z/OS
2.5

# *IBM Cloud Provisioning and Management for z/OS*

**Note**

Before using this information and the product it supports, read the information in “Notices” on page 193.

This edition applies to Version 2 Release 5 of z/OS® (5650-ZOS) and to all subsequent releases and modifications until otherwise indicated in new editions.

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# About this content

This content supports z/OS (5650-ZOS) and contains information about IBM Cloud Provisioning and Management for z/OS.

## Purpose of this information

This is a collection of all of the information that you need to understand and use IBM Cloud Provisioning and Management for z/OS. Some of this information also appears elsewhere in the z/OS library.

## Who should read this information

This document provides information for the persons who are responsible for setting up z/OSMF on a z/OS system or for setting up software instances on a z/OS system. It also contains information for someone who has a need to use a z/OS instance or z/OS middleware instance. In addition, it contains information for someone who would like to exploit APIs that provide services related to those tasks.

## Related information

For an interactive starting point, and access to a variety of resources related to IBM Cloud Provisioning and Management for z/OS, see Cloud Provisioning for z/OS (www.ibm.com/support/z-content-solutions/cloud-provisioning/).

For information about setting up z/OSMF on a z/OS system, see *IBM z/OS Management Facility Configuration Guide*. For information about using z/OSMF, see *IBM z/OS Management Facility Online Help* . For information about using z/OSMF APIs, see *IBM z/OS Management Facility Programming Guide*. For a video playlist about preparing a software services template and provisioning software, see IBM Cloud Provisioning and Management for z/OS (mediacenter.ibm.com/channel/IBM+Z+Mainframe+Servers+and+Software/101043781).

To find the complete z/OS library, see IBM Documentation (www.ibm.com/docs/en/zos).

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# How to send your comments to IBM

We invite you to submit comments about the z/OS product documentation. Your valuable feedback helps to ensure accurate and high-quality information.

**Important:** If your comment regards a technical question or problem, see instead “If you have a technical problem” on page xv.

Submit your feedback by using the appropriate method for your type of comment or question:

**Feedback on z/OS function**
If your comment or question is about z/OS itself, submit a request through the IBM RFE Community (www.ibm.com/developerworks/rfe/).

**Feedback on IBM® Documentation function**
If your comment or question is about the IBM Documentation functionality, for example search capabilities or how to arrange the browser view, send a detailed email to IBM Documentation Support at ibmdocs@us.ibm.com.

**Feedback on the z/OS product documentation and content**
If your comment is about the information that is provided in the z/OS product documentation library, send a detailed email to mhvrcfs@us.ibm.com. We welcome any feedback that you have, including comments on the clarity, accuracy, or completeness of the information.

To help us better process your submission, include the following information:

- Your name, company/university/institution name, and email address
- The section title of the specific information to which your comment relates
- The comprehensive content collection title: Cloud Provisioning and Management
- The text of your comment.

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- Go to the IBM Support Portal (support.ibm.com).
- Contact your IBM service representative.
- Call IBM technical support.

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# What's new in IBM Cloud Provisioning and Management for z/OS?

## z/OS V2R5 updates

With IBM Cloud Provisioning and Management, you can provision a new z/OS system. Cloud Provisioning and Management includes a set of templates that you can use to provision and deprovision z/OS systems. By selecting a z/OS provisioning template from the Cloud Provisioning software services catalog, you can provision a new instance of z/OS in a monoplex configuration in less than one hour.

The Cloud Provisioning tasks are enhanced in the following ways:

- You can provision an instance of the z/OS operating system. The steps for doing so are similar to the steps you would follow for provisioning other types of software instances. A key difference is that the z/OS Provisioning software service template must be associated with a new type of dedicated resource pool that is called an *LPAR resource pool*.

  Provisioning a z/OS instance requires some customization of the z/OS provisioning template properties file to use values that are suitable for your environment.

  See Chapter 3, “Provisioning a z/OS software instance,” on page 39.

  The Resource Management task now includes actions for creating, viewing, and modifying an LPAR resource pool.

## June 2022 enhancements

The z/OS Provisioning tasks are enhanced in the following ways:

- You can provision a z/OS instance with a new RACF database with the base RACF definitions that are required for IPL and z/OSMF. Creating the new RACF database adds about 5 minutes to the provisioning time.
- You can configure Network job entry (NJE) with Transmission Control Protocol/Internet Protocol (TCP/IP) support to allow transmitting commands, messages, and jobs between the provisioned target LPAR and NJE configured nodes. The LPAR information that is used for the NJE definitions is retrieved from the properties file and from the LPAR pool. JES2 initialization is updated to configure NJE with TCP/IP support.
- Storage Management Subsystem (SMS) support now provides a basic configuration for the target LPAR. SMS changes the storage management approach from user-managed volumes to SMS-managed data sets in SMS-managed storage groups. The configuration defines the SMS automatic class selection (ACS) routines, which automatically assign the SMS classes and storage groups to data sets. It also provides the required storage classes and groups for configuration. You can allocate the source and active control data sets on the different volumes, and an alternative volume to allocate these data sets is provided.
- You can provision z/OS with z/OS Integrated Cryptographic Service Facility (ICSF) support. Basic configuration includes PARMLIB and PROCLIB setup and empty CKDS and PKDS data sets. More actions are required to prime the data sets.
- IBM Health Checker is enabled on the provisioned z/OS instance to help detect issues with configuration. You can use the checked information to correct and optimize all issues that Health Checker compares the system environment to established settings to uncover potential problems.
- You can provision z/OS with Policy Agent support. Configuring Policy Agent allows Secure Telnet and Secure FTP to be enabled on the provisioned system to provide secure access through either Secure FTP or TN3270 with TLS enabled.

The Cloud Provisioning and Management tasks are enhanced in the following ways:

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- LPAR pools can now be created and maintained in both domain and tenant-shared resource pools, and LPAR pool entries can be obtained and released from a shared resource pool.
- You can archive history entries for domains, tenants, resource pools, and templates by offloading them to an external file in a user-specified directory. If the archive directory path is specified, entries are removed from the history based on the maximum number of history entries and then archived. If no archive directory path is specified, then history entries are removed but not archived.
- The Software Services task is updated to support properly defined RACF group IDs as a RunAs step approver, as opposed to providing a list of individual users in a provisioning workflow definition.
- Administrators can view which tenants are associated with a particular template in the Resource Management and Software Services tasks. Administrators can also see the template that the resource pool is associated to and easily retrieve the information of either resource.
- The Software Services task also displays the version of the Software Services template that an instance was provisioned from. The template version property can be set and obtained from the instances API.
- The Resource Management task provides a list of provisioned instances that are using resources from a specific resource pool. This applies to dedicated and shared resource pools.
- You can begin provisioning with the new default shared resource pool in the default domain. The default pool is created upon the initialization of Cloud Provisioning and Management. This further expedites the setup process as you do not have to create a shared or dedicated pool to get started with provisioning.

## March 2021 enhancements

The Cloud Provisioning tasks are enhanced in the following ways:

- History logging for a domain can be enabled or disabled, as needed. To do so, the domain administrator uses the option **Enable history logging** in the Resource Management task. History logging is enabled by default.

  A new option **Maximum number of history entries** allows the domain administrator to manage the size of the history log in the range of 10 - 200 entries. By default, the history log is limited to 50 entries.

## z/OS V2R4 updates (12/17/2020)

The Cloud Provisioning tasks are enhanced in the following ways:

- A resource pool defines the scope of shared z/OS resources within a cloud domain that has multiple tenants. In this release, the concept of a shared resource pool is expanded to include sharing resources across an entire domain. Here, the resource pool is referred to as a *domain-shared resource pool*. Previously, you were limited to sharing a resource pool within a single tenant. By allowing multiple tenants within a domain to share a resource pool, you simplify the management of resources in a cloud provisioning environment. Administrators need only to create a domain shared resource pool once; thereafter resources from this pool are shared across multiple tenants when you provision middleware templates. In contrast, if resource isolation across tenants and templates is needed for your z/OS environments, it is recommended that you define a tenant-specific shared resource pool or a dedicated resource pool.

  The Resource Management task is updated with new functions to create, view, and modify domain-shared resource pools. The Software Services task is updated to allow a domain-shared resource pool to be associated with a template. The names of shared resource pools end with two wildcard qualifiers (*.*).

  When you define a domain-shared resource pool, you also select the templates to be associated with the resource pool. A template can be associated with a domain-shared resource pool for one or more tenants within the domain. However, within a tenant, a template can be associated with only one of the following types of resource pools:

  – Dedicated resource pool
  – Tenant shared resource pool
  – Domain-shared resource pool

- The default domain now supports manual security mode for creating templates and tenants. This option is intended for provisioning environments that cannot use automatic security mode. Previously, the default domain was required to run in automatic security mode. Now, when the default domain is created at z/OSMF startup time, it is placed in manual security mode if no security administrator is specified on the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member.
- If you have incorrectly configured the security mode for Cloud Provisioning and Management, it is now possible to change it. Doing so requires only that you edit the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member and restart the z/OSMF server. You can switch a domain from automatic security to manual security, and vice versa. Your changes to the CL OUD_SEC_ADMIN statement affect the security mode of all existing domains. The suggested practice is that you run Cloud Provisioning and Management in automatic security mode.

  Previously, when a domain's security mode was set, it could not be changed without deleting the domain and starting over. With this support, the security mode of any existing domain—even the default domain—can be switched quickly.
- It is possible to set a maximum time limit for a provisioned instance, such as 7 days, 30 days, or unlimited. This time limit can be set by the domain administrator for the associated resource pool. When a provisioned instance exceeds its time limit, it is marked as expired, and the instance remains in *provisioned* state. The **Instances** tab of the Software Services task shows when an instance is expired in the "State" column as *"Provisioned - Expired"*. When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.
- The domain administrator can modify a published template. With this support, the domain administrator can change following attributes of a published template without the need to create a new version of the template:
  - Description of the template
  - Workflow and job disposition
  - Disposition of deprovisioned instance.
- When creating a template, the domain administrator can now specify new options to do the following:
  - Delete instances automatically when they are deprovisioned. Previously, it was always necessary to delete a deprovisioned instance manually.
  - Archive provisioning workflows automatically when they complete. This selection is made through the workflows disposition setting. Previously, the domain administrator was limited to selecting to either keep or delete a workflow. `Archive` is the new default value for the workflows disposition setting.
- It is possible to modify the software services instance name prefix. The domain administrator can specify a different general name prefix, or switch to using the SNA application ID as the prefix. After the prefix is in use by existing instances, it cannot be modified.
- In the Software Services task, it is now possible to provide an optional description for the provisioning actions that you define.
- The domain administrator is automatically notified when a template is approved or rejected.
- History logging is added to the Resource Management task and Software Services task. This support enables the domain administrator to retrieve a history of actions that were performed on various objects, such as a template, domain, tenant, or resource pool.
- The actions editor is enhanced to work with variables of all types. Previously, the editor was limited to working with string variables only.

The Workflow Editor task includes the following enhancements:

- It is now possible to delete multiple steps at once in the Workflow Editor shared step library. Previously, you were limited to deleting one step at a time.
- You can open the Workflows task directly from the Workflows Editor by using the new **Test** option. This option opens the Workflows task and initializes its input fields with values for your workflow files. It provides a way to quickly create a workflow instance with your workflow definition.

- A path selector option is added to some input fields to assist you with locating workflow files and templates on your system. In the path selector window, enter a pattern that is a partial or complete name of a data set, member, or a UNIX file path.

## z/OS V2R4 updates (12/19/2019)

The Cloud Provisioning tasks are enhanced in the following ways:

- You can define a multiple sysplex domain, which allows you to provision middleware across sysplexes in your enterprise. In this configuration, creating and modifying objects is done from a primary z/OSMF system, from which you can provision templates on other, secondary z/OSMF systems. This enhancement allows your cloud provisioning environment to scale beyond the scope of a single sysplex. To use this capability, you must configure a primary z/OSMF system for communicating with secondary z/OSMF systems. You can perform this setup by using the z/OSMF Systems task to define the z/OSMF systems, then enable them for single sign-on.
- You can create storage resource pools and assign them to specific tenants and templates. When you add or modify a template and resource pool for tenants, you have the option to create a storage resource pool by using the Resource Pools tab. If so, you can use the data set attributes table to add, modify, or remove data set attributes that are associated with your storage resources.

  To use this capability, the provisioning templates must be updated to dynamically obtain data set attributes by using the Resource Management services REST API. Previously, it was not possible to isolate storage resources to particular tenants or templates, which might lead to contention for storage resources.
- You can specify SAF groups for the various administrator roles when you create, modify, or view domains. You can also specify a SAF group for template approvers when you create or modify a template. Previously, it was necessary to specify individual user IDs for these roles. You might find that using groups to represent users can help to simplify the management of Cloud Provisioning resources.

The Workflow Editor task includes the following enhancements:

- A raw text option is added to the Workflow Editor. If you select this option, the Workflow Editor opens the workflow definition in a simple text editor. The text editor provides editing access to the specified file, but without the usual tabbed interface and multi-paned layout of the Workflow Editor. Consider using the text editor when you need to quickly correct a syntax error that prevents the file from opening in the Workflow Editor UI.
- An **Expand** option is added to the **Instructions** tab on the **Step Details** page and the **Template contents field** for template steps. Use this option to expand the input area to full screen width for a larger text entry area.
- It is possible to create an input properties file in the Workflow Editor during an editing session. Previously, you had to supply an existing input properties file at the beginning of an editing session.
- As a convenience, the Edit Workflow Definition dialog now saves the location of the files that you edit. On subsequent uses, you can select the file location from the pull-down menu, rather than having to enter the full path and file name manually, as was done previously.

For more information see https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/hiren-shah1/2019/12/20/whats-new-in-zosmf-cloud-provisioning-mgmt-122019.

## z/OS V2R2 and z/OS V2R3 updates (01/04/2019)

The following enhancements are available with PTFs UI60075, UI60040 (z/OS V2R3) and PTFs UI60077, UI60042 (z/OS V2R2)

- Memory Capping : You can now set a cap for the memory that is consumed by software services instances that are provisioned in a tenant. You can also view a tenant's memory consumption.
- Software Cluster Provisioning: New clustered composite templates allow you to leverage sysplex capabilities to provision a continuously available middleware environment. With a single provisioning action, you can provision network-clustered instances of a specific middleware in a sysplex.

- Dataset Support: The files for a template, such as the workflow and actions definition files, can now be in sequential or partitioned data sets. Previously, they were required to be in z/OS UNIX files. Workflow editor is also enhanced to edit/view workflow file in sequential or partitioned dataset.
- Serviceability Enhancements: Diagnostic information for provisioning an instance is enhanced. When you view an instance, you see new information for instances that are being provisioned or that failed provisioning, including the template owner, the number of steps and current step of the provisioning workflow, and the workflow message text. You can also display additional information by hovering the mouse pointer over the state of an instance on the Instances table.
- Usability improvements: The Resource Management task has been reorganized for better usability. Properties of a domain, including the associated tenants and resource pools, are now displayed on tabs.
- Workflow Enhancements: REST steps in z/OSMF workflow can now specify the HTTPS protocol for secure connections. z/OSMF workflow is also enhanced to support a new "array" type of variable that you can define for your workflow. Consider using an array variable when you need to map a list of values.
- Workflow Editor Enhancements: The Workflow Editor now includes a "toolbox" of IBM-supplied steps, which are designed for performing common tasks on z/OS, such as creating a data set or submitting a REST request.

