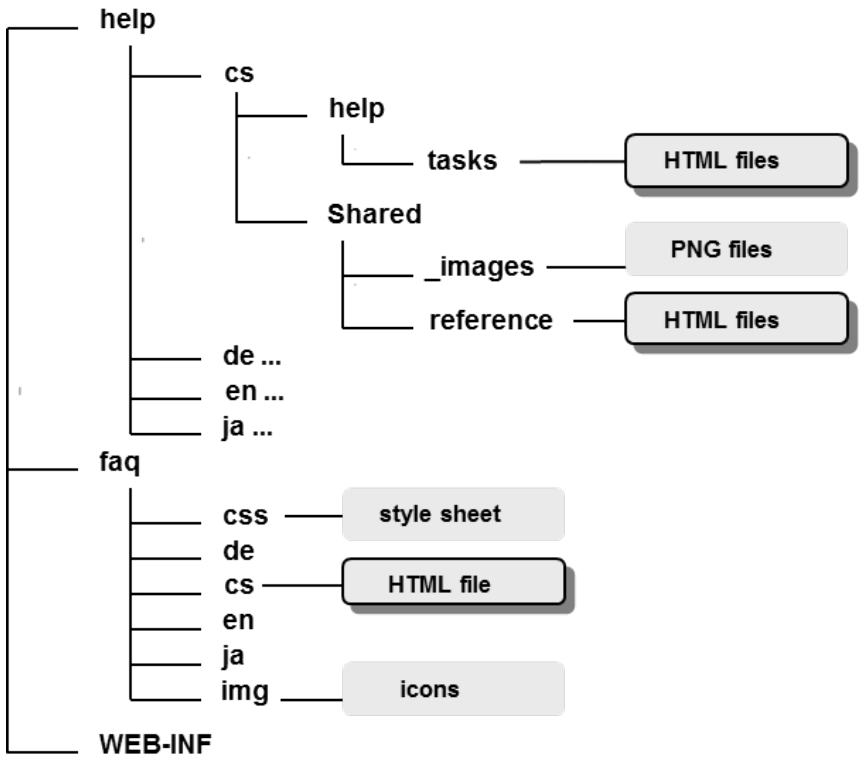
The languages provided after installation are English (en), German (de), and Japanese (ja). You can update the texts in their respective directories. The procedure is the same as when providing the texts in a different language (see below).

5. Copy the `help/en` directory and name it `help/<ISO code>`.

   Copy the `faq/en` directory and name it `faq/<ISO code>`.

   The ISO language code denotes the language for which you want to provide translations. For example, add a `cs` directory to the `help` as well as to the `faq` directory.

   The directory structure now looks as follows:



6. Translate the HTML files.

   Be aware of the following:

   - Make sure not to change any style sheet or icon.
   - Do not remove any files that you do not translate.
   - In the HTML files, make sure not to enter tags or invalid HTML code that may affect the page layout.
   - Use a separate test environment for testing your translations.
   - Images used in the online help topics can be translated as follows:
     1. Create the image with an image drawing tool.
     2. Save the image with the file name referenced in the related HTML file to the `Shared/_images` directory.
     3. Check the size of the image in the HTML topic and adapt it, if required.

7. Create a zipped archive file named `oscm-portal-help.tar.gz` containing the additional subdirectories for the new language, and copy this archive to the following directory on the Docker host:

   `<docker>/config/oscm-help`

   `<docker>` is the OSCM data directory specified at installation time.

8. Stop the `oscm-help` container:

```
docker stop oscm-help
```

9. Change to the OSCM data directory (`<docker>`).
10. Remove the `oscm-help` container:

```
docker-compose -f docker-compose-oscm.yml rm oscm-help
```

11. Recreate and restart the `oscm-help` container:

```
docker-compose -f docker-compose-oscm.yml up -d oscm-help
```

By the deployment, existing HTML files are overwritten.

Note: You are responsible for keeping the directory structures and files consistent!

E.3 Supported Language Codes

Below is the list of languages and their codes that can be used for user interface and email texts, parameter and event names, as well as online help and FAQs:

Language Code	Language
az	Azerbaijani
be	Belarusian
bg	Bulgarian
bn	Bengali
br	Breton
bs	Bosnian
ca	Catalan
ch	Chamorro
cs	Czech
cy	Welsh
da	Danish
de	German
el	Greek
en	English
es	Spanish
et	Estonian
fi	Finnish
fr	French

Language Code	Language
gl	Gallegan
gu	Gujarati
hi	Hindi
hr	Croatian
hu	Hungarian
ia	Interlingua
in	Indonesian
ii	Sichuan Yi
is	Icelandic
it	Italian
ja	Japanese
ko	Korean
lt	Lithuanian
lv	Latvian
mk	Macedonian
ml	Malayalam
mn	Mongolian
ms	Malay
nb	Norwegian Bokmål
nl	Dutch
nn	Norwegian Nynorsk
no	Norwegian
pl	Polish
pt	Portuguese
ro	Romanian
ru	Russian
sc	Sardinian
se	Northern Sami
si	Sinhalese
sk	Slovak
sl	Slovenian

Language Code	Language
sq	Albanian
sr	Serbian
sv	Swedish
ta	Tamil
te	Telugu
th	Thai
tr	Turkish
tt	Tatar
tw	Twi
uk	Ukrainian
vi	Vietnamese
zh	Chinese

Appendix F: User Data File for Multiple User Import

An administrator can import multiple users of his organization and register them with the platform. A platform operator can import multiple users of his own organization as well as of any organization managed on his platform.

The user data must be provided in a file in `csv` (comma-separated values) format. This file can then be imported into OSCM.

The following rules apply:

- The data for one user is provided in one line. Empty lines are ignored.
- The user data file is saved in UTF-8 encoding.
- The user data is provided in the following sequence:
  1. User ID (mandatory)
  2. Email address (mandatory)
  3. Language (mandatory)
  4. Title (optional)
  5. First name (optional)
  6. Last name (optional)
  7. One or several user roles to be assigned to the imported user (mandatory if no marketplace is selected at the user interface)
- The user data fields are separated by a comma each. If an optional field does not contain any data, it must be empty and separated by a comma from the next field.

The fields can take on the following values:

Field	Value(s)
User ID	Mandatory. ID with which the user is to log in to the platform. User IDs are restricted to 100 characters and must not contain any of the following characters: `! " # $ % & ' * + , / : ; < = > ? \ ^ ` `
Email address	Mandatory. Email address of the user. It is used for notifying the user about the registration. The system checks whether the syntax of the given email address is valid, and whether the domain name corresponds to the standards as defined and maintained by the Internet Assigned Numbers Authority (IANA). Examples: `user.name@domain.arpa`, `user.name@domain.org`, `user@mycompany.lan.uk`
Language	Mandatory. ISO code of the language in which the user will work by default, for example, `en` (English).
Title	Optional. Salutation. Allowed values: `MR` or `MS` Observe that the value is case-sensitive and must be specified as indicated.
First name	Optional.

Field	Value(s)
Last name	Optional.
User role	Mandatory if no marketplace is selected at the user interface. If a marketplace is selected and no role is specified, a standard user without any privileges is registered. The user roles that can be specified depend on the role of the organization for which the users are to be imported. Valid user roles are: `ORGANIZATION_ADMIN` (administrator) for organizations with any role. `SUBSCRIPTION_MANAGER` (subscription manager) for organizations with any role. `PLATFORM_OPERATOR` (operator) for platform operator organizations. `MARKETPLACE_OWNER` (marketplace manager) for marketplace owner organizations. `SERVICE_MANAGER` (service manager) for supplier organizations. `TECHNOLOGY_MANAGER` (technology manager) for technology provider organizations. `BROKER_MANAGER` (broker manager) for broker organizations. `RESELLER_MANAGER` (reseller manager) for reseller organizations. Observe the following: • The role names are case-sensitive and must be specified as indicated above. • If several user roles are specified, they must be separated by a comma and enclosed in double quotes (Example: `"ORGANIZATION_ADMIN, RESELLER_MANAGER"`). Blanks between role names and fields are ignored. • If one user role is specified that is not available for the organization for which to import users, it is ignored and the affected users are not registered. • If several roles are specified for a user, and at least one of these roles is valid for the organization, the user is imported and registered successfully, invalid roles are ignored.

Sample user data file:

```
user1,user1@company.com,en,MS,Jane,Smith,ORGANIZATION_ADMIN
user2,user2@company.com,de,MR,John F.,Cool,SUBSCRIPTION_MANAGER
user3,user3@company.com,en,,,,ORGANIZATION_ADMIN
user4,user4@company.com,en,,,Admin,"SERVICE_MANAGER,ORGANIZATION_ADMIN"
user5,user5@company.com,en,MR,,Mueller-Siegel,SERVICE_MANAGER
user6,user6@company.com,en,MR,Joe,StandardUser,
```

Appendix G: Customer Billing Data

The charges for the usage of a service in OSCM are calculated based on the price model defined for the service, customer, or subscription.

A supplier or reseller can export the billing data for one or several of his customers for a specific time. Suppliers also have access to the billing data of customers of broker organizations that sell their services. The exported data can be forwarded, for example, to an accounting system for further processing.

The result of the export is stored in an XML file, the customer billing data file. The billing data file conforms to the XML schema `BillingResult.xsd`, which can be found in the OSCM integration package.

The billing data file is named `<date>BillingData.xml`, where `<date>` represents the creation date.

This appendix describes the meaning of the elements and attributes that may occur in a billing data file.

BillingDetails

Top-level container element of a billing data file. For each subscription, a `BillingDetails` element is added to the billing data file.

A `BillingDetails` element contains the following subelements:

- `Period` (see *Period* on page 103)
- `OrganizationDetails` (see *OrganizationDetails* on page 104)
- `Subscriptions` (see *Subscriptions* on page 104)
- `OverallCosts` (see *OverallCosts* on page 117)

A `BillingDetails` element has the following attributes:

`key` - (optional, data type `long`) Unique identifier allowing, for example, accounting systems to relate billing data to an invoice. The billing data key is printed on the invoice. Suppliers and customers may use the billing data key to create a detailed billing report for an existing invoice or subscription. A supplier can retrieve the key from a billing report, a customer gets the billing data key from the corresponding invoice.

`timezone` - (required, data type `string`) Time zone based on the UTC time standard. It reflects the standard server time without daylight saving time. For example, 18:00:00 o'clock on June 1st in Berlin (UTC+1) will be output as follows in the XML file:

```
<BillingDetails timezone="UTC+01:00" key="31122">
  <Period startDate="1370106000000"
  startDateIsoFormat="2013-06-01T16:00:00.000Z" ..."/>
```

The time zone is relevant for price models with costs (see *PriceModel* on page 106).

Period

Specifies the billing period for which the data is exported. The start and end time of the billing period are output according to the start day of the billing period which was defined by the supplier or reseller.

A `Period` element has the following attributes:

- **`startDate`** - (data type `long`) Start time of the period. The start time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.

- **startDateIsoFormat** - (optional, data type `dateTime`) Same as `startDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`) .
- **endDate** - (data type `long`) End time of the period. The end time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **endDateIsoFormat** - (optional, data type `dateTime`) Same as `endDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`).

Example:

```
<Period startDateIsoFormat="2012-08-31T22:00:00.000Z"
  startDate="1346450400000"
  endDateIsoFormat="2012-09-30T22:00:00.000Z"
  endDate="1349042400000"/>
```

OrganizationDetails

Provides details of the customer for which the billing data have been exported. The details may include a `Udas` element with custom attributes that store additional information on the customer organization.

An `OrganizationDetails` element contains the following subelements:

Email

Specifies the email address of the organization (data type `string`).

Name

Specifies the name of the organization (data type `string`).

Address

Specifies the address of the organization (data type `string`).

Paymenttype

Specifies the payment type used for subscriptions of the organization (data type `string`).

Example:

```
<BillingDetails key="10002" timezone="UTC+01:00">
...
  <OrganizationDetails>
    <Email>info@company.com</Email>
    <Name>company</Name>
    <Address>Street</Address>
    <Paymenttype>INVOICE</Paymenttype>
  </OrganizationDetails>
...
</BillingDetails>
```

Subscriptions

Contains the billing data for the subscriptions of the customer which are relevant for the current billing period.

For every subscription of an organization, the `Subscriptions` element contains a `Subscription` element. In this element, the costs of the affected subscription are specified.

A `Subscription` element has the following attributes:

- **id** - (required, data type `string`) Unique subscription name.

- **purchaseOrderNumber** - (data type string) Optional reference number as specified by the customer when subscribing to a service.

A Subscription element contains a PriceModel element with the billing data for the price model of the subscription (see *PriceModel* on page 106). A Udas element with custom attributes that store additional information on the subscription may also be included (see *Udas* on page 105).

If a subscription is assigned to an organizational unit at the end of the billing period, the Subscription element also contains an OrganizationalUnit element with the following attributes:

- **name** - (required, data type string) Required name of the organizational unit to which the subscription is assigned.
- **referenceID** - (optional, data type string) Optional reference ID of the organizational unit to which the subscription is assigned.

Be aware that the organizational units to which the subscription may have been assigned before the generation of the billing data are not shown.

Example:

```
<BillingDetails key="10002" timezone="UTC+01:00">
...
  <Subscriptions>
    <Subscription id="Mega Office Basic" purchaseOrderNumber="12345">
      <OrganizationalUnit name="ProjectTeam" referenceID="123abc"/>
      <PriceModels>
        <PriceModel calculationMode="PRO_RATA" id="14001">
...
        </PriceModel>
      </PriceModels>
    </Subscription>
  </Subscriptions>
...
</BillingDetails>
```

Udas

Contains custom attributes that store additional information on an organization or subscription. This could be, for example, the profit center to which a customer's revenue is to be accounted.

A Udas element may be included in an OrganizationDetails or a Subscription element.

For every custom attribute, a Uda element is included in the Udas element.

A Uda element has the following attributes:

- **id** - (required, data type string) ID of the custom attribute.
- **value** - (required, data type string) Value of the custom attribute.

Example:

```
<BillingDetails key="10002" timezone="UTC+01:00">
...
  <Subscriptions>
    <Subscription id="Mega Office Basic" purchaseOrderNumber="12345">
...
      <Udas>
        <Uda id="Profit Center" value="My Company"/>
      </Udas>
    </Subscription>
  </Subscriptions>
```

```
...
</BillingDetails>
```

PriceModel

Contains the billing data for a price model used to calculate the utilization charges for a subscription.

A `PriceModel` element is included in every subscription element. It contains the following subelements:

- `UsagePeriod` (see *UsagePeriod* on page 106)
- `GatheredEvents` (see *GatheredEvents* on page 107)
- `PeriodFee` (see *PeriodFee* on page 108)
- `UserAssignmentCosts` (see *UserAssignmentCosts* on page 109)
- `OneTimeFee` (see *OneTimeFee* on page 110)
- `PriceModelCosts` (see *PriceModelCosts* on page 110)
- `Parameters` (see *Parameters* on page 111)

A `PriceModel` element has the following attributes:

`id` - (required, data type `string`) Unique name identifying the price model.

`calculationMode` - (required, data type `string`) Cost calculation option of the price model. Can be set to one of the following values: `FREE_OF_CHARGE` (the service is free of charge), `PRO_RATA` (the costs are calculated exactly for the time a service is used, based on milliseconds), `PER_UNIT` (the costs are calculated based on fixed time units).

UsagePeriod

Specifies the actual period in which a price model is used for calculating the charges of a subscription.

A usage period usually begins when a customer subscribes to a service and ends when the subscription is terminated. In case a free trial period is defined for the service, the usage period begins when the free trial period has ended. When the customer upgrades or downgrades the subscription, a new usage period is started in which the price model of the new service is applied. If the customer changes elements that determine how the charges for the service are calculated (e.g. the number of assigned users, the service roles of the assigned users, or the parameter values), a new usage period is started in which the updated elements are applied.

A `UsagePeriod` element is contained in a `PriceModel` element.

A `UsagePeriod` element has the following attributes:

- **`startDate`** - (data type `long`) Start time of the period. The start time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **`startDateIsoFormat`** - (optional, data type `dateTime`) Same as `startDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`) .
- **`endDate`** - (data type `long`) End time of the period. The end time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **`endDateIsoFormat`** - (optional, data type `dateTime`) Same as `endDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`).

Example:

```
<PriceModel calculationMode="PRO_RATA" id="14001">
```

```
  <UsagePeriod endDate="1306879200000"
   endDateIsoFormat="2011-05-31T22:00:00.000Z"
   startDate="1304755088065"
   startDateIsoFormat="2011-05-07T07:58:08.065Z"/>
...
</PriceModel>
```

GatheredEvents

Specifies the costs for all chargeable events that occurred in the current usage period of the subscription. These include, for example, login and logout by users to the underlying application, the completion of specific transactions, or the creation or deletion of specific data. It depends on the implementation and integration of the underlying application which events are available.

A `GatheredEvents` element is contained in a `PriceModel` element.

A `GatheredEvents` element contains the following subelements:

- `Event`
- `GatheredEventsCosts`

Event

For every event, an `Event` element is included in the `GatheredEvents` element.

An `Event` element has the following attribute:

`id` - (required, data type `string`) Event ID as specified in the technical service definition.

An `Event` element contains the following subelements:

- `Description`
- `SingleCost`
- `NumberOfOccurence`
- `CostForEventType`

Description

Contains the description of the event.

SingleCost

Specifies the price for the event as defined in the price model. If an event has stepped prices, this element is omitted. A `SteppedPrices` element is included instead (see *SteppedPrices* on page 116).

A `SingleCost` element has the following attribute:

`amount` - (required, data type `decimal`) Price for a single event.

NumberOfOccurence

Specifies how often the event occurred.

A `NumberOfOccurence` element has the following attribute:

`amount` - (required, data type `long`) Number of times the event occurred.

CostForEventType

Specifies the total costs for the event in the billing period.

A `CostForEventType` element has the following attribute:

`amount` - (required, data type `decimal`) Total costs for the event. The total costs for an event are calculated from the singular costs (`SingleCost`) multiplied with the number of occurrences (`NumberOfOccurence`). If role-based costs and/or stepped prices are specified for events, these

costs are added (see *RoleCosts* on page 115 and *SteppedPrices* on page 116). The value is rounded to two decimal places.

GatheredEventsCosts

Specifies the total costs for all events in the current `GatheredEvents` element.

A `GatheredEventsCosts` element has the following attribute:

`amount` - (required, data type `decimal`) Total costs for events. The value is rounded to two decimal places.

Example:

```
<PriceModel calculationMode="PRO_RATA" id="14001">
...
  <GatheredEvents>
    <Event id="USER_LOGOUT_FROM_SERVICE">
      <Description xml:lang="en">Logout from the service.</Description>
      <SingleCost amount="100.00"/>
      <NumberOfOccurrence amount="3"/>
      <CostForEventType amount="300.00"/>
    </Event>
...
    <GatheredEventsCosts amount="1200.00"/>
  </GatheredEvents>
...
</PriceModel>
```

PeriodFee

Specifies the costs for using the subscription in the given usage period.

For each subscription, a charge can be defined that a customer has to pay on a recurring basis. Monthly, weekly, daily, or hourly periods are supported. The recurring charge for a subscription is independent of the amount of users, events, or other usage data.

The calculation of the charges depends on the cost calculation option which was chosen for the price model (see *PriceModel* on page 106 for details).

A `PeriodFee` element is contained in a `PriceModel` element.

A `PeriodFee` element has the following attributes:

- **`basePeriod`** - (required, data type `string`) Period on which the charges are based. Can be set to one of the following values: `MONTH`, `WEEK`, `DAY`, `HOUR`.
- **`basePrice`** - (required, data type `decimal`) Recurring charge per base period according to the price model.
- **`factor`** - (required, data type `decimal`) Factor used to calculate the period fee for the subscription. The factor is calculated from the usage period of the subscription divided by the base period (`basePeriod`). The recurring charge is multiplied with this factor to calculate the total costs (`price`).
- **`price`** - (required, data type `decimal`) Total period fee for the subscription. This value is calculated from the recurring charge (`basePrice`) multiplied with the factor (`factor`). The value is rounded to two decimal places.

Example:

```
<PriceModel calculationMode="PRO_RATA" id="14001">
...
  <PeriodFee basePeriod="MONTH" basePrice="10.00"
 factor="0.4020212567204301" price="4.02"/>
```

```
...
</PriceModel>
```

UserAssignmentCosts

Specifies the costs for the user assignments to the subscription.

For the users assigned to a subscription, a charge can be defined that a customer has to pay on a recurring basis. Monthly, weekly, daily, or hourly periods are supported. The charge depends on the amount of time units one or more users are assigned to the subscription. This type of charge can only be defined for services with the login or user access type.

The recurring charge for users is independent of the recurring charge per subscription or other usage data.

For this type of charge, stepped prices can be applied: Recurring charges can be defined that depend on the sum of the time units of all user assignments.

The calculation of the charges depends on the cost calculation option which was chosen for the price model (see *PriceModel* on page 106 for details).

With per time unit calculation, the costs for a time unit in which a user is assigned to a subscription are always fully charged. There is no difference in the costs between a user who is assigned from the start until the end of the time unit and a user who is assigned for a part of the time unit only. A time unit is charged only once if a user is deassigned from and re-assigned to a subscription within the same time unit. Yet, canceling an assignment, deleting the user, and then creating a new user with the same user ID is treated as if two different users are assigned to the subscription. The time unit is charged twice, accordingly.

A `UserAssignmentCosts` element is contained in a `PriceModel` element.

A `UserAssignmentCosts` element has the following attributes:

- **`basePeriod`** - (optional, data type `string`) Period on which the charges are based. Can be set to one of the following values: `MONTH`, `WEEK`, `DAY`, `HOUR`.
- **`basePrice`** - (optional, data type `decimal`) Recurring charge for users per base period according to the price model. If the charge for users has stepped prices, this attribute is omitted.
- **`factor`** - (optional, data type `decimal`) Factor used to calculate the costs for the user assignments. The factor is calculated by summing up the factors for each user specified in the `UserAssignmentCostsByUser` element. The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`).
- **`numberOfUsersTotal`** - (optional, data type `long`) Number of users assigned to the subscription in the usage period.
- **`total`** - (data type `decimal`) Total costs for the user assignments including role-based costs and stepped prices. The value is rounded to two decimal places. For details on role-based costs and stepped prices, refer to *RoleCosts* on page 115 and *SteppedPrices* on page 116.
- **`price`** - (optional, data type `decimal`) Costs for the user assignments. This value is calculated from the recurring charge (`basePrice`) multiplied with the factor (`factor`). The value is rounded to two decimal places.

A `UserAssignmentCosts` element contains the following subelement. If role-based costs and/or stepped prices are specified, a `RoleCosts` element and/or `SteppedPrices` element is also present (see *RoleCosts* on page 115 and *SteppedPrices* on page 116).

UserAssignmentCostsByUser

Specifies the fraction of the usage period a user was assigned to the subscription.

A `UserAssignmentCostsByUser` element has the following attributes:

- **`factor`** - (required, data type `decimal`) Fraction of the usage period the given user was assigned to the subscription. The factors of the single user assignments are summed up to calculate the total costs for the user assignments.
- **`userId`** - (required, data type `string`) User ID.

Example:

```
<PriceModel calculationMode="PRO_RATA" id="18000">
...
  <UserAssignmentCosts basePeriod="MONTH" basePrice="19.00"
   factor="0.5337726052867383" numberOfUsersTotal="2"
   total ="50.00" price="10.14">
     <UserAssignmentCostsByUser factor="1.0499215949820788E-4"
     userId="admin"/>
     <UserAssignmentCostsByUser factor="0.5336676131272401"
     userId="miller"/>
   </UserAssignmentCosts>
...
</PriceModel>
```

OneTimeFee

Specifies the one-time fee for the subscription.