For more information see https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/hiren-shah1/2019/11/24/whats-new-in-ibm-cloud-provisioning-mgmt-010419.

## z/OS V2R2 and z/OS V2R3 updates (06/06/2018)

The following enhancements are available with PTFs UI55996, UI55973 (z/OS V2R3) and PTFs UI56001, UI55978 (z/OS V2R2)

- Simplified security setup: Middleware system programmers such as CICS administrators and Db2 administrators can now create and test software service templates independently -- there is no need for z/OS system programmers or security administrators to perform additional setup.
- Swagger support: Cloud architects can easily consume cloud provisioning REST APIs which are now documented to the Swagger specification (now OpenAPI Specification).
- Sharing of provisioned instances: Middleware instances provisioned by a user in a specific tenant group can be shared with other users in the same tenant group. These users can view and perform actions against the shared instances.
- Workflow Editor enhancements: Workflow authors can now reference JCL, shell scripts or REXX execs in data sets when authoring workflows using Workflow Editor.
- Comprehensive content collection (c3): A new collection in Documentation provides all the information about IBM Cloud Provisioning and Management for z/OS in one place.

For more information see https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/hiren-shah1/2019/11/22/whats-new-in-ibm-cloud-provisioning-mgmt-060118.

## z/OS V2R2 and z/OS V2R3 updates (1/25/2018)

- A cloud service provider will now be able to meter the CPU utilization by a specific tenant to allow proper charge-back. Also, CPU utilization can now be capped, to prevent the possibility of runaway costs for a tenant.
- Using the z/OSMF graphical user interface, a service provider will be able to define a composite template of different middleware types with appropriate connectivity across these components. Using the composite template, a consumer will be able to provision a complex environment that consists of multiple middleware services in a matter of minutes.
- Dynamically provisioned middleware instances can be relocated on other systems in the case of an orderly shutdown of the system where they are currently running.

- Administrator can define a single "shared" resource pool for a tenant which can be used during provisioning of multiple templates. This enhancement greatly simplifies administrator task to set up templates for a tenant.
- Enhancements in workflow editor that enables building workflow efficiently.

For more information see https://community.ibm.com/community/user/ibmz-and-linuxone/blogs/hiren-shah1/2019/11/21/whats-new-in-ibm-cloud-provisioning-management-for.

# Chapter 1. What is IBM Cloud Provisioning and Management for z/OS?

IBM Cloud Provisioning and Management for z/OS helps you rapidly provision z/OS and z/OS middleware, and simplifies the configuration and deployment of z/OS components. Use it to improve the agility of your DevOps team, integrate z/OS into your hybrid cloud, and transform your IT infrastructure.

With IBM Cloud Provisioning and Management for z/OS, you can create software service templates that provision z/OS and IBM middleware, such as IBM Customer Information Control System (CICS®), IBM DB2®, IBM Information Management System (IMS), IBM MQ, and IBM WebSphere Application Server (WAS). You can track software instances that were provisioned from those templates. Users can quickly provision and deprovision an environment as needed through a self-service software services marketplace.

For an interactive starting point, and access to a variety of resources related to IBM Cloud Provisioning and Management for z/OS, see Cloud Provisioning for z/OS (www.ibm.com/support/z-content-solutions/cloud-provisioning/).

## z/OSMF and IBM Cloud Provisioning and Management for z/OS

IBM Cloud® Provisioning and Management for z/OS function is available through IBM z/OS Management Facility (z/OSMF). z/OSMF provides system management functions:

- In a task-oriented, web browser-based user interface with integrated user assistance, so that you can more easily manage the day-to-day operations and administration of your mainframe z/OS systems. By streamlining some traditional tasks and automating others, z/OSMF can help to simplify some areas of z/OS system management.

  The IBM Cloud Provisioning and Management for z/OS tasks in z/OSMF are **Resource Management** and **Software Services**, which are in the Cloud Provisioning category.
- Through Representational State Transfer (REST) APIs, which are public APIs that your application can use to work with system resources and extract system data. The z/OSMF APIs allow for easy-to-use services that are language- and platform-independent, stateless, scalable, and easily parsed. For more information on the REST APIs for Cloud Provisioning services, see Chapter 9, “Cloud provisioning REST APIs,” on page 183.

## Overview of IBM Cloud Provisioning and Management for z/OS

To provide access to the Cloud Provisioning function, a security administrator defines the IDs and roles that are required, such as the domain administrator (typically a middleware system programmer), network administrator, approvers, and consumers.

For an illustration of cloud provisioning, see Figure 1 on page 2.

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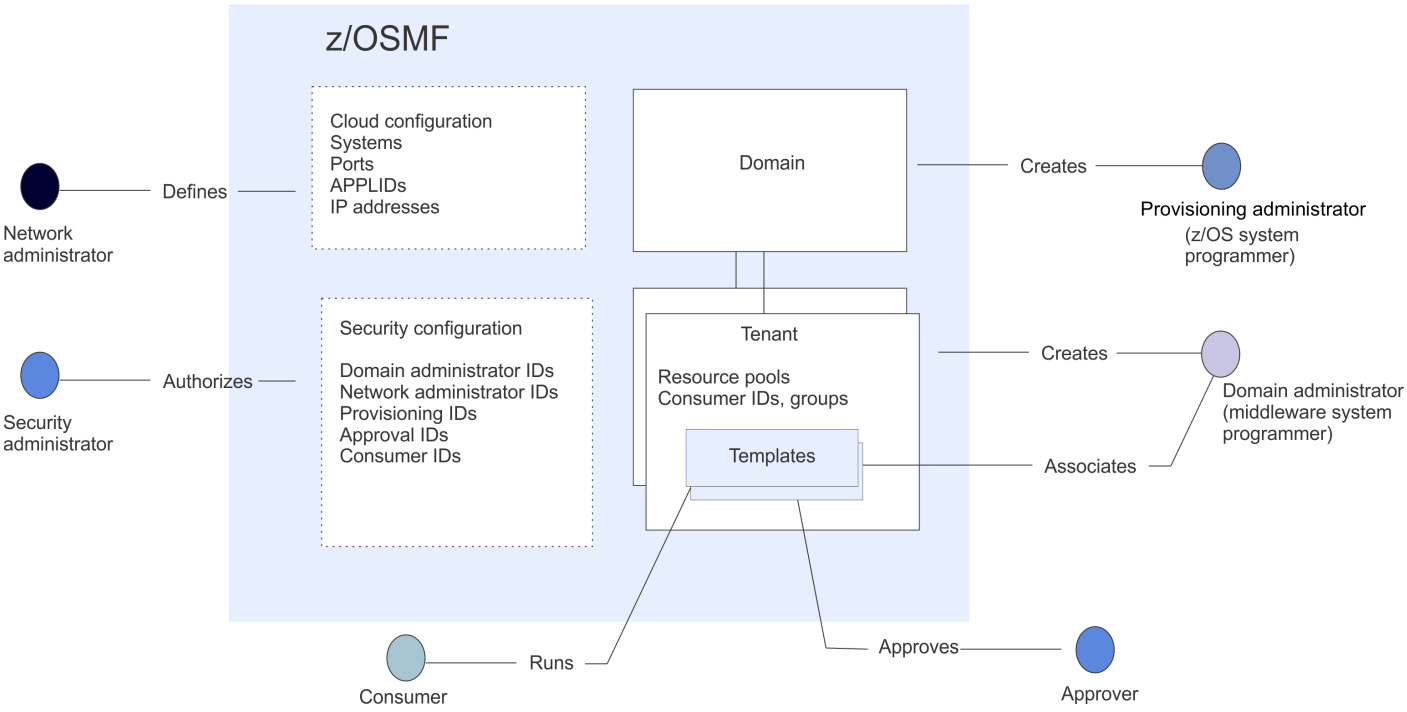


*Figure 1. Cloud Provisioning Summary*

The steps for setting up cloud provisioning are illustrated in Figure 2 on page 2. More detail about the steps and the roles follows the figure.

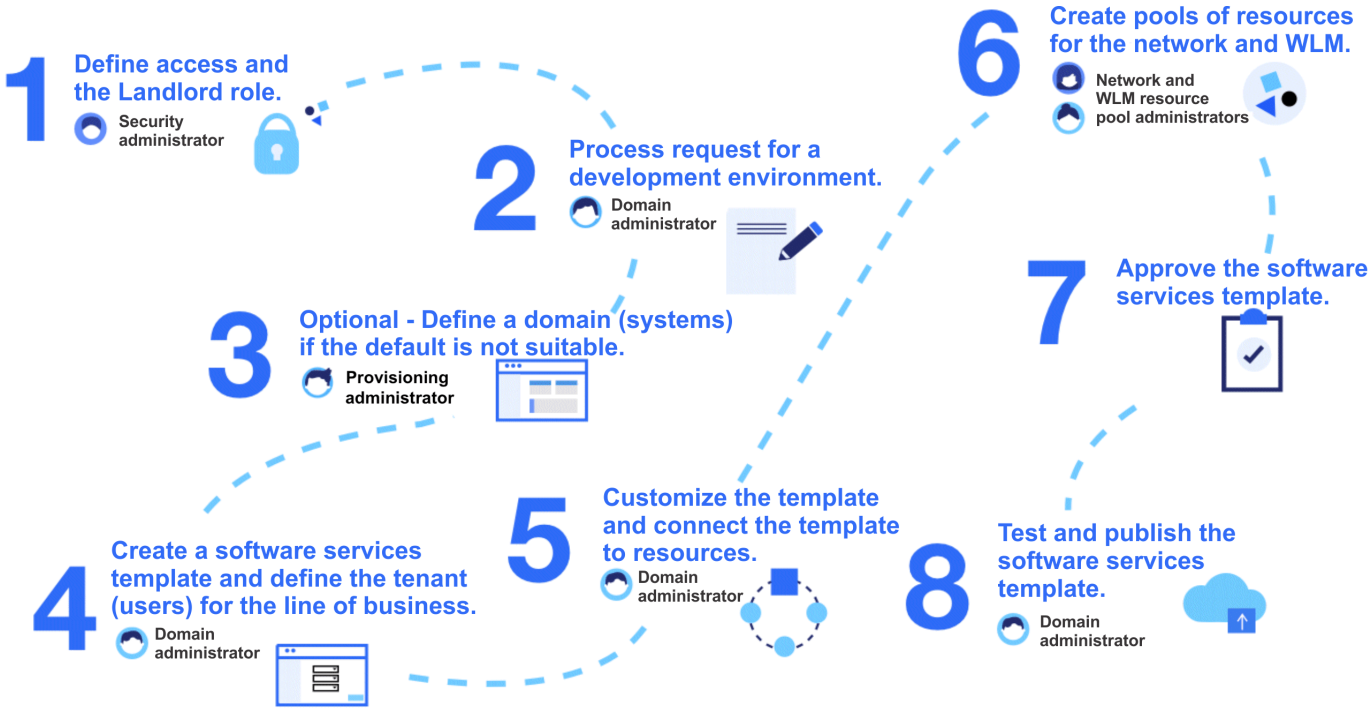


*Figure 2. Steps for cloud provisioning*

## 1. Define access and the provisioning administrator role (Security administrator)

A security administrator is responsible for the security of the cloud configuration, including defining the provisioning administrator role for the cloud domain (typically a z/OS system programmer). Sample jobs help to simply this task.

For more information, see “Steps for setting up security” on page 10

## 2. Process a request for a development environment (Domain administrator)

The domain administrator, typically a middleware system programmer, processes a request for a new environment, which might come from an application development team. This request starts the efforts to use cloud provisioning to make the environment available.

The domain administrator can take advantage of cloud provisioning to make environments available to a development team when they are needed, while the z/OS system programmer (the provisioning administrator, described in the next step) retains control over what is provisioned and how many instances are provisioned.

## 3. Optional – Define a domain (Provisioning administrator)

Software services templates are associated with a domain, which defines a system or set of systems. A domain can include systems from more than one sysplex.

A provisioning administrator, typically a z/OS system programmer, decides which system or systems (LPARs) are used for provisioning and creates a domain. If the domain extends beyond one sysplex, the provisioning administrator configures a primary z/OSMF system for communicating with secondary z/OSMF systems.

To help you get started quickly, a default domain is provided. The default domain is fully operational without any further configuration, and is accessible to any z/OSMF administrator. A default tenant is associated with the default domain.

When a domain includes more than one system, the domain administrator can specify:

- The systems that are to be used as potential targets for provisioning
- How the target system should be selected when the software service is provisioned: either automatically, by z/OSMF, or manually, by the consumer
- That the instance can be relocated to a system in the domain other than the system it was originally provisioned on. The instance can run on only one system at a time.

For more information, see Chapter 5, “Managing domains, tenants, and resource pools,” on page 55.

## 4. Create a software services template and define the tenant for the line of business (Domain administrator)

To make an environment available to consumers as a software service, a domain administrator creates and configures a software services template. The template describes what is provisioned. For example, a template might request that a Db2® subsystem be deployed onto a z/OS system with three databases, or might create a set of CICS regions.

To provision the software, templates start and run z/OSMF workflows. A template includes a workflow definition file, along with other files, including a file that defines input variables for the workflow, and a file that defines actions that can be used against the provisioned software.

The domain administrator also defines a tenant for the development team, so that they can control how many instances of the software can be provisioned by that team, and the networking resources that they can use.

For more information, see Chapter 6, “Defining software services with templates,” on page 139.

## 5. Customize the template and connect the template to resources (Domain administrator)

The template might need to be customized for the installation – for example, to conform with naming standards in your company. You might modify variables that are input to the workflow, or use a properties file that is provided with the template to configure the provisioned software. For information about

customization, you typically refer to documentation that is included with the template by the software provider. In addition, the domain administrator:

- Adds the software services template to a tenant.
- Connects the template to network, storage, and WLM resource pools. Resource pools are sets of z/OS resources that are required by the z/OS software service, for example, ports, IP addresses, or APPLIDs.

### 6. Create the pools of resources for the network and WLM (Network and WLM resource pool administrators)

When a template requires resource pools, for example, when you want to dynamically allocate ports to provisioned software instances, the network and WLM resource pool administrators (typically z/OS system programmers) use the appropriate z/OSMF tasks to complete the resource pools.

For more information, see "Defining workload management resource pools" on page 119 and "Defining network resource pools" on page 121.

### 7. Approve the template

Offering self-service provisioning to a development team might require that some steps in the template, or certain actions, run under automation IDs. Any use of these user IDs in a template must be approved. Approval records are created for a template when a workflow or action definition file contains an element that identifies a user ID under which a workflow step or action is to be performed. (The workflow element is runAsUser ID, and the ID is sometimes referred to as a runAsUser ID). Approval records can also be defined for the template in general, and for a domain. Approval records must be approved by the approvers (typically identified by user ID) before the template can be tested or published.

For more information, see "Approve a template" on page 159.

### 8. Test and publish the software services template (Domain administrator)

The domain administrator tests the template to ensure that it successfully provisions the software, that is, creates the environment. Software that is provisioned from a template is known as a software services instance. (Note that this is different than a software instance that you manage with the Software Management task. A *software instance* is a collection of data sets containing installed software, and other data sets that may be associated with that installed software.) You manage a software services instance by using actions such as **Remove** and **deprovision**.

Publishing the template makes it available to consumers in the tenant – the application developers who require the new environment.

For more information, see "Test Run a template" on page 162 and "Publish a template" on page 165.

### Tailored Fit Pricing for IBM Z

You can define a tenant as a container for Tailored Fit Pricing for IBM Z by specifying a solution ID for the tenant. Then, any software that you provision for that tenant is treated as part of the solution. This approach simplifies the setup that is required for Tailored Fit Pricing for IBM Z, because the Resource Management task does the z/OSMF Workload Management work for you, including creating the tenant resource group, tenant report class, and classifications.

# Getting started with IBM Cloud Provisioning and Management for z/OS

To get started with IBM Cloud Provisioning and Management for z/OS, you need to perform some configuration to enable the z/OSMF plug-ins, and set up security.

### Plug-ins

In z/OSMF, a plug-in is a collection of one or more system management tasks that add function to z/OSMF. When you configure a plug-in, you make its tasks available to users in the z/OSMF navigation area of the user interface. The IBM Cloud Provisioning and Management for z/OS tasks in z/OSMF are **Resource Management** and **Software Services**, which are in the Cloud Provisioning category.

### Security

Your security administrator is responsible for the security of the cloud configuration, including the various roles that are required, such as the domain administrator, network administrator, approvers, and consumers.

To continue with enabling the plug-ins for cloud provisioning and setting up security, see Chapter 2, “Enabling the plug-ins and setting up security for IBM Cloud Provisioning for z/OS,” on page 9.

# Terms you should know

The terms that you need to understand are defined here.

### Resources

The following are the key resources in the Cloud Provisioning tasks.

*Table 1. Resources for Cloud Provisioning*

| Resource | Description |
|---|---|
| *Domain* | Defines the management scope for tenants, services, and resource pools.<br>A domain consists of one or more z/OS systems. A domain can include z/OS systems from more than one sysplex.<br>A z/OS system can be in a single domain or in multiple domains that are managed by a single instance of z/OSMF. A cloud domain is defined by a z/OS system programmer who acts as the *provisioning administrator*. Each cloud domain is assigned one or more middleware system programmers who act as domain administrators.<br>A base z/OSMF configuration includes one domain by default — the default domain. |
| *Resource pool* | Identifies the z/OS resources that are required by a z/OS software service. In a cloud domain with multiple tenants, the resource pool defines the scope of resource sharing and resource isolation. For example, a resource pool can define a range of dedicated IP addresses or ports for each tenant.<br>A base z/OSMF configuration includes one resource pool by default — the default domain shared resource pool. |

| Table 1. Resources for Cloud Provisioning (continued) | |
|---|---|
| **Resource** | **Description** |
| *Tenant* | Defines the group of users who have the authority to provision software instances.<br>A tenant consists of a user or group of users that have contracted for the use of specified services and pooled z/OS resources that are associated with the services in a domain.<br>A base z/OSMF configuration includes one tenant by default — the default tenant. |

## User roles

The following are the key roles in the Cloud Provisioning tasks.

| Table 2. User roles for Cloud Provisioning | | |
|---|---|---|
| **Role** | **Performer** | **Description** |
| *Provisioning administrator* | z/OS system programmer | Defines the cloud domains and the associated system resources for the cloud. The provisioning administrator also designates one or more users as domain administrators. |
| *Domain administrator* | Middleware system programmer | Manages a domain. The domain administrator is responsible for defining services, tenants, and resource pools for the domain, and managing the relationship across tenants, services, and resource pools. |
| *Resource pool networking administrator* | Network administrator | Manages the resource pool for the networking resources in the cloud, such as network configuration policies. |
| *Resource pool WLM administrator* | Performance administrator | Manages the resource pool for the WLM resources in the cloud, such as WLM policies. |
| *Security administrator* | Security administrator | Maintains the installation's security manager, such as RACF. |
| *Template approver* | System programmer or security administrator | Responsible for approving the pending approval records that are associated with the template. |
| *Consumer* | Application programmer | Has access to the software services and resource pools for a tenant. This user can provision a software services instance by using a software services template, and can manage the lifecycle of a software services instance. |

## Objects

The following are some basic objects that you work with in the Cloud Provisioning tasks.

| Table 3. Objects for Cloud Provisioning | |
|---|---|
| **Object** | **Description** |
| *Instance, or software services instance* | Represents software that is provisioned by using templates. |

| *Table 3. Objects for Cloud Provisioning (continued)* | |
|---|---|
| **Object** | **Description** |
| *Template, or software services template* | Represents z/OS or z/OS middleware, or a z/OS middleware resource service. A template consists of workflows and input variables that can be used to provision z/OS software, actions that can be used with the provisioned software (the instance), and documentation. |

# Chapter 2. Enabling the plug-ins and setting up security for IBM Cloud Provisioning for z/OS

This information describes how to quickly get started with IBM Cloud Provisioning and Management for z/OS, by using supplied jobs to set up a secure default domain and tenant.

For information on configuration and security of z/OSMF in general, see *IBM z/OS Management Facility Configuration Guide*. If you would like to watch a video on how to configure IBM Cloud Provisioning and Management for z/OS, see How to configure IBM Cloud Provisioning and Management for z/OS (mediacenter.ibm.com/media/How+to+configure+IBM+Cloud+Provisioning+and+Management+for+z+OS/1_liafaqr1/101043781).

IBM strongly recommends the use of groups, whenever possible, for ease of security administration. This chapter, the IZUPRSEC sample RACF setup job, and the automatic security management in IBM Cloud Provisioning and Management for z/OS all assume that you will use groups for security administration.

After you perform the initial security setup, you will not need to repeat the steps in this chapter. Instead, the Cloud Provisioning tasks will perform dynamic updates to your security environment, with one exception: The provisioning administrator group is maintained manually by your security administrator.

The instructions in this chapter assume that your installation shares its security database across the participating systems in the sysplex. If you use more than one security database, your security administrator must duplicate the Cloud Provisioning authorizations in each security database.

## Help with security setup

In SYS1.SAMPLIB, the ZUPRSEC job represents the security definitions and authorizations that are needed for enabling the Cloud Provisioning functions. The job contains sample RACF commands for creating the required security authorizations.

Ask your security administrator to make a copy of this job and edit it for your environment.

Your security administrator can run the job to perform the following security setup actions:

- Define the required SAF resource profiles.
- Create the corresponding SAF security groups.
- Grant the appropriate authorizations.

As an alternative to running the IZUPRSEC job, your security administrator can perform the security setup manually. If so, see “Steps for setting up security” on page 10 for instructions.

If your installation uses a security manager other than RACF, your security administrator can refer to the IZUPRSEC job for examples when creating equivalent commands for the security management product on your system.

## Prerequisite services for Cloud Provisioning

Cloud Provisioning uses other z/OSMF services. Therefore, it is recommended that you enable these services prior to using Cloud Provisioning.

Cloud Provisioning uses the following z/OSMF services:

**Network Configuration Assistant**
Cloud Provisioning uses this service to define network resource pools. Resource pools are sets of z/OS resources that are required by a software service, such as port numbers.

**Resource Monitoring**
Cloud Provisioning uses this service for metering and capping. Metering helps you manage the use of resources by the tenant. Capping helps you limit the use of resources by the tenant.

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**Workload Management**
Cloud Provisioning uses this service to enable metering and capping, and for defining workload management (WLM) resource pools. A WLM resource pool associates cloud information, such as a tenant name and domain ID, with WLM elements, such as report classes and classification rules. You define domains and tenants with the Resource Management task.

It is recommended that you enable the services prior to using Cloud Provisioning. To do so, you must do the following:

- In your active IZUPRMxx member, ensure that the PLUGINS statement is uncommented and includes at least the following options:

```
PLUGINS(COMMSERVER_CFG,RESOURCE_MON,WORKLOAD_MGMT)
```

- Create security profiles for the tasks that are associated with each z/OSMF service. IBM provides a set of IZU*nn*SEC jobs in SYS1.SAMPLIB with RACF commands to help with performing these changes. Each IZU*nn*SEC job is associated with a service, as follows:

  **IZUCASEC**
  Network Configuration Assistant

  **IZURMSEC**
  Resource Monitoring

  **IZUWMSEC**
  Workload Management

Modify the IZU*xx*SEC jobs for your environment. The IZUCASEC and IZUWMSEC jobs include commented sections for Cloud Provisioning, which you must uncomment.

Submit the IZU*xx*SEC jobs. Or, manually create the authorizations in your external security manager.

# Steps for setting up security

In a z/OSMF base configuration, the initial IBM Cloud Provisioning and Management for z/OS environment includes a default domain and default tenant to help you quickly get started. This topic describes the steps for creating the security authorizations for the default domain and default tenant.

## Before you begin

This procedure assumes that your installation has already created a base z/OSMF configuration.

This procedure is presented as an alternative for users who prefer to perform the security updates manually. The authorizations that it creates are equivalent to the security setup that is performed by running the IZUPRSEC job in SYS1.SAMPLIB. If you choose to run the IZUPRSEC job instead, locate the commented sections for Cloud Provisioning and uncomment them. Be sure to review and modify the job as necessary to ensure that its definitions work in your security environment. A summary of the IZUPRSEC authorizations is provided in “Summary of security requirements for the Cloud Provisioning tasks” on page 22.

Regardless of whether you create authorizations manually or through IZUPRSEC, you need to connect one or more z/OS system programmer user IDs to the provisioning administrator group, as described in Step “2.d” on page 12 of the procedure. These users, called *provisioning administrators*, are responsible for managing the cloud environment.

**Note:** With the installation of the PTF for APAR PH29813, the default domain now supports manual security mode for creating templates and tenants. This option is intended for provisioning environments that cannot use automatic security mode. Previously, the default domain was required to run in automatic security mode. Now, when the default domain is created at z/OSMF startup time, it is placed in manual security mode if no security administrator is specified on the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member.

If you have incorrectly configured the security mode for Cloud Provisioning and Management, it is possible to change it. Doing so requires only that you edit the CLOUD_SEC_ADMIN statement in the IZUPRMxx

parmlib member and restart the z/OSMF server. You can switch a domain from automatic security to manual security, and vice versa. Your changes to the CLOUD_SEC_ADMIN statement affect the security mode of all existing domains. The suggested practice is that you run Cloud Provisioning and Management in automatic security mode.

## About this task

Use this procedure to define an initial set of security groups, user IDs, and resource profiles for your Cloud Provisioning environment.

This procedure involves the following changes to your security database:

- Activating the necessary RACF classes
- Creating the required SAF security groups
- Defining the required SAF resource profiles
- Granting the appropriate authorizations
- Refreshing the necessary RACF classes.

The examples in this section show the commands as they would be entered for a RACF installation. If your installation uses a security manager other than RACF, your security administrator can refer to the IZUPRSEC job for examples when creating equivalent authorizations for your system.

The instructions in this procedure assume that your installation shares its security database across the participating systems in the sysplex. If you use more than one security database, your security administrator must duplicate the Cloud Provisioning authorizations in each security database.

This procedure is intended only for your initial security set-up. Later, after you complete this procedure, you use the Software Services task and Resource Management task to maintain your security environment. However, managing the provisioning administrator IDs is a manual operation that you perform in your security database. This work involves connecting users to, or removing users from, the provisioning administrator group.

## Procedure

1. **Activate the ZMFCLOUD resource class and enable the RACLIST and GENERIC profiles.**

   ```
   SETROPTS CLASSACT(ZMFCLOUD) GENERIC(ZMFCLOUD) RACLIST(ZMFCLOUD)
   ```

2. **Create the provisioning administrator identity.**

   a) Define the provisioning administrator security group.

   ```
   ADDGROUP IYU OWNER(some group)
   ```

   Where IYU is the default SAF profile prefix for Cloud Provisioning. This prefix is used for the provisioning administrator group. User IDs with the provisioning administrator role have the authority to create domains, delete domains, and assign administrators within domains.

   The IYU prefix is used in the examples in this procedure. Your installation can choose a different prefix by specifying it on the CLOUD_SAF_PREFIX keyword in the IZUPRMxx parmlib member. If so, substitute that value in the examples in this procedure.

   b) Define the SAF profile to be used for granting users access to the provisioning administrator role.

   ```
   RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT.IYU) UACC(NONE)
   ```

   Where IZUDFLT is the default SAF profile prefix for z/OSMF. This prefix is used for the z/OSMF resource profiles.

   The IZUDFLT prefix is used in the examples in this procedure. Your installation can choose a different prefix by specifying it on the SAF_PREFIX keyword in the IZUPRMxx parmlib member. If so, substitute that value in the examples in this procedure.

c) Grant the provisioning administrator group read access to the provisioning administrator profile.

```
PERMIT IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT.IYU +
CLASS(ZMFCLOUD) ID(IYU IZUADMIN) +
ACCESS(READ)
```

If you do not want all z/OSMF administrators to have the provisioning administrator role, remove the IZUADMIN group from the ID list.

d) Select a user ID to be the provisioning administrator and connect it to the provisioning administrator group.

```
CONNECT <user-id> GROUP(IYU)
```

To authorize more provisioning administrator users, connect each user ID to the provisioning administrator group.

3. **Set up security for the default domain.**

a) Define the domain administrator group for the default domain.

```
ADDGROUP IYU0 SUPGROUP(IYU)
```

Where IYU0 is the group name for domain administrators; it is defined under the Cloud Provisioning group (IYU), which is its RACF superior group.

b) Define the SAF profile to be used for authorizing users to be domain administrators.

```
RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT.IYU0) UACC(NONE)
```

c) Grant the provisioning administrator group (IYU), domain administrator group for the default domain (IYU0), and z/OSMF administrator group (IZUADMIN) read access to the domain administrator profile for the default domain.

```
PERMIT IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT.IYU0 +
CLASS(ZMFCLOUD) ID(IYU IYU0 IZUADMIN) ACCESS(READ)
```

If you chose not to allow all z/OSMF administrators to be able to administer the default domain, remove the z/OSMF administrator group from the ID list. If you choose to later expand this authorization, you can use the Resource Management task in Cloud Provisioning to add individual users as domain administrators.

d) Define the resource pool administrator group for networking for the default domain.

```
ADDGROUP IYU0RPAN SUPGROUP(IYU)
```

Where IYU0RPAN is the group name for networking administrators. It is defined as a subgroup of the Cloud Provisioning group.

e) Define the resource pool administrator group for WLM for the default domain.

```
ADDGROUP IYU0RPAW SUPGROUP(IYU)
```

Where IYU0RPAW is the group name for WLM administrators. It is defined as a subgroup of the Cloud Provisioning group.