A one-time fee defines the amount a customer has to pay for a subscription in the first billing period of the subscription. It is added to the total charges for the first billing period. It is independent of the number of users, events, or other usage data.

If a one-time fee is defined for a service to which a customer upgrades or downgrades a subscription, it is added to the total charges for the customer, even if the service from which the customer migrates also defines a one-time fee.

A `OneTimeFee` element is contained in a `PriceModel` element.

A `OneTimeFee` element has the following attributes:

- **`amount`** - (required, data type `decimal`) Total costs for the one-time fee. The value is rounded to two decimal places.
- **`baseAmount`** - (required, data type `decimal`) One-time fee as defined in the price model.
- **`factor`** - (required, data type `long`) Factor used for calculating the one-time fee. Since this charge occurs only once, the factor is 1 for the first billing period, and 0 in case the one-time fee has already been charged in a previous billing period.

Example:

```
<PriceModel calculationMode="PRO_RATA" id="14001">
...
  <OneTimeFee amount="10.00" baseAmount="10.00" factor="1"/>
...
</PriceModel>
```

PriceModelCosts

Specifies the total costs for the subscription in the current usage period.

A `PriceModelCosts` element is contained in a `PriceModel` element.

A `PriceModelCosts` element has the following attributes:

- **`currency`** - (required, data type `string`) ISO code of the currency in which the costs are calculated.
- **`amount`** - (required, data type `decimal`) Total amount of the costs for the subscription. The value is rounded to two decimal places.

Example:

```
<PriceModel calculationMode="PRO_RATA" id="14001">
...
  <PriceModelCosts currency="EUR" amount="990.00"/>
</PriceModel>
```

Parameters

Specifies the costs for parameters defined for the service underlying the subscription.

A price model can define prices for service parameters and options. It depends on the implementation and integration of the underlying application whether and which parameters and options are available.

A price can be defined for every parameter and option, and the price can be charged per subscription or per user assigned to the subscription. Numeric parameters are a multiplier for the price. For boolean parameters, the multiplier is `1` if the value is `true`. In all other cases, the multiplier is `0`.

The calculation of charges for parameters and options depends on the cost calculation option which was chosen for the price model (see *PriceModel* on page 106 for details).

If the charges for a subscription are calculated per time unit and a customer changes a parameter value within a time unit, the affected time unit is charged pro rata. This means that the customer is charged exactly for the time each parameter value is set.

For numeric parameters, stepped prices can be applied per subscription: Different prices can be defined depending on the parameter values.

The prices for parameters and options are independent of other price model elements.

A `Parameters` element is contained in a `PriceModel` element.

A `Parameters` element contains the following subelements:

- `Parameter`
- `ParametersCosts`

Parameter

For every parameter, a `Parameter` element is included in the `Parameters` element.

A `Parameter` element has the following attribute:

`id` - (required, data type `string`) Parameter ID.

A `Parameter` element contains the following subelements:

- `ParameterUsagePeriod`
- `ParameterValue`
- `PeriodFee`
- `UserAssignmentCosts`
- `ParameterCosts`
- `Options`

ParameterUsagePeriod

Specifies the actual usage period for the parameter.

The usage period for a parameter begins when a customer subscribes to the service with the given parameter definition in the price model and ends when the subscription is terminated.

In case a free trial period is defined for the service, the usage period for the subscription begins when the free trial period has ended. If a parameter value is changed, a new usage period is started in which the updated value is applied for calculating the costs.

A `ParameterUsagePeriod` element has the following attributes:

- **`startDate`** - (data type `long`) Start time of the period. The start time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **`startDateIsoFormat`** - (optional, data type `dateTime`) Same as `startDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`) .
- **`endDate`** - (data type `long`) End time of the period. The end time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **`endDateIsoFormat`** - (optional, data type `dateTime`) Same as `endDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`).

ParameterValue

Specifies the costs and data type for the parameter.

A `ParameterValue` element has the following attributes:

- **`amount`** - (required, data type `string`) Costs for the parameter as defined in the price model.
- **`type`** - (required, data type `string`) Data type of the parameter. Can be set to one of the following values: `BOOLEAN`, `INTEGER`, `LONG`, `STRING`, `ENUMERATION`, `DURATION`.

PeriodFee

Specifies the costs for using the parameter in the given usage period. If a parameter has stepped prices, a `SteppedPrices` element is included in the `PeriodFee` element.

A `PeriodFee` element has the following attributes:

- **`basePeriod`** - (required, data type `string`) Period on which the charges are based. Can be set to one of the following values: `MONTH`, `WEEK`, `DAY`, `HOUR`.
- **`basePrice`** - (optional, data type `decimal`) Recurring charge per base period according to the price model. If a parameter has stepped prices, this attribute is omitted.
- **`factor`** - (required, data type `decimal`) Factor used to calculate the costs for using the parameter. The factor is calculated from the usage period divided by the base period (`basePeriod`). The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`).
- **`price`** - (required, data type `decimal`) Costs for using the parameter. This value is calculated from the recurring charge (`basePrice`) multiplied with the factors (`factor` and `valueFactor`). The value is rounded to two decimal places.
- **`valueFactor`** - (required, data type `float`) Factor to calculate the total costs for using the parameter depending on the parameter value. The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`). This factor is set depending on the data type of the parameter. For numeric parameters it is set to the value of the parameter. For boolean parameters, the factor is set to `1` if the value is `true`. In all other cases, the factor is set to `0`.

UserAssignmentCosts

Specifies the costs for the parameter related to the user assignments of the subscription based on the price per user for the parameter as defined in the price model. If costs for service roles are

defined, a `RoleCosts` element is included in the `UserAssignmentCosts` element (see *RoleCosts* on page 115 for details).

A `UserAssignmentCosts` element has the following attributes:

- **`basePeriod`** - (required, data type `string`) Period on which the charges are based. Can be set to one of the following values: `MONTH`, `WEEK`, `DAY`, `HOUR`.
- **`basePrice`** - (required, data type `decimal`) Recurring charge for users per base period for the parameter according to the price model.
- **`factor`** - (required, data type `decimal`) Factor used to calculate the costs for using the parameter. The factor is calculated from the parameter usage period divided by the base period (`basePeriod`) multiplied with the number of users. The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`).
- **`price`** - (required, data type `decimal`) Costs for using the parameter. This value is calculated from the recurring charge (`basePrice`) multiplied with the factors (`factor` and `valueFactor`). The value is rounded to two decimal places. If stepped prices are defined for user assignments, the costs are given in the `price` attribute.
- **`total`** - (data type `decimal`) Total costs for using the parameter including role-based costs. The value is rounded to two decimal places. For details on role-based costs, refer to *RoleCosts* on page 115.
- **`valueFactor`** - (required, data type `float`) Factor to calculate the total costs for using the parameter depending on the parameter value. The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`). This factor is set depending on the data type of the parameter. For numeric parameters it is set to the value of the parameter. For boolean parameters, the factor is set to `1` if the value is `true`. In all other cases, the factor is set to `0`.

ParameterCosts

Specifies the total costs for using the parameter.

A `ParameterCosts` element has the following attribute:

`amount` - (required, data type `decimal`) Total costs for the parameter calculated by summing up the costs specified in the `PeriodFee` and the `UserAssignmentCosts` element for the parameter and its options. If role-based costs and/or stepped prices are specified for the parameter, these are added (see *RoleCosts* on page 115 and *SteppedPrices* on page 116). The value is rounded to two decimal places.

ParametersCosts

Specifies the total costs for all parameters.

A `ParametersCosts` element has the following attribute:

`amount` - (required, data type `decimal`) Total costs for the parameters calculated by summing up the costs of the individual parameters as specified in the `ParameterCosts` elements. The value is rounded to two decimal places.

Example:

```
<Parameters>
...
  <Parameter id="MAX_FOLDER_NUMBER2">
    <ParameterUsagePeriod endDate="1306879200000"
     endDateIsoFormat="2011-05-31T22:00:00.000Z"
     startDate="1304755088065"
     startDateIsoFormat="2011-05-07T07:58:08.065Z"/>
    <ParameterValue amount="200" type="INTEGER"/>
    <PeriodFee basePeriod="MONTH" basePrice="0.00"
     factor="0.5337789669205496" price="0.00" valueFactor="200.0"/>
```

```
    <UserAssignmentCosts basePeriod="MONTH" basePrice="0.00"
     factor="0.5337726052867383" total ="0.00"
     price="0.00" valueFactor="200.0"/>
    <ParameterCosts amount="0.00"/>
  </Parameter>

...
  <ParametersCosts amount="600.00"/>
</Parameters>
```

Options

Specifies the costs for parameter options.

An `Options` element is contained in a `Parameter` element.

For every option, an `Option` element is included in the `Options` element.

An `Option` element has the following attribute:

`id` - (required, data type `string`) Option ID.

An `Option` element contains the following subelements:

- `PeriodFee`
- `UserAssignmentCosts`
- `OptionCosts`

PeriodFee

Specifies the costs for using the parameter option in the given usage period.

A `PeriodFee` element has the following attributes:

- **`basePeriod`** - (required, data type `string`) Period on which the charges are based. Can be set to one of the following values: `MONTH`, `WEEK`, `DAY`, `HOUR`.
- **`basePrice`** - (required, data type `decimal`) Recurring charge per base period according to the price model.
- **`factor`** - (required, data type `decimal`) Factor used to calculate the costs for using the parameter option. The factor is calculated from the usage period divided by the base period (`basePeriod`). The recurring charge (`basePrice`) is multiplied with this factor to calculate the total costs (`price`).
- **`price`** - (required, data type `decimal`) Costs for the parameter option. This value is calculated from the recurring charge (`basePrice`) multiplied with the factor (`factor`), and is rounded to two decimal places.

UserAssignmentCosts

Specifies the costs for the parameter option related to the user assignments of the subscription based on the price per user for the option as defined in the price model. If costs for service roles are defined, a `RoleCosts` element is included in the `UserAssignmentCosts` element (see *RoleCosts* on page 115).

A `UserAssignmentCosts` element has the following attributes:

- **`basePeriod`** - (required, data type `string`) Period on which the charges are based. Can be set to one of the following values: `MONTH`, `WEEK`, `DAY`, `HOUR`.
- **`basePrice`** - (required, data type `decimal`) Recurring charge for users per base period for the parameter option according to the price model.
- **`factor`** - (required, data type `decimal`) Factor used to calculate the costs for using the parameter option. The factor is calculated from the usage period divided by the base period

(`basePeriod`). The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`).

- **`total`** - (data type `decimal`) Total costs for using the parameter option including role-based costs. The value is rounded to two decimal places. For details on role-based costs, refer to *RoleCosts* on page 115.
- **`price`** - (required, data type `decimal`) Costs for using the parameter option. This value is calculated from the recurring charge (`basePrice`) multiplied with the factor (`factor`). The value is rounded to two decimal places. If stepped prices are defined for user assignments, the costs are given in the `price` attribute.

OptionCosts

Specifies the total costs for using the parameter option.

An `OptionCosts` element has the following attribute:

`amount` - (required, data type `decimal`) Total costs for the parameter option calculated by summing up the costs specified in the `PeriodFee` and the `UserAssignmentCosts` element. The value is rounded to two decimal places.

Example:

```
<Parameter id="MEMORY_STORAGE">
...
  <Options>
    <Option id="2">
      <PeriodFee basePeriod="MONTH" basePrice="100.00"
       factor="1.0" price="100.00"/>
      <UserAssignmentCosts basePeriod="MONTH" basePrice="0.00"
       factor="1.0" total ="0.00" price="0.00"/>
      <OptionCosts amount="100.00"/>
    </Option>
  </Options>
...
</Parameter>
```

RoleCosts

Specifies the costs for service roles.

If defined for the underlying application, roles can be used to grant specific privileges to different users. The roles are specified in the technical service definition as service roles. Service roles can be mapped to corresponding permissions in the application.

For each role, a price can be defined. This price is added to the base price per user in the cost calculation for a billing period.