4. **Set up security for the default tenant.**

a) Define the tenant consumer group for the default tenant.

```
ADDGROUP IYU000 SUPGROUP(IYU0)
```

Where IYU000 is the group name for tenant consumers. It is defined as a subgroup of the domain administrator group.

b) Define the SAF profile to be used for authorizing users to be consumers in the default tenant.

```
RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT.IYU000) +
UACC(NONE)
```

c) Grant the tenant consumer group read access to the tenant consumer profile for the default tenant.

```
PERMIT IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT.IYU000 +
CLASS(ZMFCLOUD) ID(IYU000) ACCESS(READ)
```

5. **Define the SAF profile to be used for authorizing users to be template approvers for the default domain.**

```
RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.TEMPLATE.APPROVERS.IYU0) UACC(NONE)
```

6. **Authorize users to be WLM administrators for the default domain.**
   a) Define the SAF profile to be used for authorizing users to be resource pool administrators for WLM.

```
RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.RESOURCE_POOL.WLM.IYU0) UACC(NONE)
```

   b) Grant the WLM administrator group and the z/OSMF administrator group (IZUADMIN) read access to the WLM administrator profile.

```
PERMIT IZUDFLT.ZOSMF.RESOURCE_POOL.WLM.IYU0 +
CLASS(ZMFCLOUD) ID(IYU0RPAW IZUADMIN) ACCESS(READ)
```

   c) Grant the z/OSMF server user ID access to the WLM administrator profile.

```
PERMIT IZUDFLT.ZOSMF.RESOURCE_POOL.WLM.IYU0 +
CLASS(ZMFCLOUD) ID(IZUSVR) ACCESS(READ)
```

   Where IZUSVR is the default user ID for the z/OSMF server, which in turn has a default name of IZUSVR1. If you assigned a different user ID to the z/OSMF server started task, specify that user ID instead.

7. **Authorize users to be network administrators for the default domain.**
   a) Define the SAF profile to be used for authorizing users to be resource pool administrators for the network.

```
RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.RESOURCE_POOL.NETWORK.IYU0) UACC(NONE)
```

   b) Grant the network administrator group and the z/OSMF administrator group (IZUADMIN) read access to the network administrator profile.

```
PERMIT IZUDFLT.ZOSMF.RESOURCE_POOL.NETWORK.IYU0 +
CLASS(ZMFCLOUD) ID(IYU0RPAN IZUADMIN) ACCESS(READ)
```

   c) Grant the z/OSMF server user ID access to the network administrator profile.

```
PERMIT IZUDFLT.ZOSMF.RESOURCE_POOL.NETWORK.IYU0 +
CLASS(ZMFCLOUD) ID(IZUSVR) ACCESS(READ)
```

   Where IZUSVR is the default user ID for the z/OSMF server, which in turn has a default name of IZUSVR1. If you assigned a different user ID to the z/OSMF server started task, specify that user ID instead.

8. **Define the ZMFAPLA profiles for the Cloud Provisioning, Workflows, Workflow Editor, and System Variables resources.**
   a) Define the SAF profile to be used for authorizing users to the Software Services task.

```
RDEFINE ZMFAPLA (IZUDFLT.ZOSMF.PROVISIONING.SOFTWARE_SERVICES) UACC(NONE)
```

   b) Define the SAF profile to be used for authorizing users to the Resource Management task.

```
RDEFINE ZMFAPLA (IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT) UACC(NONE)
```

   c) Define the SAF profile to be used for authorizing users to the Workflows task.

```
RDEFINE ZMFAPLA (IZUDFLT.ZOSMF.WORKFLOW.WORKFLOWS) UACC(NONE)
```

d) Define the SAF profile to be used for authorizing users to the Workflow Editor task.

```
RDEFINE ZMFAPLA (IZUDFLT.ZOSMF.WORKFLOW.EDITOR) UACC(NONE)
```

e) Define the SAF profile to be used for authorizing users to the System Variables resource.

```
RDEFINE ZMFAPLA (IZUDFLT.ZOSMF.VARIABLES.SYSTEM.ADMIN) UACC(NONE)
```

9. **Grant z/OSMF access to the provisioning administrator, default domain administrator, and the default tenant consumer groups.**

```
PERMIT IZUDFLT.ZOSMF CLASS(ZMFAPLA) ID(IYU IYU0 IYU000) ACC(READ)
```

10. **Grant the resource administrator groups access to z/OSMF.**

```
PERMIT IZUDFLT.ZOSMF CLASS(ZMFAPLA) ID(IYU0RPAN IYU0RPAW) ACCESS(READ)
```

11. **Grant the user groups access to the Software Services, Workflows, and Workflow Editor tasks.**

```
PERMIT IZUDFLT.ZOSMF.PROVISIONING.SOFTWARE_SERVICES +
CLASS(ZMFAPLA) ID(IYU IYU0 IYU000) ACCESS(READ)

PERMIT IZUDFLT.ZOSMF.WORKFLOW.WORKFLOWS +
CLASS(ZMFAPLA) ID(IYU IYU0 IYU000) ACCESS(READ)

PERMIT IZUDFLT.ZOSMF.WORKFLOW.EDITOR +
CLASS(ZMFAPLA) ID(IYU IYU0 IYU000) ACCESS(READ)
```

12. **Grant administrators access to the Resource Management task.**

```
PERMIT IZUDFLT.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT +
CLASS(ZMFAPLA) ID(IYU IYU0) ACCESS(READ)
```

13. **Grant the resource administrator groups access to the Workflows task and Software Services task.**

```
PERMIT IZUDFLT.ZOSMF CLASS(ZMFAPLA) ID(IYU0RPAN IYU0RPAW) ACCESS(READ)

PERMIT IZUDFLT.ZOSMF.PROVISIONING.SOFTWARE_SERVICES +
CLASS(ZMFAPLA) ID(IYU0RPAN IYU0RPAW) ACCESS(READ)

PERMIT IZUDFLT.ZOSMF.WORKFLOW.WORKFLOWS +
CLASS(ZMFAPLA) ID(IYU0RPAN IYU0RPAW) ACCESS(READ)
```

14. **Grant the z/OSMF administrator group the authority to modify or delete system variables by using the Systems task or a z/OSMF REST service.**

```
PERMIT IZUDFLT.ZOSMF.VARIABLES.SYSTEM.ADMIN +
CLASS(ZMFAPLA) ID(IZUADMIN) ACCESS(READ)
```

15. **Create the z/OSMF security administrator role if it does not exist already.**

These users can perform automatic security updates in the Resource Management task.

a) Define the z/OSMF security administrator group.

```
ADDGROUP IZUSECAD
```

Where IZUSECAD is the default group name.

b) Define the SAF profile to be used for authorizing users to be z/OSMF security administrators.

```
RDEFINE ZMFCLOUD (IZUDFLT.ZOSMF.SECURITY.ADMIN) UACC(NONE)
```

Where IZUDFLT is the z/OSMF SAF profile prefix.

c) Grant the security administrator group read access to the security administrator profile.

```
PERMIT IZUDFLT.ZOSMF.SECURITY.ADMIN CLASS(ZMFCLOUD) +
ID(IZUSECAD) ACCESS(READ)
```

Only users with read access to this profile can be selected as domain security administrators by the provisioning administrator.

16. **Enable the z/OSMF server to perform authorization checks for ZMFCLOUD class resources.**
    a) Create the SERVER class profile.

```
RDEFINE SERVER (BBG.SECCLASS.ZMFCLOUD) UACC(NONE)
```

    b) Grant the z/OSMF server user ID access to the SERVER class profile.

```
PERMIT BBG.SECCLASS.ZMFCLOUD CLASS(SERVER) ID(IZUSVR) +
ACCESS(READ)
```

    Where IZUSVR is the default user ID for the z/OSMF server, which in turn has a default name of IZUSVR1. If you assigned a different user ID to the z/OSMF server started task, specify that user ID instead.

    c) Connect the z/OSMF started task user ID to the z/OSMF security administrator group (by default, IZUSECAD).

```
CONNECT IZUSVR GROUP(IZUSECAD)
```

17. **Refresh the RACF classes to make the preceding changes effective.**

```
SETROPTS RACLIST(ZMFAPLA ZMFCLOUD SERVER) REFRESH
```

### What to do next

To verify that you configured IBM Cloud Provisioning and Management for z/OS correctly, you can use the supplied IVP template in the default domain. For the steps to follow, see "Verify that security is set up for the domain administrator" on page 15.

## Verify that security is set up for the domain administrator

You can verify that security is set up correctly for the domain administrator role in IBM Cloud Provisioning and Management for z/OS. To do so, you can add an IBM-supplied template to the Software Services catalog and test run the template. This verification is referred to as performing the *installation verification procedure* or IVP for IBM Cloud Provisioning and Management for z/OS.

### Before you begin

The IVP is supplied by IBM in the following location on your system: `/usr/lpp/samples/cpm-sample-ivp/`

The IVP contains the following parts:

**cloud-provisioning-ivp-workflow.xml**
Workflow definition file for the provisioning workflow.

**cloud-provisioning-ivp.properties**
Contains values for the console command and unsolicited message.

**cloud-provisioning-ivp-actions.xml**
Actions file that defines only a deprovision action.

**cloud-provisioning-ivp-AdministratorDoc.pdf**
Documentation file for the IVP.

**cloud-provisioning-ivp.mf**
Manifest file. This file provides a shortcut when you create the template. Rather than specifying each of the aforementioned files in the template individually, you can specify just the manifest file, then click **Load** to supply values for the other files.

## About this task

The IVP contains a template that runs a provisioning workflow under your user ID.

The workflow consists of two steps:

- If Step 1 completes successfully, your user ID is set up correctly for issuing operator commands. This step issues the START command to start a non-existent job (IZUTEST), which results in an unsolicited message (IEFC452I) when the job is not found. To issue the command, the step uses a REST service.
- If Step 2 completes successfully, your user ID is set up correctly for reading messages that are written to the operations console. This step checks the result of the previous step for the presence of unsolicited message IEFC452I.

To perform the IVP, your user ID must be authorized as a domain administrator. If your installation defined security as described in "Steps for setting up security" on page 10 or by using the IZUPRSEC sample job, the user IDs in the IZUADMIN group are authorized as domain administrators.

## Procedure

1. **Add the sample template to the software services catalog.**
   a) Log in to z/OSMF with a domain administrator user ID.
   b) In the z/OSMF desktop view, select **Software Services**.
   c) Select the **Templates** tab.
   d) In the *Templates* table, click **Add Template**, then select **Standard** to use a standard template.
   If **Add Template** is not available, it might be because you are not a domain administrator. If so, contact your system programmer or security administrator for assistance.
   e) On the page that is displayed, supply the required values, as follows:
      i) For *Template source file*, specify the absolute z/OS UNIX path of the template manifest file for the IVP: `/usr/lpp/zosmf/samples/cpm-sample-ivp/cloud-provisioning-ivp.mf`
      ii) Click **Load** to supply values for other fields on the window.
      iii) Specify a template name, for example, `SampleIVP`.
      iv) Optionally, select the Workflows disposition and Jobs disposition to delete the workflow and job on completion. The default is *keep*, which means that the workflow and job are preserved. You can remove them later, if you prefer.
      v) Click **OK**. The template is added to the software services catalog.
2. **Associate the template with the default tenant and create a resource pool.**
   a) In the *Templates* table, select the template by clicking the check box for the template that you created, then click **Actions** > **Associate Tenant**.
   b) On the **Associate Tenant** window, accept the defaults. For resource pool selection, ensure that **Create a dedicated resource pool** is selected.
   A *dedicated resource pool* is allocated only to this template. In contrast, a *shared resource pool* can be used by multiple templates.
   c) Click **OK**.
   The Resource Management task opens to the *Add Template and Resource Pool for Tenant* window.
   d) On the *Add Template and Resource Pool for Tenant* window, enter the following values:
      - For the software services instance name prefix, specify a meaningful value, such as `IVP`.
      - For the maximum number of software services instances, specify a low value, such as `10`.
      - The instance runs under `Job Class A`, which is the IBM default. If this job class is defined and active at your installation, you can use it. Otherwise, you must include a JOB statement with a valid job class job in the *Add Template and Resource Pool for Tenant* window. You can optionally include other JCL values on the JOB statement, such as the accounting information.
   e) Click **OK**.

If message IYURP0013I is displayed, click **OK** to continue.

The resource pool for the template is created with no network or workload management resources.

f) Having used the Resource Management task to add a template to the tenant, return now to the Software task. Click the **Software Services** tab.

3. **Test run the template to provision a software instance.**

a) In the *Templates* table, select the template that you created.

Notice that the template is in *Draft* state, which means that the template is ready to be provisioned.

b) Click **Actions**, then select **Test Run**.

c) Click **OK**.

Message IYUSC0032I is displayed to indicate that the software services instance is started.

If you used the suggested values, the instance name is `ConsoleCommand_IVP00`.

4. **Verify that the template is provisioned.**

a) Click the **Instances** tab.

b) In the *Instances* table, check the state of your instance.

- If the template state is **Being Provisioned**, click **Refresh** to refresh the table display. Provisioning might take several minutes to complete.
- If the template state is **Provisioning-Failed**, your user ID needs an extra security authorization. Proceed to **Step 5** and **Step 6** for actions to take to resolve the problem.
- If the template state is **Provisioned**, you started the instance successfully. Skip to **Step 7**.

5. **Determine which step failed.**

a) In the *Instances* table, click the instance name.

The **Instance details** tab is shown, which includes the following details about the instance:

- Domain name (*default*)
- Tenant name (*default*)
- Name of the provisioning workflow. The workflow name follows the convention `ConsoleCommand_<prefix><instance-count>provision<generated string>`.

b) Click the workflow name to navigate to the workflow.

c) In the workflow, check for the following results:

i) Step 1 is *Complete* or *Failed*.

ii) Step 2 is *Complete* or *Failed*.

6. **Resolve the step failure.**

a) Work with your system programmer or security administrator to add the missing authorizations to your user ID.

- If Step 1 failed, your user ID is not authorized to issue console commands.
- If Step 2 failed, your user ID is not authorized to a console for viewing the unsolicited message.

For the required authorizations, see the sample security job for z/OSMF console services (IZUGCSEC) in SYS1.SAMPLIB.

b) Repeat Steps 1-4 of this procedure.

7. **Deprovision the instance.**

a) In **Software Services**, select the Instances tab.

b) In the *Instances* table, select the instance that you created.

c) Click **Actions** > **Perform** > **Deprovision**.

d) In the Perform deprovision window, click **OK**.

## What to do next

For a more advanced test of your security setup, you can create and test run a template that requires approval from a specified approver. In a production environment, the approver might be a middleware system programmer or a security administrator.

To perform this test, you create a new template based on the one you created previously. This time, you modify the workflow input variable file that was supplied with the IVP to add a performer (a *runAsUser*) and an approver for the template. You repeat some of the steps you performed in the previous procedure.

Follow these steps:

1. In the *Templates* table, select your template.
2. Create another template based on the one you created previously:
   a. Click **Actions** > **CreateBased on**.
      i) For Template name, specify the name of a new template, for example `SampleIVP2`.
      ii) For Target file path, specify the name of an empty or non-existent directory, for example: `/tmp/`*xxx*. If the directory does not exist, z/OSMF attempts to create it.
      iii) For Domain, select default to use the default domain.
   b. Click **OK** to create the template. The template is created in a draft state.
3. Associate the template with the default tenant and create a resource pool, as you did in **Step 2** of the previous procedure. If message IYURP0013I is displayed, click **OK** to continue.
4. Specify a run-as-user and an approver for the template, as follows:
   a. Select **Templates** > **Modify** > **Edit path**, which opens the Workflow Editor.
   b. In the Workflow Editor, click the Input Properties tab, then specify your own user ID for the properties CONSOLE_ADMIN and CONSOLE_APPROVER.