The calculation of the charges for service roles depends on the cost calculation option which was chosen for the price model (see *PriceModel* on page 106 for details).

If the charges are calculated per time unit and the role assignment of a user is changed within a time unit, the affected time unit is charged pro rata. This means that the customer is charged exactly for the time each user role is assigned.

If the charges are calculated per time unit and a user with a specific role is removed from the subscription and assigned to it again with a different role in the same time unit, the customer is also charged for the time during which the user is not assigned to the subscription. This means that he is charged with the price for the first service role until the user is assigned to the subscription with the second service role.

A `RoleCosts` element is contained in a `UserAssignmentCosts` element (as subelement of the `PriceModel`, `Parameters`, or `Option` element).

A `RoleCosts` element has the following attribute:

`total` - (required, data type `decimal`) Total amount of costs for the service roles. The value is rounded to two decimal places.

For every service role, a `RoleCost` element is included in the `RoleCosts` element.

A `RoleCost` element has the following attributes:

- **`id`** - (required, data type `string`) ID of the service role.
- **`basePrice`** - (required, data type `decimal`) Recurring charge for the service role according to the price model.
- **`factor`** - (required, data type `decimal`) Factor used to calculate the costs for the service role. The factor is calculated as a fraction of the actual usage period. The recurring charge (`basePrice`) is multiplied with this factor to calculate the costs (`price`).
- **`price`** - (required, data type `decimal`) Costs for the service role. This value is calculated from the recurring charge (`basePrice`) multiplied with the factor (`factor`). The value is rounded to two decimal places.

Example:

```
<Parameter id="MEMORY_STORAGE">
...
  <RoleCosts total="0.00">
    <RoleCost basePrice="0.00" factor="0.4020087753882915"
     id="USER" price="0.00"/>
    <RoleCost basePrice="0.00" factor="0.8040175186678614"
     id="ADMIN" price="0.00"/>
  </RoleCosts>
...
</Parameter>
```

SteppedPrices

Specifies the stepped prices for a user assignment, event, or parameter.

Stepped prices allow for the definition of ranges for which different price factors apply. Step limits, i.e. the upper limits of ranges, can be set for:

- The **sum of the time units** users are assigned and work with a subscription in a billing period. For example, up to 10 hours one user is assigned to a subscription cost 10.00 € per hour, every additional hour the user is assigned costs 8.00 €.
- The **number of events** occurring in the usage of a subscription. For example, up to 10 file downloads cost 1.00 € per download, any additional download costs 0.50 €.
- **Values of numeric parameters**. For example, uploading up to 100 files costs 1.00 € per file, any additional upload costs 0.50 € per file.

Stepped prices are independent of any other price model elements.

A `SteppedPrices` element is contained in `UserAssignmentCosts` (as subelement of the `PriceModel` element), `Event`, and `PeriodFee` (as subelement of the `Parameters` element) elements.

A `SteppedPrices` element has the following attribute:

`amount` - (required, data type `decimal`) Summed up costs for all steps including the last one.

For every price step, a `SteppedPrice` element is included in a `SteppedPrices` element.

A `SteppedPrice` element has the following attributes:

- **`additionalPrice`** - (required, data type `decimal`) Summed up costs for the previous steps. The costs are calculated from the `limit`, `freeAmount` and `basePrice` attributes of the previous step (`(limit - freeAmount) * price`). The `additionalPrice` attribute of the first step always has a value of `0`. The value is rounded to two decimal places.
- **`basePrice`** - (required, data type `decimal`) Costs for the current step according to the price model.
- **`freeAmount`** - (required, data type `long`) Amount of units for the current step that are considered as a fixed discount, for example, the number of users that are free of charge. The value corresponds to the value of the `limit` attribute in the previous step. The `freeAmount` attribute of the first step always has a value of `0`.
- **`limit`** - (required, data type `string`) Step limit as defined in the price model.
- **`stepAmount`** - (optional, data type `decimal`) Summed up costs for the current step. These costs are calculated from the `basePrice` and `stepEntityCount` attributes of the current step. The value is rounded to two decimal places.
- **`stepEntityCount`** - (optional, data type `decimal`) Factor used to calculate the costs for the current step.

Example:

```
<PriceModel calculationMode="PRO_RATA" id="350001">
...
  <UserAssignmentCosts basePeriod="MONTH" factor="2.707940780619112"
 numberOfUsersTotal="4" price="1283.18">
    <SteppedPrices amount="1283.18">
      <SteppedPrice additionalPrice="0.00" basePrice="500.00"
       freeAmount="0" limit="2" stepAmount="1000.00"
 stepEntityCount="2"/>
      <SteppedPrice additionalPrice="1000.00" basePrice="400.00"
       freeAmount="2" limit="3" stepAmount="283.18"
       stepEntityCount="0.707940780619112"/>
      <SteppedPrice additionalPrice="1400.00" basePrice="300.00"
       freeAmount="3" limit="null" stepAmount="0.00"
 stepEntityCount="0"/>
    </SteppedPrices>
  </UserAssignmentCosts>
...
</PriceModel>
```

OverallCosts

Contains the total amount of the charges to be paid by a customer for all subscriptions in the current billing period. The costs are given in the currency specified in the price model.

If a discount was specified, the net amount of the costs is given in the `Discount` element (see *Discount* on page 119). If a VAT rate was defined, it is given in the `VAT` element (see *VAT* on page 118).

An `OverallCosts` element has the following attributes:

- **`netAmount`** - (required, data type `decimal`) Net costs after the net discount has been deducted from the original net costs (see *Discount* on page 119). The value is rounded to two decimal places.
- **`currency`** - (required, data type `string`) ISO code of the currency in which the costs are calculated.

- **grossAmount** - (required, data type `decimal`) Gross amount of the costs, calculated from the net costs (`netAmount`) plus VAT (see *VAT* on page 118). The value is rounded to two decimal places.

Example:

```
<BillingDetails key="10002" timezone="UTC+01:00">
...
<OverallCosts netAmount="900.00" currency="EUR" grossAmount="1053.00"/>

</OverallCosts>
</BillingDetails>
```

VAT

Specifies the VAT rate to be applied.

A supplier can define a basic VAT rate that applies by default to all prices for his customers. In addition to this basic VAT rate, country-specific or even customer-specific VAT rates can be defined. You can:

- Enable VAT rate support for your organization.
- Define a default VAT rate that applies to all prices for all customers.
- Define a country-specific VAT rate for every country where you want to sell your services.
- Define a customer-specific VAT rate, for example, in case a customer organization has a subsidiary located in another country than its parent organization.

The VAT rate settings have the following effects on the cost calculation for a customer:

- If VAT rate support is disabled, prices are calculated as net prices; no VAT is added to the overall costs.
- A customer-specific VAT rate takes priority over any default or country-specific VAT rate.
- The country-specific VAT rate for the country where the customer organization is located is applied to the cost calculation when no customer-specific VAT rate is defined.
- The default VAT rate is used in all other cases.

The VAT rate does not affect any price model elements. The calculated VAT amount is added to the overall costs and results in the gross price to be paid by a customer.

A `VAT` element is contained in the `OverallCosts` element.

A `VAT` element has the following attributes:

- **percent** - (required, data type `float`) VAT rate in percent, specified as a decimal number.
- **amount** - (required, data type `decimal`) Net amount of VAT to be added to the net costs (`netAmount` attribute of the `OverallCosts` element). The value is rounded to two decimal places.

Example:

```
<BillingDetails key="10002" timezone="UTC+01:00">
...
  <OverallCosts netAmount="900.00" currency="EUR" grossAmount="1053.00">
    <VAT percent="17.0" amount="153.00"/>
  </OverallCosts>
</BillingDetails>
```

Discount

Specifies the discount granted to the customer.

A discount can be defined for a customer which applies to all subscriptions of the customer to services. A discount may be valid as of the current or a future month. It can be restricted to a certain period of time. Before the time expires, the customer is notified by email so that he can react and contact the supplier.

The discount is defined as a percentage that is subtracted from the regular total price for a subscription. It is granted for all costs of a customer that incur in a billing period in which the discount is valid. It does not matter whether the discount is valid for the whole billing period or only a part of it.

A discount is completely independent of what a customer might purchase. If a discount is changed, the new discount is valid the next time the billing data is generated. Usually, a discount is only changed in agreement with the relevant customer.

A `Discount` element is contained in the `OverallCosts` element.

A `Discount` element has the following attributes:

- **`percent`** - (required, data type `float`) Percentage of costs to be deducted from the net costs, specified as a decimal number.
- **`discountNetAmount`** - (required, data type `decimal`) Net discount to be deducted from the original net costs (`netAmountBeforeDiscount`). The value is rounded to two decimal places.
- **`netAmountAfterDiscount`** - (required, data type `decimal`) Net costs after the net discount (`discountNetAmount`) has been deducted from the original net costs (`netAmountBeforeDiscount`). The value is rounded to two decimal places.
- **`netAmountBeforeDiscount`** - (required, data type `decimal`) Net costs before the net discount (`discountNetAmount`) has been deducted. The value is rounded to two decimal places.

Example:

```
<BillingDetails key="10002" timezone="UTC+01:00">
...
  <OverallCosts netAmount="900.00" currency="EUR" grossAmount="1053.00">
    <Discount percent="10.00" discountNetAmount="100.00"
     netAmountAfterDiscount="900.00"
     netAmountBeforeDiscount="1000.00" />
    <VAT percent="17.0" amount="153.00"/>
  </OverallCosts>
</BillingDetails>
```

Appendix H: Revenue Share Data

In extended usage scenarios, suppliers may involve brokers and resellers in selling their services. The brokers and resellers as well as the platform operator and the owners of the marketplaces on which the services are published, usually receive a share of the revenue for the services. OSCM calculates these revenue shares based on the billing data for the customers who use the services.

Suppliers, brokers, resellers, and marketplace owners can generate reports for their revenue shares and export the revenue share data for a specific time. Operators can export the data for all the suppliers, brokers, resellers, or marketplace owners known to their platform installation. The exported data can be forwarded, for example, to an accounting system for further processing.

The result of the export is stored in an XML file, the revenue data file. The file conforms to one of the following schemas, depending on the type of the revenue share data:

- `BrokerRevenueShareResult.xsd` : revenue share data for brokers
- `ResellerRevenueShareResult.xsd` : revenue share data for resellers
- `MPOwnerRevenueShareResult.xsd` : revenue share data for marketplace owners
- `SupplierRevenueShareResult.xsd` : revenue share data for suppliers

Each of these schemas includes the `BillingBase.xsd` with common definitions. All the schemas can be found in the OSCM integration package.

The XML files containing the revenue share data are named `<date>BillingData.xml`, where `<date>` represents the creation date.

This appendix describes the meaning of the elements and attributes that may occur in the different types of revenue share data file. The first section explains elements and attributes that are common to all revenue share data files. The subsequent sections describe the individual files.

H.1 Common Elements

The sections below describe the following elements that are common to all revenue share data files:

- `Period`
- `OrganizationData`

Period

Specifies the billing period for which the data is exported. The start and end time of the billing period are output according to the start day of the billing period which was defined by the supplier or reseller.

A `Period` element has the following attributes:

- **`startDate`** - (data type `long`) Start time of the period. The start time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **`startDateIsoFormat`** - (optional, data type `dateTime`) Same as `startDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`) .
- **`endDate`** - (data type `long`) End time of the period. The end time is specified in milliseconds, the starting point for the calculation is `1970-01-01, 00:00`.
- **`endDateIsoFormat`** - (optional, data type `dateTime`) Same as `endDate`, but specified in ISO 8601 format (`YYYY-MM-DDThh:mm:ss.fffZ`).

Example:

```
<Period startDateIsoFormat="2012-08-31T22:00:00.000Z"
  startDate="1346450400000"
  endDateIsoFormat="2012-09-30T22:00:00.000Z"
  endDate="1349042400000"/>
```

OrganizationData

Provides details of an organization.

An `OrganizationData` element has the following attributes:

- **`id`** - (required, data type `string`) ID of the organization.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the organization.

An `OrganizationData` element contains the following subelements:

- **`Email`** - (data type `string`) Email address of the organization.
- **`Name`** - (data type `string`) Name of the organization.
- **`Address`** - (data type `string`) Address of the organization.
- **`CountryIsoCode`** - (data type `string`) ISO code of the country where the organization is located.

Example:

```
<OrganizationData id="8e8f596c" key="37003">
  <Email>info@company.com</Email>
  <Name>Company</Name>
  <Address>Postal Address</Address>
  <CountryIsoCode>DE</CountryIsoCode>
</OrganizationData>
```

H.2 Broker Revenue Share Data

The following sections describe the XML elements and attributes that make up the revenue share data for brokers.

BrokerRevenueShareResult

Top-level container element for broker revenue share data. For each broker organization in consideration, a `BrokerRevenueShareResult` element is added to the billing data file.

A `BrokerRevenueShareResult` element has the following attributes:

- **`organizationId`** - (required, data type `string`) ID of the broker organization.
- **`organizationKey`** - (required, data type `positiveInteger`) Internal numeric key of the broker organization.

A `BrokerRevenueShareResult` element contains the following subelements:

- An `OrganizationData` element specifying the details of the broker organization (see *OrganizationData* on page 121).
- A `Period` element specifying the billing period (see *Period* on page 120).
- A `Currency` element for each currency for which broker revenue share data is available (see *Currency* on page 122).

Example:

```
<BrokerRevenueShareResult organizationId="cd9ffaac"
 organizationKey="19000" >
  <OrganizationData> ... </OrganizationData>
  <Period> ... </Period>
  <Currency> ... </Currency>
</BrokerRevenueShareResult>
```

Currency

Contains the broker revenue share data for a specific currency.

A `Currency` element has the following attribute:

`id` - (required, data type `string`) ISO code of the currency.

A `Currency` element contains the following subelements:

- A `Supplier` element for each supplier organization that provides a service for which the current broker organization receives a revenue share (see *Supplier* on page 122).
- A `BrokerRevenue` element specifying the overall revenue for the currency in its `totalAmount` attribute (optional, data type positive `decimal`, scale 2), and the overall broker revenue share for the currency in its `amount` attribute (required, data type positive `decimal`, scale 2).

Example:

```
<Currency id="EUR">
  <Supplier>...</Supplier>
  <BrokerRevenue totalAmount="1000.50" amount="100.05" />
</Currency>
```

Supplier

Contains the broker revenue share data for the services provided by a specific supplier.

A `Supplier` element contains the following subelements:

- An `OrganizationData` element specifying the details of the supplier organization (see *OrganizationData* on page 121).
- A `Service` element for each service provided by the supplier for which the current broker organization receives a revenue share (see *Service* on page 122).
- A `BrokerRevenuePerSupplier` element specifying the overall revenue for the supplier in its `totalAmount` attribute (optional, data type positive `decimal`, scale 2), and the overall broker revenue share in its `amount` attribute (required, data type positive `decimal`, scale 2).

Example:

```
<Supplier>
  <OrganizationData> ... </OrganizationData>
  <Service> ... </Service>
  <BrokerRevenuePerSupplier totalAmount="200.50" amount="20.05" />
</Supplier>
```

Service

Specifies the broker revenue share data for a specific service.

A `Service` element has the following attributes:

- **`id`** - (required, data type `string`) Name of the service.

- **key** - (required, data type positiveInteger) Internal numeric key of the service offered by the broker. Technically, this is a copy of the original service defined by the supplier.
- **templateKey** - (required, data type positiveInteger) Internal numeric key of the original service defined by the supplier.

A Service element contains a ServiceRevenue element which specifies the total revenue for the service and the broker revenue share in its attributes:

- **totalAmount** - (required, data type positive decimal, scale 2) Total revenue for the service in the billing period.
- **brokerRevenueSharePercentage** - (required, data type positive decimal, scale 2) Percentage of the revenue the broker is entitled to.
- **brokerRevenue** - (required, data type positive decimal, scale 2) The broker's revenue share for the service in the billing period.

A ServiceRevenue element contains a ServiceCustomerRevenue subelement for each customer who used the service. It specifies the total revenue for the service generated by the customer and the broker revenue share in its attributes:

- **customerName** - (optional, data type string) Name of the customer organization.
- **customerId** - (optional, data type string) ID of the customer organization.
- **totalAmount** - (optional, data type positive decimal, scale 2) Total revenue for the service generated by the customer in the billing period.
- **brokerRevenueSharePercentage** - (optional, data type positive decimal, scale 2) Percentage of the revenue the broker is entitled to.
- **brokerRevenue** - (optional, data type positive decimal, scale 2) The broker's revenue share for the service generated by the customer in the billing period.

Example:

```
<Service id="Mega Office" key="17005" templateKey="10501">
  <ServiceRevenue totalAmount="200.00"
   brokerRevenueSharePercentage="10.00" brokerRevenue="20.00" />
    <ServiceCustomerRevenue customerName="MyCompany"
     customerId="862cfb94" totalAmount="50.00"
     brokerRevenueSharePercentage="10.00" brokerRevenue="5.00" />
</Service>
```

H.3 Reseller Revenue Share Data

The following sections describe the XML elements and attributes that make up the revenue share data for resellers.

ResellerRevenueShareResult

Top-level container element for reseller revenue share data. For each reseller organization in consideration, a ResellerRevenueShareResult element is added to the billing data file.

A ResellerRevenueShareResult element has the following attributes:

- **organizationId** - (required, data type string) ID of the reseller organization.
- **organizationKey** - (required, data type positiveInteger) Internal numeric key of the reseller organization.

A `ResellerRevenueShareResult` element contains the following subelements:

- An `OrganizationData` element specifying the details of the reseller organization (see *OrganizationData* on page 121).
- A `Period` element specifying the billing period (see *Period* on page 120).
- A `Currency` element for each currency for which reseller revenue share data is available (see *Currency* on page 124).

Example:

```
<ResellerRevenueShareResult organizationId="cd9ffaac"
 organizationKey="19000">
  <OrganizationData> ... </OrganizationData>
  <Period> ... </Period>
  <Currency> ... </Currency>
</ResellerRevenueShareResult>
```

Currency

Contains the reseller revenue share data for a specific currency.

A `Currency` element has the following attribute:

`id` - (required, data type `string`) ISO code of the currency.

A `Currency` element contains the following subelements:

- A `Supplier` element for each supplier organization that provides a service for which the current reseller organization receives a revenue share (see *Supplier* on page 124).
- A `ResellerRevenue` element with the following attributes:

  `totalAmount` - (optional, data type positive `decimal`, scale 2) Overall revenue for the currency.

  `amount` - (required, data type positive `decimal`, scale 2) Overall reseller revenue share.

  `purchasePrice` - (optional, data type positive `decimal`, scale 2) Difference between the `totalAmount` and the `amount` attribute.

Example:

```
<Currency id="EUR">
  <Supplier>...</Supplier>
  <ResellerRevenue totalAmount="1000.50" amount="200.10"
   purchasePrice="800.40"/>
</Currency>
```

Supplier

Contains the reseller revenue share data for the services provided by a specific supplier.

A `Supplier` element contains the following subelements:

- An `OrganizationData` element specifying the details of the supplier organization (see *OrganizationData* on page 121).
- A `Service` element for each service provided by the supplier for which the current reseller organization receives a revenue share (see *Service* on page 125).
- A `ResellerRevenuePerSupplier` element with the following attributes:

  `totalAmount` - (optional, data type positive `decimal`, scale 2) Overall revenue for the supplier.

  `amount` - (required, data type positive `decimal`, scale 2) Overall reseller revenue share for the supplier.

`purchasePrice` - (optional, data type positive `decimal`, scale 2) Difference between the `totalAmount` and the `amount` attribute.

Example:

```
<Supplier>
  <OrganizationData> ... </OrganizationData>
  <Service> ... </Service>
  <ResellerRevenuePerSupplier totalAmount="200.50" amount="40.10"
   purchasePrice="160.40"/>
</Supplier>
```

Service

Specifies the reseller revenue share data for a specific service.

A `Service` element has the following attributes:

- **`id`** - (required, data type `string`) Name of the service.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the service offered by the reseller. Technically, this is a copy of the original service defined by the supplier.
- **`templateKey`** - (required, data type `positiveInteger`) Internal numeric key of the original service defined by the supplier.

A `Service` element contains the following subelements:

- A `Subscription` element for each subscription to the service offered by the reseller (see *Subscription* on page 125).
- A `ServiceRevenue` element specifying the overall reseller revenue share for the service (see *ServiceRevenue* on page 126).

Example:

```
<Service id="Mega Office" key="17005" templateKey="10501">
  <Subscription> ... </Subscription>
  <ServiceRevenue> ... </ServiceRevenue>
</Service>
```

Subscription

Specifies the revenue for a specific subscription to a service.

A `Subscription` element has the following attributes:

- **`id`** - (required, data type `string`) Name of the subscription.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the subscription.
- **`billingKey`** - (required, data type `positiveInteger`) Unique identifier allowing, for example, accounting systems to relate billing data to an invoice. The billing data key is printed on the invoice.
- **`revenue`** - (required, data type positive `decimal`, scale 2) The total revenue for the subscription in the billing period. Note that there is a `Service` element for each phase of the subscription if the subscription is upgraded or downgraded.

A `Subscription` element contains a `Period` subelement specifying the applicable billing period (see *Period* on page 120).

Example:

```
<Subscription id="Mega Office Basic" key="17005" billingKey="19032"
  revenue="600.00">
  <Period>... </Period>
</Subscription>
```

ServiceRevenue

Specifies the total revenue for a service and the reseller revenue share.

A `ServiceRevenue` element has the following attributes:

- **`totalAmount`** - (required, data type positive `decimal`, scale 2) Total revenue for all subscriptions to the service in the billing period.
- **`resellerRevenueSharePercentage`** - (required, data type positive `decimal`, scale 2) Percentage of the revenue the reseller is entitled to.
- **`resellerRevenue`** - (required, data type positive `decimal`, scale 2) The reseller's revenue share for the service in the billing period.

A `ServiceRevenue` element contains a `ServiceCustomerRevenue` subelement for each customer who used the service. It specifies the total revenue for the service generated by the customer and the reseller revenue share in its attributes:

- **`customerName`** - (optional, data type `string`) Name of the customer organization.
- **`customerId`** - (optional, data type `string`) ID of the customer organization.
- **`totalAmount`** - (optional, data type positive `decimal`, scale 2) Total revenue for the service generated by the customer in the billing period.
- **`resellerRevenueSharePercentage`** - (optional, data type positive `decimal`, scale 2) Percentage of the revenue the reseller is entitled to.
- **`resellerRevenue`** - (optional, data type positive `decimal`, scale 2) The reseller's revenue share for the service generated by the customer in the billing period.
- **`purchasePrice`** - (optional, data type positive `decimal`, scale 2) Difference between the `totalAmount` and the `resellerRevenue` attribute.

Example:

```
<ServiceRevenue totalAmount="200.00"
  resellerRevenueSharePercentage="10.00" resellerRevenue="20.00">
    <ServiceCustomerRevenue customerName="MyCompany"
     customerId="862cfb94" totalAmount="50.00"
     resellerRevenueSharePercentage="10.00" resellerRevenue="5.00"
     purchasePrice="45"/>
</ServiceRevenue>
```

H.4 Marketplace Owner Revenue Share Data

The following sections describe the XML elements and attributes that make up the revenue share data for marketplace owners.

MarketplaceOwnerRevenueShareResult

Top-level container element for marketplace owner revenue share data. For each marketplace owner organization in consideration, a `MarketplaceOwnerRevenueShareResult` element is added to the billing data file.

A `MarketplaceOwnerRevenueShareResult` element has the following attributes:

- **`organizationId`** - (required, data type `string`) ID of the marketplace owner organization.
- **`organizationKey`** - (required, data type `positiveInteger`) Internal numeric key of the marketplace owner organization.