      **Tip:** In Cloud Provisioning, when a template specifies a user ID under which a step must be performed, an approval record is created. Here, the user ID is referred to as the *runAsUser ID* for the step. Approval records must be approved by the approvers before the template can be run or published.

      In the example that follows, IBMUSER is specified for both properties.

```
# Licensed Materials - Property of IBM
# 5650-ZOS
# Copyright IBM Corp. 2018
#
# Status = HSMA230
#-------------------------------------------------------------------------------
#
# This is the command that will be issued
# via the z/OSMF REST Consoles API
#
CONSOLE_CMD = S IZUTEST#
# This is  the unsolicited keyword that
# z/OSMF REST Consoles API should expect
# in the response to the CONSOLE_CMD.
#
UNSOL_KEY_TO_DETECT = IEFC452I#
# This is the console Administrator user ID
# that should be used to issue the
# z/OSMF REST Consoles API if the user ID
# running the template does not have appropriate
# authorization.
#
CONSOLE_ADMIN = ibmuser
#
# This is the console Approval user ID used
# for approving the usage of the console
# Administrator user ID specified by
# the ADMIN_CONSOLE variable.
#
CONSOLE_APPROVER = ibmuser
```

   c. Click **Save** to save the input properties file.
   d. Close the Workflow Editor window.
5. In the **Templates** > **Modify** page, click **OK**.

6. In the *Templates* table, check the state of the template:
   - If the template state is **Pending security update**, click **Refresh** to refresh the table display.
   - If the state is **Draft pending approval**, the template requires approval. Resolving this state requires the approver user ID that you specified earlier to approve the template.
7. Approve the template:
   a. In the *Templates* table, select the template that is in **Draft pending approval** state, then click **Actions** > **Approvals**.
   b. In the Approvals window, review the item to approve.
   c. To approve the template, select the row, then click **Actions** > **Approve**.
   d. Return to the *Templates* table. Notice that the template is now **Draft approved**.
8. Test run the template by clicking **Actions**, then **Test Run**.
9. In the *Instances* table, check the state of your instance:
   - If the template state is **Being Provisioned**, click **Refresh** to refresh the table display. Provisioning might take several minutes to complete.
   - If the template state is **Provisioning-Failed**, resolve the errors for any failed steps and test run the template again.
   - If the template state is **Provisioned**, you started the instance successfully.
10. Deprovision the instance.

You can remove the template from the software services catalog when you are done.

**Exploring this function further:** Try running the IVP with other user IDs specified for the CONSOLE_ADMIN and CONSOLE_APPROVER properties. When these user IDs do not match, Cloud Provisioning automatically generates an additional approval record for your security administrator to approve. This behavior helps to ensure that security is maintained when provisioning is performed under different user IDs.

In the Workflow Editor:

- For CONSOLE_ADMIN, specify the user ID under which the template is to run. This user ID requires the authority to enter commands from the z/OS operations console. Typically, this person is a middleware system programmer who provisions templates at your company.
- For CONSOLE_APPROVER, specify the user ID of the person who must approve the provisioning of the template.

Avoid using a functional user ID for the approver. The approver user ID must be able to log in to z/OSMF.

## Automatic security management for Cloud Provisioning

During regular operations with Cloud Provisioning, your installation periodically adds or removes users for domains and tenants. Such changes require immediate updates to your security setup. If you select *automatic security* for Cloud Provisioning in the Resource Management task, or accept the default, these changes are performed for you automatically.

This topic describes the options that are available for enabling automatic security management for IBM Cloud Provisioning and Management for z/OS.

Automatic security management can be performed by using either of the following methods:

- XML security descriptor. Cloud Provisioning will generate an XML request that identifies the required security operations for your external security manager (ESM) to process.
- Security REXX exec that is provided by the vendor of the ESM. For example, IBM supplies the REXX exec **`izu.provisioning.security.config.rexx`** for use with RACF.

Automatic security is enabled by default. It uses the z/OS service **R_SecMgtOper** to perform security operations directly and synchronously. In contrast, the REXX exec is run by a Resource Management workflow.

Both of these methods require that a valid user ID be specified for the CLOUD_SEC_ADMIN keyword in the IZUPRMxx parmlib member.

## Using the XML descriptor support for automatic security processing

This method of automatic security uses the **R_SecMgtOper** service (module IRRSMO00) in z/OS to process an IBM-supplied XML document. The contents of the XML document are processed by the external security manager (ESM). For information about the **R_SecMgtOper** service, see *z/OS Security Server RACF Callable Services*.

Use of IRRSMO00 by z/OSMF requires that the external security manager (ESM) is defined to your system. For a RACF installation, this means that the RACF subsystem is defined to your system, such as by using either of the following techniques:

- Add the following statement to IEFSSNxx:

```
SUBSYS SUBNAME(RACF) INITRTN(IRRSSI00) INITPARM('<')
```

- A temporary alternative is to enter the following command. This change does not persist across an IPL of the system.

```
SETSSI ADD,SUBNAME=RACF,INITRTN=IRRSSI00,INITPARM='<'
```

To enable automatic security processing based on XML security descriptors, do the following:

1. Ask your security administrator to do the following:
   a. Locate the security configuration properties file on your system:

      ```
      /global/zosmf/configuration/workflow/izu.provisioning.security.config.properties
      ```

      Locate the following property:

      ```
      security-configuration-directsecurity-enabled=
      ```

      If this property is not present, add it.
   b. To use XML security descriptors, ensure that the property is set to true:

      ```
      security-configuration-directsecurity-enabled=true
      ```

   c. Save the properties file.
2. Restart the z/OSMF server. From the operator console, enter the START command for the z/OSMF server started task: START IZUSVR1

When the server initializes, the following message is written to the IZUG0.log to indicate that the **R_SecMgtOper** service is used for automatic security processing:

```
Cloud Provisioning and Management will use direct security processing via R_SecMgtOper
for automatic security domains.
```

## Using a REXX exec for automatic security processing

This method of automatic security uses the security REXX exec from IBM or one that you have obtained from another vendor. When installed, the security REXX exec is owned by the z/OSMF server user ID (by default, IZUSVR) and is intended for use by security administrators only. The exec can be updated only by users in the z/OSMF security administrator group (by default, IZUSECAD).

If your installation uses a security manager other than RACF, you must obtain a REXX exec with equivalent security commands from your vendor and store it on your system.

Then, do the following:

1. Ensure that a security REXX exec is installed on your system. The IBM-supplied REXX exec for RACF is already included in the following directory on your system:

   ```
   /global/zosmf/configuration/workflow/izu.provisioning.security.config.rexx
   ```

   For other security managers, you must obtain an equivalent REXX exec from your vendor and install it on your system.

2. Recycle the z/OSMF server to ensure that the security configuration properties file is created with the default IBM content and the correct ownership and permission settings.

   From the operator console, enter the operator commands in the following sequence: **STOP IZUSVR1** > **START IZUSVR1** > **STOP IZUSVR1**.

   It is not necessary to stop or restart the z/OSMF angel process (IZUANG1).

3. With the z/OSMF server stopped, ask your security administrator to do the following:

   a. Locate the security configuration properties file on your system:

      ```
      /global/zosmf/configuration/workflow/izu.provisioning.security.config.properties
      ```

      Locate the following property:

      ```
      security-configuration-rexx-location=
      ```

      By default, the property identifies the location of the IBM-supplied security REXX exec.

   b. To use a different REXX exec, edit the property so that it refers to the location of the replacement REXX exec. The location can be a sequential data set, partitioned data set (PDS), or z/OS UNIX path and file name.

      If the REXX exec resides in a data set, observe the following naming conventions:

      - Enter the fully qualified data set name, including the member name if you are using a PDS.
      - Do not enclose the data set name in quotation marks.

      Example:

      ```
      security-configuration-rexx-location=SYS1.REXX(ZOSMFSEC)
      ```

      If the REXX exec resides in a z/OS UNIX file, observe the following naming conventions:

      - Enter the full path name, beginning with the forward slash (/) and including the file name, or a relative path.
      - The name cannot contain any path segments, such as / . / or / . . /

      Example:

      ```
      security-configuration-rexx-location=/u/cloud/zosmf/workflow/
      izu.provisioning.security.config.rexx
      ```

   c. Save the properties file.

4. Restart the z/OSMF server. From the operator console, enter the START command for the z/OSMF server started task: START  IZUSVR1

When the server initializes, the following message is written to the IZUG0.log to indicate that REXX processing is used for automatic security processing:

```
Cloud Provisioning and Management will use REXX processing for automatic security domains.
```

### Applying service to the IBM-supplied REXX exec

IBM can ship service updates to Cloud Provisioning, which might include updates to the **izu.provisioning.security.config.rexx** exec. If you use the IBM exec, it is recommended that you apply the PTFs to stay current with the latest level of the exec.

If your installation uses a modified version of the IBM-supplied security REXX exec for RACF security:

- Ensure that the security configuration properties file identifies the location of the exec on your system. See the procedure for updating the properties file in "Using a REXX exec for automatic security processing" on page 20.
- Work with your security administrator to reconcile any differences between your copy of the exec and a new version from IBM.

When you are working with service updates, always check the PTF ++HOLD action for specific instructions for deploying the updated code, such as the need to restart the z/OSMF server to have the updates take effect.

## Summary of security requirements for the Cloud Provisioning tasks

This topic describes the resources that must be defined, and the groups that must be permitted to the resources.

The security configuration requirements for Cloud Provisioning are described in the sections that follow. Typically, these permissions are created by your security administrator.


- "Select the Legacy Special user ID" on page 22
- "Group name prefix for Cloud Provisioning user groups" on page 22
- "Class activation for Cloud Provisioning" on page 23
- "Resource authorizations for security administrators" on page 23
- "Resource authorizations for network administrators" on page 23
- "Resource authorizations for WLM administrators" on page 23
- "Resource authorizations for application developers" on page 23
- "Resource authorizations for the Cloud Provisioning user roles" on page 24
- "Resource authorizations for the z/OSMF server user ID" on page 26.


### Select the Legacy Special user ID

During configuration, you select a user ID to use for authorizing groups to the domain. This user ID, which is referred to as the *Legacy Special* user ID, requires RACF SPECIAL authority. It must also be connected to the z/OSMF security group for z/OSMF security administrators (IZUSECAD, by default). Typically, this user is a security administrator.

The Legacy Special user is the first provisioning administrator to be defined for your configuration. After Cloud Provisioning is configured, remember the Legacy Special user ID and keep it active for future operations. For example, with the Legacy Special user ID, you can authorize other users to be provisioning administrators, or use the Resource Management task to create more domains and add default domain administrators.

### Group name prefix for Cloud Provisioning user groups

Your installation must define a SAF group name to be used for Cloud Provisioning groups. The group name is prepended to the names of the groups that represent the various roles in Cloud Provisioning, such as provisioning administrators, domain administrators, and tenants. The group name prefix is used in the RACF commands for defining groups.

By default, the value IYU is the group name prefix for Cloud Provisioning groups. Your installation can select a different SAF group prefix. To do so, specify the value in the IZUPRMxx parmlib member.

Your installation can select a different group name prefix for user groups. If so, substitute that value in the examples. If you plan to use a different value, ensure that it is 1-3 characters (alpha-numeric, uppercase, or the following special characters: $, and @).

## Class activation for Cloud Provisioning

For a RACF® installation, the security class ZMFCLOUD must be active when you configure Cloud Provisioning. The RACF commands for activating the class (with generic profile checking activated) are included in the IZUPRSEC job. If your installation uses an external security manager other than RACF, ask your security administrator to create equivalent commands for your environment.

The ZMFCLOUD class requires the RACLIST option. If you change the profiles, you must refresh the ZMFCLOUD class to have the changes take effect.

Table 4 on page 23 describes the class activation for Cloud Provisioning.

*Table 4. Class activation for Cloud Provisioning*

| Class | Purpose | RACF command for activating |
|---|---|---|
| **ZMFCLOUD** | Allow the user to use the z/OSMF core functions and tasks that are related to Cloud Provisioning. z/OSMF defines a resource name for each core function and task that is related to Cloud Provisioning. | `SETROPTS CLASSACT(ZMFCLOUD) GENERIC(ZMFCLOUD) + RACLIST(ZMFCLOUD)` |

## Resource authorizations for security administrators

Users who perform security administration tasks should be members of the z/OSMF security administrator group (IZUSECAD, by default). This group requires an OMVS group ID (GID).

Security administrators require access to the system resources that are used by the Cloud Provisioning tasks. For more information, see Table 5 on page 24.

## Resource authorizations for network administrators

Network administrators require access to the Network Configuration Assistant task, and to system resources that are used by the Network Configuration Assistant task. For more information, see Table 5 on page 24.

## Resource authorizations for WLM administrators

WLM administrators require access to resources, such as those that are protected by the profile MVSADMIN.WLM.POLICY. For more information, see the topic about updating z/OS for the Workload Management plug-in in *IBM z/OS Management Facility Configuration Guide* and Table 5 on page 24.

## Resource authorizations for application developers

z/OSMF includes the Swagger interface, which allows application developers and other users to display format descriptions of the Cloud Provisioning REST APIs. To enable the use of Swagger at your installation, define the Swagger resources in your external security manager, and grant READ access to the appropriate users and groups.

On a system with RACF as the security manager, you can use the following commands:

1. Define the allAuthenticatedUsers resource profile:

```
RDEFINE EJBROLE IZUDFLT.com.ibm.ws.management.security.resource.allAuthenticatedUsers UACC(NONE)
```

The profile includes the z/OSMF SAF profile prefix, which is IZUDFLT, by default. Your installation can select a different SAF profile prefix for z/OSMF in the IZUPRMxx parmlib member.

2. To give users and administrators access to Swagger, grant them READ access to the allAuthenticatedUsers resource profile:

```
PERMIT IZUDFLT.com.ibm.ws.management.security.resource.allAuthenticatedUsers CLASS(EJBROLE)
ID(IZUUSER IZUADMIN) ACCESS(READ)
```

By default, the user and administrator groups for z/OSMF are IZUUSER and IZUADMIN.

3. Create an administrator role for Swagger by defining the Administrator resource profile:

```
RDEFINE EJBROLE IZUDFLT.com.ibm.ws.management.security.resource.Administrator UACC(NONE)
```

4. Assign the administrator role to the z/OSMF administrator group, which is IZUADMIN by default:

```
PERMIT IZUDFLT.com.ibm.ws.management.security.resource.Administrator CLASS(EJBROLE)
ID(IZUADMIN) ACCESS(READ)
```

For more information about the Cloud Provisioning REST services, see *IBM z/OS Management Facility Programming Guide*.

## Resource authorizations for the Cloud Provisioning user roles

Table 5 on page 24 describes the authorization requirements for the common user roles in Cloud Provisioning. The IZUPRSEC job includes sample RACF commands for creating these authorizations on your system. A procedure for creating these authorizations manually is shown in "Steps for setting up security" on page 10.