A `MarketplaceOwnerRevenueShareResult` element contains the following subelements:

- An `OrganizationData` element specifying the details of the marketplace owner organization (see *OrganizationData* on page 121).
- A `Period` element specifying the billing period (see *Period* on page 120).
- A `Currency` element for each currency for which marketplace owner revenue share data is available (see *Currency* on page 127).

Example:

```
<MarketplaceOwnerRevenueShareResult organizationId="cd9ffaac"
 organizationKey="19000">
  <OrganizationData> ... </OrganizationData>
  <Period> ... </Period>
  <Currency> ... </Currency>
</MarketplaceOwnerRevenueShareResult>
```

Currency

Contains the marketplace owner revenue share data for a specific currency.

A `Currency` element has the following attribute:

`id` - (required, data type `string`) ISO code of the currency.

A `Currency` element contains the following subelements:

- A `Marketplace` element for each marketplace for which revenue share data for the current marketplace owner organization is available (see *Marketplace* on page 127).
- A `RevenuesOverAllMarketplaces` element summarizing the revenue shares across the marketplaces (see *RevenuesOverAllMarketplaces* on page 131).

Example:

```
<Currency id="EUR">
  <Marketplace>...</Marketplace>
  <RevenuesOverAllMarketplaces> ... </RevenuesOverAllMarketplaces>
</Currency>
```

Marketplace

Contains the revenue share data for a specific marketplace.

A `Marketplace` element has the following attributes:

- **`id`** - (required, data type `string`) ID of the marketplace.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the marketplace.

A `Marketplace` element contains the following subelements:

- A `Service` element for each service published on the marketplace for which revenue share data is available (see *Service* on page 128).
- A `RevenuesPerMarketplace` element summarizing the revenue shares for all organizations involved (see *RevenuesPerMarketplace* on page 130).

Example:

```
<Marketplace id="e1828fba" key="17021">
  <Service>...</Service>
  <RevenuesPerMarketplace> ... </RevenuesPerMarketplace>
</Marketplace>
```

Service

Specifies the revenue share data for a specific service published on the current marketplace.

A `Service` element has the following attributes:

- **`id`** - (required, data type `string`) Name of the service.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the published service. If the service is offered by a broker or reseller, this is the key of an internal technical copy of the original service defined by the supplier. If the service is offered directly by its supplier, it is the key of the original service.
- **`model`** - (required, data type `string`) String specifying by which type of organization the service is offered. Possible values are:
  - `DIRECT` : The service is offered by its supplier.
  - `BROKER` : The service is offered by a broker.
  - `RESELLER` : The service is offered by a reseller.
- **`templateKey`** - (optional, data type `positiveInteger`) Internal numeric key of the original service defined by the supplier, if the service is published by a broker or reseller.

A `Service` element contains the following subelements:

- A `Supplier` element specifying the supplier organization who defined the service in an `OrganizationData` subelement (see *OrganizationData* on page 121).
- If the service is offered by a broker: A `Broker` element specifying the broker organization in an `OrganizationData` subelement (see *OrganizationData* on page 121).
- If the service is offered by a reseller: A `Reseller` element specifying the reseller organization in an `OrganizationData` subelement (see *OrganizationData* on page 121).
- A `RevenueShareDetails` element specifying the revenue shares for the service (see *RevenueShareDetails* on page 129).

Examples:

The service is offered directly by its supplier:

```
<Service id="Mega Office" key="17005" model="DIRECT">
  <Supplier> <OrganizationData> ... </OrganizationData> </Supplier>
  <RevenueShareDetails> ... </RevenueShareDetails>
</Service>
```

The service is offered by a broker:

```
<Service id="Mega Office" key="17005" model="BROKER"
 templateKey="10501">
  <Supplier> <OrganizationData> ... </OrganizationData> </Supplier>
  <Broker> <OrganizationData> ... </OrganizationData> </Broker>
  <RevenueShareDetails> ... </RevenueShareDetails>
</Service>
```

The service is offered by a reseller:

```
<Service id="Mega Office" key="17005" model="RESELLER"
 templateKey="10501">
  <Supplier> <OrganizationData> ... </OrganizationData> </Supplier>
  <Reseller> <OrganizationData> ... </OrganizationData> </Reseller>
  <RevenueShareDetails> ... </RevenueShareDetails>
</Service>
```

RevenueShareDetails

Specifies the revenue for a specific service and the revenue shares for all organizations involved in selling the service.

A `RevenueShareDetails` element has the following attributes:

- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Total revenue for the service in the billing period.
- **`marketplaceRevenueSharePercentage`** - (required, data type `decimal`, scale 2) Percentage of the revenue the marketplace owner is entitled to.
- **`operatorRevenueSharePercentage`** - (required, data type `decimal`, scale 2) Percentage of the revenue the platform operator is entitled to.
- **`brokerRevenueSharePercentage`** - (optional, data type `decimal`, scale 2) If the service is offered by a broker: Percentage of the revenue the broker is entitled to.
- **`resellerRevenueSharePercentage`** - (optional, data type `decimal`, scale 2) If the service is offered by a reseller: Percentage of the revenue the reseller is entitled to.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) The marketplace owner's revenue share for the service in the billing period.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) The platform operator's revenue share for the service in the billing period.
- **`brokerRevenue`** - (optional, data type `decimal`, scale 2) If the service is offered by a broker: The broker's revenue share for the service in the billing period.
- **`resellerRevenue`** - (optional, data type `decimal`, scale 2) If the service is offered by a reseller: The reseller's revenue share for the service in the billing period.
- **`amountForSupplier`** - (required, data type `decimal`, scale 2) The supplier's revenue share for the service in the billing period. This is the remaining value of the total service revenue after subtracting the revenue shares for the operator, marketplace owner, broker, and/or reseller.

Examples:

The service is offered directly by its supplier:

```
<RevenueShareDetails serviceRevenue="500.00"
  marketplaceRevenueSharePercentage="15.00" marketplaceRevenue="75.00"
  operatorRevenueSharePercentage="10.00" operatorRevenue="50.00"
  amountForSupplier="375.00">
</RevenueShareDetails>
```

The service is offered by a broker:

```
<RevenueShareDetails serviceRevenue="4000.00"
  marketplaceRevenueSharePercentage="21.00" marketplaceRevenue="840.00"
  brokerRevenueSharePercentage="9.00" brokerRevenue="360.00"
  operatorRevenueSharePercentage="5.00" operatorRevenue="200.00"
  amountForSupplier="2600.00">
```

```
</RevenueShareDetails>
```

The service is offered by a reseller:

```
<RevenueShareDetails serviceRevenue="3000.00"
  marketplaceRevenueSharePercentage="16.00" marketplaceRevenue="480.00"
  resellerRevenueSharePercentage="20.00" resellerRevenue="600.00"
  operatorRevenueSharePercentage="5.00" operatorRevenue="150.00"
  amountForSupplier="1770.00">
</RevenueShareDetails>
```

RevenuesPerMarketplace

Provides an overview of the revenue shares for the different organizations involved in selling services on a specific marketplace.

A `RevenuesPerMarketplace` element contains the following subelements:

- A `Brokers` element listing the relevant broker organizations with their revenue shares in `Organization` subelements.
- A `Resellers` element listing the relevant reseller organizations with their revenue shares in `Organization` subelements.
- A `Suppliers` element listing the relevant supplier organizations with their revenue shares in `Organization` subelements.
- A `MarketplaceOwner` element specifying the revenue share for the marketplace owner in its `amount` attribute (required, data type `decimal`, scale 2).

Each `Brokers`, `Resellers`, or `Suppliers` element included in a `RevenuesPerMarketplace` element has the following attributes:

- **`amount`** - (optional, data type `decimal`, scale 2) Overall revenue share of the listed broker, reseller, or supplier organizations.
- **`marketplaceRevenue`** - (optional, data type `decimal`, scale 2) The marketplace owner's share of the revenue of the listed broker, reseller, or supplier organizations.
- **`totalAmount`** - (optional, data type `decimal`, scale 2) Overall revenue for all services offered by the listed broker, reseller, or supplier organizations on the marketplace.

An `Organization` element included in a `Brokers`, `Resellers`, or `Suppliers` element has the following attributes:

- **`identifier`** - (required, data type `string`) ID of the organization.
- **`amount`** - (required, data type `decimal`, scale 2) Revenue share of the organization.
- **`name`** - (optional, data type `string`) Name of the organization.
- **`marketplaceRevenue`** - (optional, data type `decimal`, scale 2) The marketplace owner's share of the organization's revenue.
- **`totalAmount`** - (optional, data type `decimal`, scale 2) Overall revenue for all services offered by the organization on the marketplace.

Example:

```
<RevenuesPerMarketplace>
  <Brokers amount="250.00" totalAmount="1000.00"
   marketplaceRevenue="200.00">
    <Organization identifier="da3cd3a3" amount="100.00" name="broker"
     marketplaceRevenue="80.00" totalAmount="400.00" />
    <Organization identifier="ea4cd3a3" amount="150.00" name="broker2"
```

```
    marketplaceRevenue="120.00" totalAmount="600.00" />
  </Brokers>
  <Resellers amount="600.00" totalAmount="2000.00"
   marketplaceRevenue="400.00">
    <Organization identifier="bc4cd3a3" amount="240.00" name="reseller"
     marketplaceRevenue="160.00" totalAmount="800.00" />
    <Organization identifier="fg5cd3a3" amount="360.00" name="reseller2"
     marketplaceRevenue="240.00" totalAmount="1200.00" />
  </Resellers>
  <Suppliers />
  <MarketplaceOwner amount="600.00" />
</RevenuesPerMarketplace>
```

RevenuesOverAllMarketplaces

Provides an overview of the revenue shares for the different organizations involved in selling services on any of the marketplaces that belong to a specific marketplace owner.

A `RevenuesOverAllMarketplaces` element contains the following subelements:

- A `Brokers` element listing the relevant broker organizations with their revenue shares in `Organization` subelements.
- A `Resellers` element listing the relevant reseller organizations with their revenue shares in `Organization` subelements.
- A `Suppliers` element listing the relevant supplier organizations with their revenue shares in `Organization` subelements.
- A `MarketplaceOwner` element specifying the revenue share for the marketplace owner in its `amount` attribute (required, data type `decimal`, scale 2).

Each `Brokers`, `Resellers`, or `Suppliers` element included in a `RevenuesOverAllMarketplaces` element has the following attributes:

- **`amount`** - (optional, data type `decimal`, scale 2) Overall revenue share of the listed broker, reseller, or supplier organizations.
- **`marketplaceRevenue`** - (optional, data type `decimal`, scale 2) The marketplace owner's share of the revenue of the listed broker, reseller, or supplier organizations.
- **`totalAmount`** - (optional, data type `decimal`, scale 2) Overall revenue for all services offered by the listed broker, reseller, or supplier organizations on the marketplaces.

An `Organization` element included in a `Brokers`, `Resellers`, or `Suppliers` element has the following attributes:

- **`identifier`** - (required, data type `string`) ID of the organization.
- **`amount`** - (required, data type `decimal`, scale 2) Revenue share of the organization.
- **`name`** - (optional, data type `string`) Name of the organization.
- **`marketplaceRevenue`** - (optional, data type `decimal`, scale 2) The marketplace owner's share of the organization's revenue.
- **`totalAmount`** - (optional, data type `decimal`, scale 2) Overall revenue for all services offered by the organizations on the marketplaces.

Example:

```
<RevenuesOverAllMarketplaces>
  <Brokers amount="250.00" totalAmount="1000.00"
   marketplaceRevenue="200.00">
    <Organization identifier="da3cd3a3" amount="100.00" name="broker"
```

```
    marketplaceRevenue="80.00" totalAmount="400.00" />
   <Organization identifier="ea4cd3a3" amount="150.00" name="broker2"
    marketplaceRevenue="120.00" totalAmount="600.00" />
 </Brokers>
 <Resellers amount="600.00" totalAmount="2000.00"
  marketplaceRevenue="400.00">
   <Organization identifier="bc4cd3a3" amount="240.00" name="reseller"
    marketplaceRevenue="160.00" totalAmount="800.00" />
   <Organization identifier="fg5cd3a3" amount="360.00" name="reseller2"
    marketplaceRevenue="240.00" totalAmount="1200.00" />
 </Resellers>
 <Suppliers />
 <MarketplaceOwner amount="600.00" />
</RevenuesOverAllMarketplaces>
```

H.5 Supplier Revenue Share Data

The following sections describe the XML elements and attributes that make up the revenue share data for suppliers.

SupplierRevenueShareResult

Top-level container element for all revenue share data a supplier has to pay to all participating parties (platform operator, marketplace owners, brokers, resellers) based on his contractual agreements. For each supplier organization in consideration, a `SupplierRevenueShareResult` element is added to the billing data file.

A `SupplierRevenueShareResult` element has the following attributes:

- **`organizationId`** - (required, data type `string`) ID of the supplier organization.
- **`organizationKey`** - (required, data type `positiveInteger`) Internal numeric key of the supplier organization.

A `SupplierRevenueShareResult` element contains the following subelements:

- An `OrganizationData` element specifying the details of the supplier organization (see *OrganizationData* on page 121).
- A `Period` element specifying the billing period (see *Period* on page 120).
- A `Currency` element for each currency for which supplier revenue share data is available (see *Currency* on page 132).

Example:

```
<SupplierRevenueShareResult organizationId="cd9ffaac"
 organizationKey="19000">
  <OrganizationData> ... </OrganizationData>
  <Period> ... </Period>
  <Currency> ... </Currency>
</SupplierRevenueShareResult>
```

Currency

Contains the supplier revenue share data for a specific currency.

A `Currency` element has the following attribute:

`id` - (required, data type `string`) ISO code of the currency.

A `Currency` element contains the following subelements:

- A `Marketplace` element for each marketplace for which revenue share data for the supplier organization is available (see *Marketplace* on page 133).
- A `SupplierRevenue` element specifying the detailed revenue share data for the current supplier organization (see *SupplierRevenue* on page 133).

Example:

```
<Currency id="EUR">
  <Marketplace>...</Marketplace>
  <SupplierRevenue>...</SupplierRevenue>
</Currency>
```

Marketplace

Contains the revenue share data for a specific marketplace.

A `Marketplace` element has the following attributes:

- **`id`** - (required, data type `string`) ID of the marketplace.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the marketplace.

A `Marketplace` element contains the following subelements:

- A `MarketplaceOwner` element specifying the marketplace owner in an `OrganizationData` subelement (see *OrganizationData* on page 121).
- A `Service` element for each service published on the marketplace for which revenue share data for the supplier is available (see *Service* on page 135).
- A `RevenuePerMarketplace` element summarizing the revenue shares for all organizations involved (see *RevenuePerMarketplace* on page 139).

Example:

```
<Marketplace id="e1828fba" key="17021">
  <MarketplaceOwner>
    <OrganizationData> ... </OrganizationData>
  </MarketplaceOwner>
  <Service>...</Service>
  <RevenuePerMarketplace> ... </RevenuePerMarketplace>
</Marketplace>
```

SupplierRevenue

Contains the detailed revenue data for a supplier organization.

A `SupplierRevenue` element has the following attributes:

- **`amount`** - (required, data type `decimal`, scale 2) Overall revenue for the supplier.

A `SupplierRevenue` element may contain the following subelements, depending on which organizations offer the supplier's services:

- A `DirectRevenue` element specifying the revenue for the services offered directly by the supplier.
- A `BrokerRevenue` element specifying the revenue for the supplier's services offered by brokers.
- A `ResellerRevenue` element specifying the revenue for the supplier's services offered by resellers.

Example:

```
<SupplierRevenue amount="1500.00">
  <DirectRevenue> ... </DirectRevenue>
  <BrokerRevenue> ... </BrokerRevenue>
  <ResellerRevenue> ... </ResellerRevenue>
</SupplierRevenue>
```

DirectRevenue

Contains the revenue data for services offered directly by their supplier.

A `DirectRevenue` element has the following attributes:

- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the services offered by the supplier.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the owners of the marketplaces where the services are offered by the supplier.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the platform operator who provides the infrastructure for the marketplaces and services.

Example:

```
<SupplierRevenue amount="1500.00">
  <DirectRevenue serviceRevenue="600.00" marketplaceRevenue="75.00"
   operatorRevenue="25.00"/>
  <BrokerRevenue> ... </BrokerRevenue>
  <ResellerRevenue> ...</ResellerRevenue>
</SupplierRevenue>
```

BrokerRevenue

Contains the revenue data for a supplier's services offered by brokers.

A `BrokerRevenue` element has the following attributes:

- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the services offered by the broker.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the owners of the marketplaces where the services are offered by brokers.
- **`brokerRevenue`** - (required, data type `decimal`, scale 2) Overall revenue share for the broker offering the services.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the platform operator who provides the infrastructure for the marketplaces and services.

Example:

```
<SupplierRevenue amount="1500.00">
  <DirectRevenue> ... </DirectRevenue>
  <BrokerRevenue serviceRevenue="700.00" marketplaceRevenue="75.00"
   brokerRevenue="25.00" operatorRevenue="100.00"/>
  <ResellerRevenue> ...</ResellerRevenue>
</SupplierRevenue>
```

ResellerRevenue

Contains the revenue data for the supplier's services offered by resellers.

A `ResellerRevenue` element has the following attributes:

- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the services offered by resellers.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the owners of the marketplaces where the services are offered by the resellers.
- **`resellerRevenue`** - (required, data type `decimal`, scale 2) Overall revenue share for the resellers offering the services.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the platform operator who provides the infrastructure for the marketplaces and services.
- **`overallRevenue`** - (required, data type `decimal`, scale 2) Overall revenue for the services offered by the resellers minus the marketplace owner revenue (`marketplaceRevenue`), the reseller revenue (`resellerRevenue`), and the operator revenue (`operatorRevenue`).

Example:

```
<SupplierRevenue amount="1500.00">
  <DirectRevenue> ... </DirectRevenue>
  <BrokerRevenue> ... </BrokerRevenue>
  <ResellerRevenue serviceRevenue="650.00"
  marketplaceRevenue="75.00"
  resellerRevenue="25.00"
  operatorRevenue="50.00"
  overallRevenue="500.00" />
</SupplierRevenue>
```

Service

Specifies the revenue share data for a specific service.

A `Service` element has the following attributes:

- **`id`** - (required, data type `string`) Name of the service.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the published service. If the service is offered by a broker or reseller, this is the key of an internal technical copy of the original service defined by the supplier. If the service is offered directly by its supplier, it is the key of the original service.
- **`model`** - (required, data type `string`) String specifying by which type of organization the service is offered. Possible values are:
  - `DIRECT` : The service is offered by its supplier.
  - `BROKER` : The service is offered by a broker.
  - `RESELLER` : The service is offered by a reseller.
- **`templateKey`** - (optional, data type `positiveInteger`) Internal numeric key of the original service defined by the supplier, if the service is published by a broker or reseller.

A `Service` element contains the following subelements:

- If the service is offered directly by the supplier: A `Subscription` element for each subscription to the service for which revenue share data is available (see *Subscription* on page 136).
- If the service is offered by a broker:
  - A `Subscription` element for each subscription to the service for which revenue share data is available (see *Subscription* on page 136).

    - A `Broker` element specifying the broker organization in an `OrganizationData` subelement (see *OrganizationData* on page 121).
- If the service is offered by a reseller:
    - A `SubscriptionsRevenue` element summarizing the total revenue for all subscriptions to the service in its `amount` attribute (required, data type positive `decimal`, scale 2).
    - A `Reseller` element specifying the reseller organization in an `OrganizationData` subelement (see *OrganizationData* on page 121).
- A `RevenueShareDetails` element specifying the revenue shares for the service (see *RevenueShareDetails* on page 137).

Examples:

The service is offered directly by its supplier:

```
<Service id="Mega Office" key="17005" model="DIRECT">
  <Subscription> ... </Subscription>
  <RevenueShareDetails> ... </RevenueShareDetails>
</Service>
```

The service is offered by a broker:

```
<Service id="Mega Office" key="17005" model="BROKER"
 templateKey="10501">
  <Subscription> ... </Subscription>
  <Broker> <OrganizationData> ... </OrganizationData> </Broker>
  <RevenueShareDetails> ... </RevenueShareDetails>
</Service>
```

The service is offered by a reseller:

```
<Service id="Mega Office" key="17005" model="RESELLER"
 templateKey="10501">
  <SubscriptionsRevenue amount="6000.00" />
  <Reseller> <OrganizationData> ... </OrganizationData> </Reseller>
  <RevenueShareDetails> ... </RevenueShareDetails>
</Service>
```

Subscription

Specifies the revenue for a specific subscription to a service.

A `Subscription` element has the following attributes:

- **`id`** - (required, data type `string`) Name of the subscription.
- **`key`** - (required, data type `positiveInteger`) Internal numeric key of the subscription.
- **`billingKey`** - (required, data type `positiveInteger`) Unique identifier allowing, for example, accounting systems to relate billing data to an invoice. The billing data key is printed on the invoice.
- **`revenue`** - (required, data type positive `decimal`, scale 2) The total revenue for the subscription in the billing period. Note that there is a `Service` element for each phase of the subscription if the subscription is upgraded or downgraded.

A `Subscription` element contains a `Period` subelement specifying the applicable billing period (see *Period* on page 120).

Example:

```
<Subscription id="Mega Office Basic" key="17005" billingKey="19032"
  revenue="600.00">
  <Period>... </Period>
</Subscription>
```

RevenueShareDetails

Specifies the revenue for a specific service and the revenue shares for all organizations involved in selling the service.

A `RevenueShareDetails` element has the following attributes:

- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Total revenue for the service in the billing period.
- **`marketplaceRevenueSharePercentage`** - (required, data type `decimal`, scale 2) Percentage of the revenue the marketplace owner is entitled to.
- **`brokerRevenueSharePercentage`** - (optional, data type `decimal`, scale 2) If the service is offered by a broker: Percentage of the revenue the broker is entitled to.
- **`resellerRevenueSharePercentage`** - (optional, data type `decimal`, scale 2) If the service is offered by a reseller: Percentage of the revenue the reseller is entitled to.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) The marketplace owner's revenue share for the service in the billing period.
- **`brokerRevenue`** - (optional, data type `decimal`, scale 2) If the service is offered by a broker: The broker's revenue share for the service in the billing period.
- **`resellerRevenue`** - (optional, data type `decimal`, scale 2) If the service is offered by a reseller: The reseller's revenue share for the service in the billing period.
- **`operatorRevenueSharePercentage`** - (required, data type `decimal`, scale 2) Percentage of the revenue the operator is entitled to.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) The operator's revenue share for the service in the billing period.
- **`amountForSupplier`** - (required, data type `decimal`, scale 2) The supplier's revenue share for the service in the billing period. This is the remaining value of the total service revenue after subtracting the revenue shares for the operator, marketplace owner, broker, and/or reseller.

A `RevenueShareDetails` element contains a `CustomerRevenueShareDetails` subelement for each customer who used the service (see *CustomerRevenueShareDetails* on page 138).

Examples:

The service is offered directly by its supplier:

```
<RevenueShareDetails serviceRevenue="500.00"
  marketplaceRevenueSharePercentage="15.00" marketplaceRevenue="75.00"
  operatorRevenueSharePercentage="10.00" operatorRevenue="50.00"
  amountForSupplier="375.00">
  <CustomerRevenueShareDetails> ... </CustomerRevenueShareDetails>
</RevenueShareDetails>
```

The service is offered by a broker:

```
<RevenueShareDetails serviceRevenue="4000.00"
  marketplaceRevenueSharePercentage="21.00" marketplaceRevenue="840.00"
  brokerRevenueSharePercentage="9.00" brokerRevenue="360.00"
```

```
  operatorRevenueSharePercentage="10.00" operatorRevenue="400.00"
  amountForSupplier="2400.00">
  <CustomerRevenueShareDetails> ... </CustomerRevenueShareDetails>
</RevenueShareDetails>
```

The service is offered by a reseller:

```
<RevenueShareDetails serviceRevenue="3000.00"
  marketplaceRevenueSharePercentage="16.00" marketplaceRevenue="480.00"
  resellerRevenueSharePercentage="20.00" resellerRevenue="600.00"
  operatorRevenueSharePercentage="10.00" operatorRevenue="300.00"
  amountForSupplier="1620.00">
  <CustomerRevenueShareDetails> ... </CustomerRevenueShareDetails>
</RevenueShareDetails>
```

CustomerRevenueShareDetails

Specifies the revenue for a specific service generated by a given customer and the revenue shares for all organizations involved in selling the service.