*Table 5. Security setup requirements for Cloud Provisioning user roles*

| Resource class | Resource name | Who needs access? | Type of access required | Why |
|---|---|---|---|---|
| **DATASET** | *your_stack_include_dataset* | TCP/IP stack started task ID. | READ | Allows the TCP/IP stack to read the include data set when the TCP/IP stack is started. This definition is applicable only when your installation uses discrete or generic profiles to protect data set access. |
| **DATASET** | *your_stack_dynamic_update_dataset* | TCP/IP stack started task ID. | READ | Allows the TCP/IP stack to read the VARY OBEY data set that IBM Cloud Provisioning and Management uses to dynamically update the TCP/IP stack. This definition is applicable only when your installation uses discrete or generic profiles to protect data set access. |
| **EJBROLE** | *<SAF-prefix>* .IzuManagementFacilityProvisioning . izuUsers | • z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to connect to the Software Services and Resource Management tasks. |
| **EJBROLE** | *<SAF-prefix>* .com.ibm.ws.management. security.resource.Administrator | • z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to act as administrator for the Swagger function in z/OSMF. |

*Table 5. Security setup requirements for Cloud Provisioning user roles (continued)*

| Resource class | Resource name | Who needs access? | Type of access required | Why |
|---|---|---|---|---|
| **EJBROLE** | <*SAF-prefix*> .com.ibm.ws.management.security.resource.allAuthenticatedUsers | z/OSMF administrators group (IZUADMIN) | READ | Allow the user to use Swagger to display information about the z/OSMF REST APIs.<br>For information about the REST services, see *IBM z/OS Management Facility Programming Guide*. . |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.IBM_ CLOUDPORTAL.MARKETPLACE. CONSUMER | Consumers and domain administrators | READ | Allow the user to use the marketplace to provision and manage software services. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.IBM_ CLOUDPORTAL.MARKETPLACE. ADMIN | Domain administrators | READ | Allow the user to control which services are published to the marketplace, and manage the services to which consumers have subscribed. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT | • Provisioning administrator group<br>• Domain group<br>• Resource pool network administrator group<br>• Resource pool WLM administration group<br>• z/OSMF security administrators group (IZUSECAD) | READ | Allow the user to access the Resource Management task. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.PROVISIONING.SOFTWARE_SERVICES | • Provisioning administrator group<br>• Domain group<br>• Tenant group<br>• Resource pool network administrator group<br>• Resource pool WLM administration group<br>• z/OSMF security administrators group (IZUSECAD)<br>• Consumers and domain administrators | READ | Allow the user to access the Software Services task. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.VARIABLES.SYSTEM.ADMIN | z/OSMF administrators group (IZUADMIN) | READ | Allow the user to access the system variable definitions. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.WORKFLOW. EDITOR | • Provisioning administrator group<br>• Domain group<br>• Tenant group<br>• z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to access the Workflow Editor task in z/OSMF. |

| Table 5. Security setup requirements for Cloud Provisioning user roles (continued) | | | | |
|---|---|---|---|---|
| **Resource class** | **Resource name** | **Who needs access?** | **Type of access required** | **Why** |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.WORKFLOW.WORKFLOWS | • Provisioning administrator group<br>• Domain group<br>• Tenant group<br>• z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to access the Workflows task in z/OSMF. |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.WORKLOAD_MANAGEMENT.WORKLOAD_MANAGEMENT.ENWRP | • z/OSMF administrators group (IZUADMIN)<br>• WLM resource pool administration group | READ | Allow the user to access the WLM Resource Pooling (WRP) functions of z/OSMF. Using a WRP definition, the user can associate cloud information (tenant name, domain ID, template type, service levels supported) with WLM elements (report classes and classification rules). |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT. *tenantGroupID* | Tenant group | READ | Allow the user to act as a tenant. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.PROVISIONING.RESOURCE_MANAGEMENT. *domainGroupID* | Domain group | READ | Allow the user to act as a domain administrator. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.RESOURCE_POOL.NETWORK. *domainGroupID* | Resource pool network administration group | READ | Allow the user to act as a network resource pool administrator. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.RESOURCE_POOL.WLM.*domainGroupID* | Resource pool WLM administration group | READ | Allow the user to act as a WLM resource pool administrator. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.SECURITY.ADMIN | z/OSMF security administrators group (IZUSECAD) | READ | Allow the user to access the security administration resource. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.TEMPLATE.APPROVERS.*domainGroupID* | Template approvers | READ | Allow the user to act as a cloud domain level template approver. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.TEMPLATE.APPROVERS.*domainGroupID*. *templateName* | Template approvers | READ | Allow the user to approve the specified template. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.TEMPLATE.INSTANCE.*domainGroupID*. *templateInstanceName* | Template instance owner | READ | Allow the user to access the specified template registry instance. |

## Resource authorizations for the z/OSMF server user ID

Table 6 on page 27 describes the Cloud authorizations that you must create for the z/OSMF server. By default, the server user ID is IZUSVR1. However, your installation might have selected a different user ID for the server during z/OSMF configuration. The IZUPRSEC job includes sample RACF commands for creating these authorizations on your system.

*Table 6. Authorizations required for the z/OSMF server user ID*

| Resource class | Resource name | Type of access required | Why |
|---|---|---|---|
| **DATASET** | *your_stack_include_dataset* | ALTER | Allows the Network Configuration Assistant task to write to the configured include data sets when a network resource is provisioned or deprovisioned. There is one include data set for each stack that is defined for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses discrete or generic profiles to protect data set access. |
| **DATASET** | *your_stack_dynamic_update_dataset* | ALTER | Allows the Network Configuration Assistant task to write to the configured dynamic updates data sets when a network resource is provisioned or deprovisioned. There can be one dynamic update data set for each stack that is defined for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses a discrete or generic profile to protect data set access. |
| **OPERCMDS** | MVS.VARY.TCPIP.OBEYFILE | CONTROL | Allows the Network Configuration Assistant task to issue the **VARY TCPIP OBEYFILE** command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **VARY TCPIP OBEYFILE** command. |
| **OPERCMDS** | MVS.MCSOPER.ZCDPLM* | READ | Allows the Network Configuration Assistant task to issue various operator commands for IBM Cloud Provisioning and Management for z/OS. The console name for this extended MCS console is the text string ZCDPLM that is appended with the MVS sysclone value of the system of the z/OSMF instance. |
| **OPERCMDS** | MVS.DISPLAY.JOB | READ | Allows the Network Configuration Assistant task to issue the display A operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **DISPLAY A** operator command. |
| **OPERCMDS** | MVS.DISPLAY.TCPIP | READ | Allows the Network Configuration Assistant task to issue the display TCPIP operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **DISPLAY TCPIP** operator command. |
| **OPERCMDS** | MVS.DISPLAY.XCF | READ | Allows the Network Configuration Assistant task to issue the **DISPLAY XCF** operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **DISPLAY XCF** operator command. |
| **OPERCMDS** | MVS.ROUTE.CMD.*sysname* | READ | Allows the Network Configuration Assistant task to issue the **ROUTE** operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only if the installation uses this profile to restrict the use of the **ROUTE** command. |

| Table 6. Authorizations required for the z/OSMF server user ID (continued) | | | |
|---|---|---|---|
| **Resource class** | **Resource name** | **Type of access required** | **Why** |
| **SERVAUTH** | EZB.NETWORKUTILS.CLOUD.*mvsname* | READ | Allows the Network Configuration Assistant task to issue operator commands for IBM Cloud Provisioning and Management for z/OS. *mvsname* is the name of the system where z/OSMF is running. |
| **SERVAUTH** | EZB.NETSTAT.*mvsname.tcpprocname*.CONFIG | READ | Allows the Network Configuration Assistant task to issue the command **NETSTAT CONFIG**. This definition is applicable only when your installation uses the SERVAUTH class to restrict usage of the **NETSTAT** command. When this definition is applicable, IZUSVR must be authorized for each stack defined for IBM Cloud Provisioning and Management for z/OS. |
| **SERVAUTH** | EZB.NETSTAT.*mvsname.tcpprocname*.VIPADCFG | READ | Allows the Network Configuration Assistant task to issue the command **NETSTAT VIPADCFG**. This definition is applicable only when your installation uses the SERVAUTH class to restrict usage of the **NETSTAT** command. When this definition is applicable, IZUSVR must be authorized for each stack that is defined for IBM Cloud Provisioning and Management for z/OS. |
| **SERVER** | BBG.SECCLASS.ZMFCLOUD | READ | Allows the z/OSMF server to perform access checks in the ZMFCLOUD class. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF. RESOURCE_POOL.NETWORK. *domainGroupID* | READ | Allows the z/OSMF server to access to the network administrator profile. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF. RESOURCE_POOL.WLM.*domainGroupID* | READ | Allows the z/OSMF server to access the WLM administrator profile. |

# Parameters in IZUPRMxx

The IZUPRMxx parmlib member specifies options for z/OSMF. SYS1.SAMPLIB contains a copy of the IZUPRMxx member that you can copy to SYS1.PARMLIB and modify. This topic describes the key parameters in parmlib member IZUPRMxx for IBM Cloud Provisioning and Management for z/OS.

For complete information about IZUPRMxx, see *IBM z/OS Management Facility Configuration Guide*.

## Key parameters for cloud provisioning

**CLOUD_SAF_PREFIX('IYU')**

SAF profile prefix that is prepended to the names of any groups to be used for authorizing users to IBM Cloud Provisioning and Management for z/OS task activities.

**Note:** The IZUPRSEC sample job contains commands that include the group name for creating authorizations for IBM Cloud Provisioning and Management for z/OS. The value that is specified here must match the prefix name that you define for Cloud Provisioning authorizations in the IZUPRSEC job or by entering equivalent commands.

**Rules:**

- Must follow the rules for RACF profile names.
- 1 – 3 characters.

**Default:** IYU

**CLOUD_SEC_ADMIN('*user-id*')**
Specifies the security administrator user ID to be used for automatic security management in Cloud Provisioning. When specified, automatic security updates are performed under this user ID. Otherwise, if this value is omitted, security updates for Cloud Provisioning must be performed manually by your security administrator.

The user ID that is specified here must be connected to the z/OSMF security administrator group, which is named IZUSECAD by default. The IZUPRSEC job in SYS1.SAMPLIB contains a commented RACF command for creating this authorization. Minimally, this user ID requires:

- READ access to the ZMFCLOUD class resource profile IZUDFLT.ZOSMF.SECURITY.ADMIN.
- Authorization to manage resource profiles in the ZMFAPLA and ZMFCLOUD resource classes.
- Authorization to manage security groups.

During regular operations with Cloud Provisioning, your installation might periodically update Resource Management domains and tenants to add or remove users. Such changes require updates to your security setup. By specifying a user ID for the CLOUD_SEC_ADMIN keyword, you indicate that *automatic security* is to be used for performing user authorizations. If so, the authorizations are performed automatically by the Resource Management task, by using a security REXX exec that is provided by the external security manager. For example, IBM supplies the REXX exec **izu.provisioning.security.config.rexx** for use with RACF. For more information, see "Automatic security management for Cloud Provisioning" on page 19.

If the CLOUD_SEC_ADMIN value is changed, the new setting applies only to domains that are created after the change. Any existing domains continue to operate with manual or automated security, based on the value that was in effect when these domains were created.

**Note:** With the installation of the PTF for APAR PH29813, the default domain now supports manual security mode for creating templates and tenants. This option is intended for provisioning environments that cannot use automatic security mode. Previously, the default domain was required to run in automatic security mode. Now, when the default domain is created at z/OSMF startup time, it is placed in manual security mode if no security administrator is specified on the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member.

If you have incorrectly configured the security mode for Cloud Provisioning and Management, it is possible to change it. Doing so requires only that you edit the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member and restart the z/OSMF server. You can switch a domain from automatic security to manual security, and vice versa. Your changes to the CLOUD_SEC_ADMIN statement affect the security mode of all existing domains. The suggested practice is that you run Cloud Provisioning and Management in automatic security mode.

**Rules:**

- Must follow the rules for z/OS user IDs.
- 1 – 8 characters.

**Default:** None. If you do not provide a valid z/OS user ID, the Resource Management task does not perform automatic security updates.

**PLUGINS(plugin-id,plugin-id,plugin-id,...)**
Specifies the optional plug-ins to be made available in your configuration. Enter all of the plug-in identifiers that are shown in Table 7 on page 29.

*Table 7. z/OSMF plug-ins that are required for IBM Cloud Provisioning and Management for z/OS*

| Plug-in ID | Plug-in name |
|---|---|
| **COMMSERVER_CFG** | Network Configuration Assistant |
| **RESOURCE_MON** | Resource Monitoring |
| **WORKLOAD_MGMT** | Workload Management |

# Set up Network Configuration Assistant for Cloud Provisioning

You need to set up the Network Configuration Assistant task for use with Cloud Provisioning.

## About this task

Network Configuration Assistant is used to define network resource pools used by Cloud Provisioning. You must perform the initial set up of Network Configuration Assistant before Network Configuration Assistant can manage any cloud networking resources.

You must have the appropriate network administrator access to perform this task.

## Procedure

1. In z/OSMF, select the Network Configuration Assistant task in the Configuration category of the navigation area.

   The welcome screen is displayed.
2. Select **Manage z/OS Cloud configuration**, then click **Proceed**.

   The resulting page has multiple tabs, for different Network Configuration Assistant functions.
3. Define a TCP/IP stack as follows:
   a) Click the **Systems** tab.
   b) Select the system image you want to add a TCP/IP stack under.
   c) Click **Actions**, then select **Add TCP/IP Stack...**

      The Add TCP/IP Stack dialog is displayed.
   d) In the **Name** field, specify the actual TCP/IP stack name.

      If you do not know the TCP/IP stack name, use the DISPLAY TCPIP command to display it.

      **Restriction:** Only a single INET TCP/IP stack is supported on a system image that is used for network resource provisioning. Use of a CINET TCP/IP stack for network resource provisioning is not supported.
   e) Add a description if desired.
   f) Click **Save**.

      A confirmation dialog is displayed.
   g) On the confirmation dialog, click **Proceed**.

      A panel for configuring the stack's cloud data sets is displayed.
   h) On the Configure Stack Properties panel, specify values.
      - Choose a data set allocation method for the include data set.
        – Click **Specify a pre-allocated data set** if you have allocated a data set for this purpose.

          Enter the name of an allocated PDSE data set and member that exists on shared Direct Access Storage Device (DASD) to be used as the stack cloud include data set. Use of Partitioned Data Set Extended (PDSE) members is required. PDSE members will be created dynamically from the previously allocated PDSE library. The data set must exist on shared DASD when the TCP/IP stack exists on a system that is remote from the system running z/OSMF.
        – Click **Use a workflow to allocate a data set of a customizable size...** to use a workflow to allocate a PDSE of a customizable size.
          i) Click **Allocate data set using workflow**. A workflow named "ezb_cloud_allocate_stack_pdse" is created.
          ii) Open the **z/OSMF Workflows** tab.
          iii) Select the workflow and choose **Actions > Open**.
          iv) Select the first step and choose **Actions > Perform**.

v) Customize the workflow with a unique data set name and a customized size. The data set must be a PDSE that exists on a shared DASD volume.

vi) After the workflow completes, enter the name of the data set with a PDSE member name, for example, 'SYS1.CLOUD(V007INCL)'. The member that you specify will be created dynamically within the PDSE.