A `CustomerRevenueShareDetails` element has the following attributes:

- **`customerName`** - (required, data type `string`) Name of the customer organization.
- **`customerId`** - (required, data type `string`) ID of the customer organization.
- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Total revenue for the service in the billing period.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) The marketplace owner's revenue share for the service in the billing period.
- **`resellerRevenue`** - (optional, data type `decimal`, scale 2) If the service is offered by a reseller: The reseller's revenue share for the service in the billing period.
- **`brokerRevenue`** - (optional, data type `decimal`, scale 2) If the service is offered by a broker: The broker's revenue share for the service in the billing period.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) The operator's revenue share for the service in the billing period.
- **`amountForSupplier`** - (required, data type `decimal`, scale 2) The supplier's revenue share for the service generated by the customer in the billing period. This is the remaining value of the total service revenue generated by the customer after subtracting the revenue shares for the operator, marketplace owner, broker, and/or reseller.

Examples:

The service is offered directly by its supplier:

```
<CustomerRevenueShareDetails customerName="MyCompany"
  customerId="8dac00a0" serviceRevenue="316.92"
  marketplaceRevenue="31.69" operatorRevenue="31.69"
  amountForSupplier="223.54"/>
```

The service is offered by a broker:

```
<CustomerRevenueShareDetails customerName="ITCompany"
  customerId="ff48ae0b" serviceRevenue="300.00"
  marketplaceRevenue="63.00" brokerRevenue="27.00"
  operatorRevenue="30.00" amountForSupplier="180.00" />
```

The service is offered by a reseller:

```
<CustomerRevenueShareDetails customerName="YourCompany"
  customerId="859069d7" serviceRevenue="500.00"
  marketplaceRevenue="80.00" resellerRevenue="250.00"
  operatorRevenue="50.00" amountForSupplier="120.00"/>
```

RevenuePerMarketplace

Provides an overview of the revenue shares for the different organizations involved in selling the services of a supplier on a specific marketplace.

A `RevenuePerMarketplace` element has the following attributes:

- **`serviceRevenue`** - (required, data type `decimal`, scale 2) Total revenue for all relevant services in the billing period.
- **`marketplaceRevenue`** - (required, data type `decimal`, scale 2) Total revenue share for the marketplace owner.
- **`brokerRevenue`** - (optional, data type `decimal`, scale 2) Total revenue share for all brokers.
- **`resellerRevenue`** - (optional, data type `decimal`, scale 2) Total revenue share for all resellers.
- **`operatorRevenue`** - (required, data type `decimal`, scale 2) Total revenue share for the operator.
- **`overallRevenue`** - (required, data type `decimal`, scale 2) Total revenue for the supplier. This is the remaining value of the total revenue for all services after subtracting the revenue shares for the operator, marketplace owner, brokers, and/or resellers.

Example:

```
<RevenuePerMarketplace serviceRevenue="80905.00"
  marketplaceRevenue="8090.50"
  resellerRevenue="0.00"
  brokerRevenue="20226.25"
  operatorRevenue="8899.55"
  overallRevenue="43688.70"/>
```

Appendix I: Menu Options and Required Roles

The roles of an organization determine which functions are available to its users at the OSCM user interface and which roles the users can be assigned. The user roles control the actions an individual user is allowed to execute.

This appendix provides a list of the available user interface functions and shows which user of which organization is allowed to execute a function.

Account Menu

This menu is available to organizations of all roles.

Function	Organization Role	User Role
Edit profile	Any	Any
Import users (if the organization uses LDAP-based user management)	Any	Administrator
Change password (if the organization does not use an external system for user management)	Any	Any
Register new users (if the organization does not use an external system for user management)	Any	Administrator
Manage users	Any	Administrator
LDAP settings (if the organization uses LDAP-based user management)	Any	Administrator
Create report	Any	Administrator
Process triggers	Any	Administrator
Manage suppliers	Technology provider	Technology manager
Manage custom attributes	Supplier	Service manager
Manage processes (if the organization is connected to an external process control system)	Any	Any
Export billing data	Supplier, reseller, broker, marketplace owner, operator	Service manager, reseller, broker, marketplace manager, operator

Function	Organization Role	User Role
Define billing period	Supplier, reseller	Service manager, reseller

Customer Menu

This menu is available to supplier, reseller, and broker organizations.

Function	Organization Role	User Role
Register customer	Supplier, reseller, broker	Service manager, reseller, broker
View customer	Reseller, broker	Reseller, broker
Manage customer	Supplier	Service manager
Manage payment types	Supplier, reseller	Service manager, reseller
Manage VAT rates	Supplier	Service manager
View subscription	Supplier, reseller, broker	Service manager, reseller, broker
Manage subscription attributes	Supplier	Service manager
Terminate subscription	Supplier, reseller	Service manager, reseller

Marketable Service Menu

This menu is available to supplier, reseller, and broker organizations.

Function	Organization Role	User Role
Define service	Supplier	Service manager
Update service	Supplier	Service manager
View service	Broker	Broker
Manage service	Reseller	Reseller
Copy service	Supplier	Service manager
Delete service	Supplier	Service manager
Define up/downgrade options	Supplier	Service manager
Define publishing options	Supplier, reseller, broker	Service manager, reseller, broker
Activate or deactivate services	Supplier, reseller, broker	Service manager, reseller, broker

Marketplace Menu

This menu is available to marketplace owner and operator organizations.

Function	Organization Role	User Role
Manage categories	Marketplace owner	Marketplace manager
Manage access	Marketplace owner	Marketplace manager
Manage sellers	Marketplace owner	Marketplace manager
Create marketplace	Operator	Operator
Update marketplace	Marketplace owner, operator	Marketplace manager or operator. The operator can assign a different marketplace owner and define revenue shares; the marketplace manager can change the name and settings of the marketplace.
Delete marketplace	Operator	Operator
Manage broker revenue share	Operator	Operator
Manage reseller revenue share	Operator	Operator
Add tracking code	Marketplace owner	Marketplace manager
Define featured services	Marketplace owner	Marketplace manager
Customize stage	Marketplace owner	Marketplace manager
Customize texts	Marketplace owner	Marketplace manager
Customize layout	Marketplace owner	Marketplace manager

Operation Menu

This menu is available to operator organizations only.

Function	Organization Role	User Role
Manage users	Operator	Operator
Create organization	Operator	Operator
Create payment service provider	Operator	Operator
Manage organization	Operator	Operator
Manage operator revenue share	Operator	Operator
Manage timers	Operator	Operator
Manage payment service provider	Operator	Operator

Function	Organization Role	User Role
Manage currencies	Operator	Operator
Manage LDAP settings	Operator	Operator
Update configuration settings	Operator	Operator
Update search index	Operator	Operator
Billing data preview	Operator	Operator
Execute billing tasks	Operator	Operator
Export audit log	Operator	Operator
Manage languages	Operator	Operator
Manage tenants	Operator	Operator

Price Model Menu

This menu is available to supplier organizations only.

Function	Organization Role	User Role
Define for service	Supplier	Service manager
Define for customer	Supplier	Service manager
Delete for customer	Supplier	Service manager
Define for subscription	Supplier	Service manager

Technical Service Menu

This menu is available to technology provider organizations only.

Function	Organization Role	User Role
Register service definition	Technology provider	Technology manager
Import service definition	Technology provider	Technology manager
Update service definition	Technology provider	Technology manager
Export service definition	Technology provider	Technology manager
Delete service definition	Technology provider	Technology manager
View billing systems	Technology provider	Technology manager

Glossary

Administrator

A privileged user role within an organization with the permission to manage the organization's account and subscriptions as well as its users and their roles. Each organization has at least one administrator.

Application

A software, including procedures and documentation, which performs productive tasks for users.

Billing System

A system responsible for calculating the charges for using a service.

Broker

An organization which supports suppliers in establishing relationships to customers by offering the suppliers' services on a marketplace, as well as a privileged user role within such an organization.

Cloud

A metaphor for the Internet and an abstraction of the underlying infrastructure it conceals.

Cloud Computing

The provisioning of dynamically scalable and often virtualized resources as a service over the Internet on a utility basis.

Customer

An organization which subscribes to one or more marketable services in OSCM in order to use the underlying applications in the Cloud.

Infrastructure as a Service (IaaS)

The delivery of computer infrastructure (typically a platform virtualization environment) as a service.

Marketable Service

A service offering to customers in OSCM, based on a technical service. A marketable service defines prices, conditions, and restrictions for using the underlying application.

Marketplace

A virtual platform for suppliers, brokers, and resellers in OSCM to provide their services to customers.

Marketplace Owner

An organization which holds a marketplace in OSCM, where one or more suppliers, brokers, or resellers can offer their marketable services.

Marketplace Manager

A privileged user role within a marketplace owner organization.

OIDC

An authentication mode of OSCM where users are managed and authenticated by means of OpenID Connect in an external system such as Microsoft Azure Active Directory, the so-called OIDC provider.

OIDC Tenant

An entity in OSCM representing a configuration of settings and parameters required to connect to a specific tenant at an OIDC provider, for example, a specific domain and directory in Microsoft Azure Active Directory.

Operator

An organization or person responsible for maintaining and operating OSCM.

Organization

An organization typically represents a company, but it may also stand for a department of a company or a single person. An organization has a unique account and ID, and is assigned one or more of the following roles: technology provider, supplier, customer, broker, reseller, marketplace owner, operator.

Organizational Unit

A set of one or more users within an organization representing, for example, a department in a company, an individual project, a cost center, or a single person. A user may be assigned to one or more organizational units.

OU Administrator

A privileged user role within an organization allowing a user to manage the organizational units for which he has been appointed as an administrator, and to create, modify, and terminate subscriptions for these units.

Payment Type

A specification of how a customer may pay for the usage of his subscriptions. The operator defines the payment types available in OSCM; the supplier or reseller determines which payment types are offered to his customers, for example payment on receipt of invoice, direct debit, or credit card.

Platform as a Service (PaaS)

The delivery of a computing platform and solution stack as a service.

Price Model

A specification for a marketable service defining whether and how much customers subscribing to the service will be charged for the subscription as such, each user assigned to the subscription, specific events, or parameters and their options.

Reseller

An organization which offers services defined by suppliers to customers applying its own terms and conditions, as well as a privileged user role within such an organization.

Role

A collection of authorities that control which actions can be carried out by an organization or user to whom the role is assigned.

Seller

Collective term for supplier, broker, and reseller organizations.

Service

Generally, a discretely defined set of contiguous or autonomous business or technical functionality, for example an infrastructure or Web service. OSCM distinguishes between technical services and marketable services, and uses the term "service" as a synonym for "marketable service".

Service Manager

A privileged user role within a supplier organization.

Standard User

A non-privileged user role within an organization.

Software as a Service (SaaS)

A model of software deployment where a provider licenses an application to customers for use as a service on demand.

Subscription

An agreement registered by a customer for a marketable service in OSCM. By subscribing to a service, the customer is given access to the underlying application under the conditions defined in the marketable service.

Subscription Manager

A privileged user role within an organization with the permission to create and manage his own subscriptions.

Supplier

An organization which defines marketable services in OSCM for offering applications provisioned by technology providers to customers.

Technical Service

The representation of an application in OSCM. A technical service describes parameters and interfaces of the underlying application and is the basis for one or more marketable services.

Technology Manager

A privileged user role within a technology provider organization.

Technology Provider

An organization which provisions applications as technical services in OSCM.