**Authorization requirements for creating a workflow.**

The user's z/OS user ID must have the following access:

- READ access to the <SAF-PREFIX>.ZOSMF.WORKFLOW.WORKFLOWS profile in the ZMFAPLA class.
- READ access to the <SAF_PREFIX>.*.izuUsers profile in the EJBROLE class, or at a minimum, READ access to the <SAF_PREFIX>.IzuManagementFacilityWorkflow.izuUsers resource name in the EJBROLE class.
- READ access to the <SAF-prefix>.ZOSMF.SETTINGS.SYSTEMS.VIEW profile in the ZMFAPLA class.

– Click **Dynamically allocate data set** to have the specified data set dynamically allocated by using your installation's default size.

Enter the name of a data set to be dynamically allocated and specify a member name. If you have had a data set dynamically allocated by using this method for this or another TCP/IP stack, you can specify that data set name and a unique member.

Dynamically allocated data sets are dynamically deallocated when no longer referenced by any Cloud TCP/IP stacks.

- Choose a data set allocation method for the dynamic update data set. Follow the instructions above for the include data. You might choose the same or different data sets for the include data set and the dynamic update data set. If you choose to use the same data set as the include data set, you must also choose the same data set allocation method radio button as you did for the include data set and specify a unique member name. Similarly, you might specify the same data set that was specified for other TCP/IP stacks when the same data set allocation method is specified.

i) Click **Save**. A message is displayed that describes the expected behavior if the TCP/IP Profile technology of Network Configuration Assistant is used for this TCP/IP stack.

j) Click **OK** to close the message window and return to the Cloud perspective.

k) If you are not using the TCP/IP Profile technology to manage your TCP/IP Profile, edit the TCP/IP Profile data set.

If you are not using the TCP/IP Profile technology to manage your TCP/IP Profile, edit the TCP/IP Profile data set on your system for the TCP/IP stack name that you entered. Add an Include statement that references the name that you supplied for **Include data set**. For example, if you supplied the name of 'USER1.TCPIP.INCLUDE(TCPIP)', add the following Include statement to the+TCP/IP Profile data set: INCLUDE USER1.TCPIP.INCLUDE(TCPIP)

# Summary of security requirements for the Cloud Provisioning tasks

This topic describes the resources that must be defined, and the groups that must be permitted to the resources.

The security configuration requirements for Cloud Provisioning are described in the sections that follow. Typically, these permissions are created by your security administrator.


- "Select the Legacy Special user ID" on page 32
- "Group name prefix for Cloud Provisioning user groups" on page 32
- "Class activation for Cloud Provisioning" on page 32
- "Resource authorizations for security administrators" on page 33

- “Resource authorizations for network administrators” on page 33
- “Resource authorizations for WLM administrators” on page 33
- “Resource authorizations for application developers” on page 33
- “Resource authorizations for the Cloud Provisioning user roles” on page 33
- “Resource authorizations for the z/OSMF server user ID” on page 36.

## Select the Legacy Special user ID

During configuration, you select a user ID to use for authorizing groups to the domain. This user ID, which is referred to as the *Legacy Special* user ID, requires RACF SPECIAL authority. It must also be connected to the z/OSMF security group for z/OSMF security administrators (IZUSECAD, by default). Typically, this user is a security administrator.

The Legacy Special user is the first provisioning administrator to be defined for your configuration. After Cloud Provisioning is configured, remember the Legacy Special user ID and keep it active for future operations. For example, with the Legacy Special user ID, you can authorize other users to be provisioning administrators, or use the Resource Management task to create more domains and add default domain administrators.

## Group name prefix for Cloud Provisioning user groups

Your installation must define a SAF group name to be used for Cloud Provisioning groups. The group name is prepended to the names of the groups that represent the various roles in Cloud Provisioning, such as provisioning administrators, domain administrators, and tenants. The group name prefix is used in the RACF commands for defining groups.

By default, the value `IYU` is the group name prefix for Cloud Provisioning groups. Your installation can select a different SAF group prefix. To do so, specify the value in the IZUPRMxx parmlib member.

Your installation can select a different group name prefix for user groups. If so, substitute that value in the examples. If you plan to use a different value, ensure that it is 1-3 characters (alpha-numeric, uppercase, or the following special characters: $, and @).

## Class activation for Cloud Provisioning

For a RACF installation, the security class ZMFCLOUD must be active when you configure Cloud Provisioning. The RACF commands for activating the class (with generic profile checking activated) are included in the IZUPRSEC job. If your installation uses an external security manager other than RACF, ask your security administrator to create equivalent commands for your environment.

The ZMFCLOUD class requires the RACLIST option. If you change the profiles, you must refresh the ZMFCLOUD class to have the changes take effect.

Table 8 on page 32 describes the class activation for Cloud Provisioning.

*Table 8. Class activation for Cloud Provisioning*

| Class | Purpose | RACF command for activating |
|---|---|---|
| **ZMFCLOUD** | Allow the user to use the z/OSMF core functions and tasks that are related to Cloud Provisioning. z/OSMF defines a resource name for each core function and task that is related to Cloud Provisioning. | `SETROPTS CLASSACT(ZMFCLOUD) GENERIC(ZMFCLOUD) + RACLIST(ZMFCLOUD)` |

### Resource authorizations for security administrators

Users who perform security administration tasks should be members of the z/OSMF security administrator group (IZUSECAD, by default). This group requires an OMVS group ID (GID).

Security administrators require access to the system resources that are used by the Cloud Provisioning tasks. For more information, see Table 9 on page 34.

### Resource authorizations for network administrators

Network administrators require access to the Network Configuration Assistant task, and to system resources that are used by the Network Configuration Assistant task. For more information, see Table 9 on page 34.

### Resource authorizations for WLM administrators

WLM administrators require access to resources, such as those that are protected by the profile MVSADMIN.WLM.POLICY. For more information, see the topic about updating z/OS for the Workload Management plug-in in *IBM z/OS Management Facility Configuration Guide* and Table 9 on page 34.

### Resource authorizations for application developers

z/OSMF includes the Swagger interface, which allows application developers and other users to display format descriptions of the Cloud Provisioning REST APIs. To enable the use of Swagger at your installation, define the Swagger resources in your external security manager, and grant READ access to the appropriate users and groups.

On a system with RACF as the security manager, you can use the following commands:

1. Define the allAuthenticatedUsers resource profile:

```
RDEFINE EJBROLE IZUDFLT.com.ibm.ws.management.security.resource.allAuthenticatedUsers UACC(NONE)
```

   The profile includes the z/OSMF SAF profile prefix, which is IZUDFLT, by default. Your installation can select a different SAF profile prefix for z/OSMF in the IZUPRMxx parmlib member.

2. To give users and administrators access to Swagger, grant them READ access to the allAuthenticatedUsers resource profile:

```
PERMIT IZUDFLT.com.ibm.ws.management.security.resource.allAuthenticatedUsers CLASS(EJBROLE)
ID(IZUUSER IZUADMIN) ACCESS(READ)
```

   By default, the user and administrator groups for z/OSMF are IZUUSER and IZUADMIN.

3. Create an administrator role for Swagger by defining the Administrator resource profile:

```
RDEFINE EJBROLE IZUDFLT.com.ibm.ws.management.security.resource.Administrator UACC(NONE)
```

4. Assign the administrator role to the z/OSMF administrator group, which is IZUADMIN by default:

```
PERMIT IZUDFLT.com.ibm.ws.management.security.resource.Administrator CLASS(EJBROLE)
ID(IZUADMIN) ACCESS(READ)
```

For more information about the Cloud Provisioning REST services, see *IBM z/OS Management Facility Programming Guide*.

### Resource authorizations for the Cloud Provisioning user roles

Table 9 on page 34 describes the authorization requirements for the common user roles in Cloud Provisioning. The IZUPRSEC job includes sample RACF commands for creating these authorizations on your system. A procedure for creating these authorizations manually is shown in "Steps for setting up security" on page 10.

*Table 9. Security setup requirements for Cloud Provisioning user roles*

| Resource class | Resource name | Who needs access? | Type of access required | Why |
|---|---|---|---|---|
| **DATASET** | *your_stack_include_dataset* | TCP/IP stack started task ID. | READ | Allows the TCP/IP stack to read the include data set when the TCP/IP stack is started. This definition is applicable only when your installation uses discrete or generic profiles to protect data set access. |
| **DATASET** | *your_stack_dynamic_update_dataset* | TCP/IP stack started task ID. | READ | Allows the TCP/IP stack to read the VARY OBEY data set that IBM Cloud Provisioning and Management uses to dynamically update the TCP/IP stack. This definition is applicable only when your installation uses discrete or generic profiles to protect data set access. |
| **EJBROLE** | *<SAF-prefix>* .IzuManagementFacilityProvisioning . izuUsers | • z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to connect to the Software Services and Resource Management tasks. |
| **EJBROLE** | *<SAF-prefix>* .com.ibm.ws.management. security.resource.Administrator | • z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to act as administrator for the Swagger function in z/OSMF. |
| **EJBROLE** | *<SAF-prefix>* .com.ibm.ws.management. security.resource.allAuthenticatedUsers | z/OSMF administrators group (IZUADMIN) | READ | Allow the user to use Swagger to display information about the z/OSMF REST APIs.<br>For information about the REST services, see *IBM z/OS Management Facility Programming Guide*. . |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.IBM_ CLOUDPORTAL.MARKETPLACE. CONSUMER | Consumers and domain administrators | READ | Allow the user to use the marketplace to provision and manage software services. |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.IBM_ CLOUDPORTAL. MARKETPLACE. ADMIN | Domain administrators | READ | Allow the user to control which services are published to the marketplace, and manage the services to which consumers have subscribed. |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.PROVISIONING. RESOURCE_MANAGEMENT | • Provisioning administrator group<br>• Domain group<br>• Resource pool network administrator group<br>• Resource pool WLM administration group<br>• z/OSMF security administrators group (IZUSECAD) | READ | Allow the user to access the Resource Management task. |

*Table 9. Security setup requirements for Cloud Provisioning user roles (continued)*

| Resource class | Resource name | Who needs access? | Type of access required | Why |
|---|---|---|---|---|
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.PROVISIONING. SOFTWARE_SERVICES | • Provisioning administrator group<br>• Domain group<br>• Tenant group<br>• Resource pool network administrator group<br>• Resource pool WLM administration group<br>• z/OSMF security administrators group (IZUSECAD)<br>• Consumers and domain administrators | READ | Allow the user to access the Software Services task. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.VARIABLES. SYSTEM.ADMIN | z/OSMF administrators group (IZUADMIN) | READ | Allow the user to access the system variable definitions. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.WORKFLOW. EDITOR | • Provisioning administrator group<br>• Domain group<br>• Tenant group<br>• z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to access the Workflow Editor task in z/OSMF. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF.WORKFLOW. WORKFLOWS | • Provisioning administrator group<br>• Domain group<br>• Tenant group<br>• z/OSMF users group (IZUUSER)<br>• z/OSMF administrators group (IZUADMIN) | READ | Allow the user to access the Workflows task in z/OSMF. |
| **ZMFAPLA** | <*SAF-prefix*>.ZOSMF. WORKLOAD_MANAGEMENT. WORKLOAD_MANAGEMENT.ENWRP | • z/OSMF administrators group (IZUADMIN)<br>• WLM resource pool administration group | READ | Allow the user to access the WLM Resource Pooling (WRP) functions of z/OSMF. Using a WRP definition, the user can associate cloud information (tenant name, domain ID, template type, service levels supported) with WLM elements (report classes and classification rules). |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF.PROVISIONING. RESOURCE_MANAGEMENT. *tenantGroupID* | Tenant group | READ | Allow the user to act as a tenant. |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF.PROVISIONING. RESOURCE_MANAGEMENT. *domainGroupID* | Domain group | READ | Allow the user to act as a domain administrator. |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF. RESOURCE_POOL.NETWORK. *domainGroupID* | Resource pool network administration group | READ | Allow the user to act as a network resource pool administrator. |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF. RESOURCE_POOL.WLM.*domainGroupID* | Resource pool WLM administration group | READ | Allow the user to act as a WLM resource pool administrator. |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF.SECURITY.ADMIN | z/OSMF security administrators group (IZUSECAD) | READ | Allow the user to access the security administration resource. |

| Table 9. Security setup requirements for Cloud Provisioning user roles (continued) | | | | |
|---|---|---|---|---|
| **Resource class** | **Resource name** | **Who needs access?** | **Type of access required** | **Why** |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.TEMPLATE.APPROVERS.*domainGroupID* | Template approvers | READ | Allow the user to act as a cloud domain level template approver. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.TEMPLATE.APPROVERS.*domainGroupID*. *templateName* | Template approvers | READ | Allow the user to approve the specified template. |
| **ZMFCLOUD** | *<SAF-prefix>*.ZOSMF.TEMPLATE.INSTANCE.*domainGroupID*. *templateInstanceName* | Template instance owner | READ | Allow the user to access the specified template registry instance. |

## Resource authorizations for the z/OSMF server user ID

Table 10 on page 36 describes the Cloud authorizations that you must create for the z/OSMF server. By default, the server user ID is IZUSVR1. However, your installation might have selected a different user ID for the server during z/OSMF configuration. The IZUPRSEC job includes sample RACF commands for creating these authorizations on your system.

| Table 10. Authorizations required for the z/OSMF server user ID | | | |
|---|---|---|---|
| **Resource class** | **Resource name** | **Type of access required** | **Why** |
| **DATASET** | *your_stack_include_dataset* | ALTER | Allows the Network Configuration Assistant task to write to the configured include data sets when a network resource is provisioned or deprovisioned. There is one include data set for each stack that is defined for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses discrete or generic profiles to protect data set access. |
| **DATASET** | *your_stack_dynamic_update_dataset* | ALTER | Allows the Network Configuration Assistant task to write to the configured dynamic updates data sets when a network resource is provisioned or deprovisioned. There can be one dynamic update data set for each stack that is defined for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses a discrete or generic profile to protect data set access. |
| **OPERCMDS** | MVS.VARY.TCPIP.OBEYFILE | CONTROL | Allows the Network Configuration Assistant task to issue the **VARY TCPIP OBEYFILE** command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **VARY TCPIP OBEYFILE** command. |
| **OPERCMDS** | MVS.MCSOPER.ZCDPLM* | READ | Allows the Network Configuration Assistant task to issue various operator commands for IBM Cloud Provisioning and Management for z/OS. The console name for this extended MCS console is the text string ZCDPLM that is appended with the MVS sysclone value of the system of the z/OSMF instance. |

*Table 10. Authorizations required for the z/OSMF server user ID (continued)*

| Resource class | Resource name | Type of access required | Why |
|---|---|---|---|
| **OPERCMDS** | MVS.DISPLAY.JOB | READ | Allows the Network Configuration Assistant task to issue the display A operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **DISPLAY A** operator command. |
| **OPERCMDS** | MVS.DISPLAY.TCPIP | READ | Allows the Network Configuration Assistant task to issue the display TCPIP operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **DISPLAY TCPIP** operator command. |
| **OPERCMDS** | MVS.DISPLAY.XCF | READ | Allows the Network Configuration Assistant task to issue the **DISPLAY XCF** operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only when your installation uses the OPERCMDS class to restrict access to the **DISPLAY XCF** operator command. |
| **OPERCMDS** | MVS.ROUTE.CMD.*sysname* | READ | Allows the Network Configuration Assistant task to issue the **ROUTE** operator command for IBM Cloud Provisioning and Management for z/OS. This definition is applicable only if the installation uses this profile to restrict the use of the **ROUTE** command. |
| **SERVAUTH** | EZB.NETWORKUTILS.CLOUD.*mvsname* | READ | Allows the Network Configuration Assistant task to issue operator commands for IBM Cloud Provisioning and Management for z/OS. *mvsname* is the name of the system where z/OSMF is running. |
| **SERVAUTH** | EZB.NETSTAT.*mvsname.tcpprocname*.CONFIG | READ | Allows the Network Configuration Assistant task to issue the command **NETSTAT CONFIG**. This definition is applicable only when your installation uses the SERVAUTH class to restrict usage of the **NETSTAT** command. When this definition is applicable, IZUSVR must be authorized for each stack defined for IBM Cloud Provisioning and Management for z/OS. |
| **SERVAUTH** | EZB.NETSTAT.*mvsname.tcpprocname*.VIPADCFG | READ | Allows the Network Configuration Assistant task to issue the command **NETSTAT VIPADCFG**. This definition is applicable only when your installation uses the SERVAUTH class to restrict usage of the **NETSTAT** command. When this definition is applicable, IZUSVR must be authorized for each stack that is defined for IBM Cloud Provisioning and Management for z/OS. |
| **SERVER** | BBG.SECCLASS.ZMFCLOUD | READ | Allows the z/OSMF server to perform access checks in the ZMFCLOUD class. |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF. RESOURCE_POOL.NETWORK. *domainGroupID* | READ | Allows the z/OSMF server to access to the network administrator profile. |
| **ZMFCLOUD** | <*SAF-prefix*>.ZOSMF. RESOURCE_POOL.WLM.*domainGroupID* | READ | Allows the z/OSMF server to access the WLM administrator profile. |

# Chapter 3. Provisioning a z/OS software instance

IBM Cloud Provisioning and Management includes a set of templates that you can use to provision and deprovision z/OS systems. By selecting a z/OS provisioning template from the Cloud Provisioning software services catalog, you can provision a new instance of z/OS in a monoplex configuration in less than one hour.

The steps for provisioning a z/OS system are similar to the steps that you follow for provisioning other types of software instances. A key difference is that the z/OS system must be associated with a new type of dedicated resource pool that is called an *LPAR resource pool*.

During the provisioning process, an available LPAR entry is obtained from the LPAR resource pool automatically. The provisioning process uses properties that are associated with the selected LPAR entry, such as volume names, unit addresses, TCP/IP addresses, and OSA definitions to create and configure a new z/OS instance. Later, when you no longer require the instance, you can deprovision the instance. If so, the LPAR entry is returned to the pool, so that it can be reused when a new z/OS system is provisioned.

An LPAR resource pool can contain one or more LPAR entries. LPAR entries can be from the same CPC or a different CPC. If you have more than one LPAR resource pool, do not use duplicate LPAR entries.

### Planning and setup

The z/OS system that you use to provision z/OS templates is known as the *provisioning system*. Some planning and setup is required to enable the provisioning system to drive the provisioning of z/OS templates. This work involves some host system customization and modification of the provisioning template's properties file, as described in the topic that follows.

You must plan for which logical partition (LPAR) to use for hosting the new z/OS image. You can use the Hardware Management Console (HMC) to locate an available LPAR, or use the HMC to create a new LPAR in your enterprise. If you use an existing LPAR, verify that the LPAR is not needed for any other systems at your installation.

This work might require the involvement of your system programmer, systems engineer, and network administrator.

## Steps for provisioning a z/OS software instance

This topic describes the steps for provisioning a z/OS software instance.

### Before you begin

This procedure assumes that you have a z/OS system available to use for provisioning the z/OS instance, with at least a default domain configured. If you prefer, you can use another domain for provisioning the z/OS instance.

This procedure refers to the following systems:

**Provisioning system**
An existing z/OS system that is used to provision (create) the new z/OS system. Also referred to as the *driving system*.

**Source system**
An existing z/OS system that is used for copying source libraries to the provisioned system. The source system must be identified in z/OSMF as a software instance.

**Provisioned system**
The new z/OS system that is created when the z/OS provisioning template is run successfully. Also referred to as the *target system*.

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## About this task

Use this procedure to provision a z/OS software instance in your environment.

## Procedure

1. **Define the source z/OS system as a z/OSMF software instance.**
   a) From the z/OSMF desktop, select the Software Management task.
   b) In Software Management, select **Software Instances**.
   c) Select **Actions** > **Add** and follow the screen prompts for your z/OS system. For more information, see the online help for the Software Management task.
   d) Verify the z/OS product for your environment:
      - View the software instance: **Actions** > **View** > **Products, Features, FMIDs**. Verify that the z/OS release is `2.5` or `2.4`
      - View the data sets and z/OS UNIX files: **Actions** > **View** > **Data sets**.

        Notice that you can sort on the Volume column.

        Determine the number of DASD volumes used for the z/OS software instance. Be sure to check the z/OS UNIX data sets, too.
      - Work with your storage administrator to identify the type of DASD volumes that are associated with source z/OS software instance, such as Mod-9, Mod-18, or Mod-27. You will use the largest capacity of these volumes for the system residence (SYSRES) volume for the provisioned z/OS system (the target system). For example, if largest capacity SYSRES volume for the source z/OS software instance is Mod-18, all DASD volumes for the target system SYSRES must be Mod-18.

        Make note of the following details:

        Number of volumes used for z/OS
        Largest capacity device type in use.

        Later in this procedure, you will use this information when you define the LPAR pool entry for the target system.
2. **Identify a logical partition (LPAR) to be used for provisioning the z/OS software instance.**
   a) In the Hardware Management Console (HMC), locate a logical partition (LPAR) to be used for provisioning a z/OS instance. Or, define a new LPAR for this purpose.

      **Note:** Consider the potential performance implications of sharing CPU resources between existing systems and the newly provisioned system. Though this consideration applies whenever you share CPU resources between systems, be aware that Cloud Provisioning makes it easier and faster to create z/OS systems. To ensure that production workloads are insulated from competition for CPU resources, work with your systems engineer to ensure that production LPAR weights are defined properly.
   b) In the **Sys Admin** page, make note of the LPAR characteristics, such as the number of I/O devices and IP addresses. Later in this procedure, you will specify the same number of devices for the system residence volume that you use for the z/OS software instance.
3. **Ensure that Base Control Program internal interface (BCPii) is configured and active on the provisioning system (the driving system).**

   When you create a z/OS image, the provisioning system uses BCPii services to connect to system resources, such as the Support Element (SE) and the central processing complex (CPC). Therefore, the BCPii address space must be configured and active on the provisioning system.

   To determine whether BCPii is active, enter the following command from the system console:

   ```
   d a,hwibcpii
   ```

The BCPii address space (HWIBCPII) starts automatically during system IPL. If it is not active, you can start the address space manually by entering the START HWISTART command at the system console.

If the BCPii address space is unable to start, look for HWI* messages in the system log that indicate that BCPii failed to become active. Usually, the failures are caused by improper security configuration in the SE for BCPii communication with the local SE and the provisioning system. For more information, see the topic "BCPii address space does not start up at IPL" in *MVS Programming: Callable Services for High-Level Languages*.

If the provisioning system is not enabled for BCPii, you must configure the local Support Element (SE) to support BCPii and configure the BCPii address space. For the detailed steps, see the topic "BCPii setup and installation" in *MVS Programming: Callable Services for High-Level Languages*.

4. **Ensure that System REXX is configured and active on the provisioning system.**

   For more information, see Ensuring that System REXX is set up and active in *IBM z/OS Management Facility Configuration Guide*.

5. **Obtain the provisioning properties file.**

   On the provisioning system, copy the `zosProvision.properties` file from the directory `/usr/lpp/zosmf/samples/cpm-sample-zos` to a user directory.

   If you need to modify the provisioning workflow, you can copy the contents of the `/usr/lpp/zosmf/samples/cpm-sample-zos` directory to a user directory.

   Future IBM service updates can include changes to the properties file. It is recommended that you use the most current version.

6. **Modify the `zosProvision.properties` file with values for your environment.**

   For descriptions of the properties, refer to the properties file.

   You can choose to provision the z/OS instance with a new RACF database with the base RACF definitions that are required for IPL and z/OSMF. The workflow variable `source_racf_db` is optional. By leaving this field empty, the provisioning process creates a new RACF database. Creating the new RACF database adds about 5 minutes to the provisioning time.

7. **Create the z/OS provisioning template from the samples directory.**

   a) In z/OS Cloud Provisioning, click **Software Services**.

   b) Select the **Templates** tab of Software Services to work with software services templates.

   c) Modify the template property file with values that are appropriate for your environment.

   d) Add the template by selecting **Actions** > **Add Template** > **Standard**.

   e) Specify the template name.

      Rather than specifying each of the files individually, you can specify just the manifest file: `/usr/lpp/zosmf/samples/cpm-sample-zos/zos_provision.mf`. Then click **Load**.

   f) Modify the location of the properties file where you saved the updated properties file.

      If you modified the workflow files or actions file, specify the location of the updated files.

   g) Click **OK** to create the template.

8. **Associate the template with a tenant and create the LPAR resource pool.**

   The LPAR resource pool is required for the z/OS provisioning. It can be created in either a dedicated or shared resource pool.

   a) For the template you created, click **Actions** > **Associate Tenant** and select an existing tenant.

      If you need to create a new tenant, use the Resource Management task to create a tenant in the domain in which the z/OS provisioning template is created. After a new tenant is created, you can perform **Actions** > **Associate Tenant**.

   b) Select the option to either create a dedicated resource pool, use an existing tenant-shared resource pool, or use an existing domain-shared resource pool.

   c) Click **OK** to associate the template with the tenant.

d) If you chose to create a dedicated resource pool, the resource management task will open with the **Add Template and Resource Pool** displayed. If you chose to use an existing tenant-shared resource pool or use an existing domain-shared resource pool, the template will be added to the shared pool, but you will need to open the Resource Management task and modify the shared resource pool that you selected.

- To modify a tenant-shared resource pool, from the Resource Management task select the **Modify** action for the domain, select the **Modify** action for the tenant, and then select the **Modify** action for the shared resource pool.
- To modify a domain-shared resource pool, from the Resource Management task select the **Modify** action for the domain, and then select the **Modify** action for the shared resource pool.

e) In the dialog **Add Template and Resource Pool** or the dialog **Modify Template and Resource Pool**, complete the fields in the **Instance Details** tab with appropriate values.

f) In the **Resource Pools** tab, click **Actions** > **Add Entry** to add the LPAR to the LPAR resource pool for the template. This LPAR is used to host the provisioned z/OS system.

g) In the dialog **Add LPAR Pool Entry**, complete each of the tabs to define the LPAR.

When you define the LPAR entry, ensure that the number of SYSRES volumes are equal or greater than number of SYSRES volumes identified in **Step 1**. Other operational volumes and network properties are set with the information you collected in **Step 2.**

h) When you have completed the input fields, click **Complete**.

i) You can define multiple LPARs for the LPAR resource pool. If you want to identify more LPARs for hosting provisioned z/OS systems, repeat steps **f** through **g**.

Note the following rules:

- LPARs can be in same CPC or a different CPC.
- The same LPAR/CPC cannot be specified in more than one LPAR resource pool.

j) Click **OK** to associate the template with the tenant and create the LPAR resource pool.

9. If the template is in *Pending Approvals* state, you can approve it by clicking **Actions** > **Approvals**.
10. **Test-run the template.**

To test run a template before publishing it, use the **Test Run** action that is provided in the Templates table.

If you choose to provision the z/OS instance with a new RACF database, you are required to add the values for `racf_user` and `racf_password`.

a) Select the checkbox to Create a new RACF database.

b) Enter a value for the user ID for the new RACF database. This user ID is the only active user ID in the new RACF database and is used to log in into the provisioned system.

c) Enter a value for the password for the user ID. Be sure to save this value in a safe space, as it cannot be recovered or reset when the system IPLs. At initial login, this password expires and prompts you to create a new one.

If the test run encounters a problem and provisioning fails, examine the workflow and resolve the issue that is associated with the failed step. It is advised to perform a complete deprovision after a failure.

11. **Publish the template.**

Publish makes a template available to consumers and prepares it for the **Run** action. It locks the template, allowing only limited modification, and puts it in the published state.

12. **Run the template.**

To run a template, use the **Run** action that is provided in the templates table. This action creates an instance. Repeat this step every time you want to provision a new instance of z/OS.

### What to do next

To verify that the z/OS software instance is provisioned, try to log in to the system. You can, for example, use ssh or TN3270 to connect to the provisioned system host name, or open a web browser to z/OSMF to the provisioned system host name.

To determine the host name for the newly provisioned system, do the following:

1. In the Software Services task, select **Actions** > **View Instances**.
2. In the Private Variables tab, you can obtain the host name from the variable `fq_hostname`.

If you want to reIPL the provisioned z/OS system, do the following:

1. Select the **Instances** tab.
2. In the instances table, select the z/OS instance.
3. Click **Perform**, then select the action **Shutdown**.
4. Click **OK**.
5. In the instances table, select the z/OS instance.
6. Click **Perform**, then select the action **IPL**.
7. Click **OK**.

When you no longer need the z/OS software instance, you can deprovision it: **Actions** > **Perform** > **Deprovision**. The **Deprovision** action quiesces the partition, removes the operational data sets, deletes the master catalog, and initializes the volumes. The LPAR pool entry is returned back to the LPAR pool so that a new z/OS can be provisioned on that LPAR.

## Keep your z/OS provisioning templates up to date

IBM periodically makes updates to the z/OS provisioning templates through service PTFs. It is recommended that you obtain these updates when they become available so that you can leverage them in your environment. For example, IBM might add properties to the properties file, zOSProvision.properties, for a more complete z/OS configuration.

For the simplest approach to obtaining service updates, it is recommended that you make a practice of accessing the templates directly from the z/OSMF sample directory (`cpm-sample-zos`) whenever you create a provisioning template. Otherwise, if you choose to use customized versions of templates, you have a few more steps to perform to keep your templates up to date. Review the following scenarios and follow the one that matches your situation.

### Scenario 1: You use the z/OS provisioning template directly from z/OSMF sample directory without modifications

This scenario is the easiest. If you are creating a new z/OS Provisioning template, simply create the z/OS Provisioning template by using the template manifest that is provided in z/OSMF samples directory (`cpm-sample-zos/zos-provision.mf`). As supplied by IBM, the updated template already references the new or changed properties in `zosProvision.properties`.

If you have already created a z/OS provisioning template but have not yet published it, refresh the template after applying updates to properties file, or modify the template to reference a new updated properties file. Select the template and perform **Refresh Template...** to import the template changes.

If your template is in “Published” state, it cannot be refreshed or modified. Select the template and choose **Create** > **New Version...** to create a new version of the published template.

Because the template references the z/OS provisioning template directly from z/OSMF sample directory, the new version picks up the workflow changes provided with the update. You need to provide a modified properties file that includes any new or updated properties that are provided with the update.

After you review and test the template, you can publish it.

### Scenario 2: You use a copy of the z/OS provisioning template from your own directory, but you have not modified it

If your copy of the z/OS provisioning template is unchanged from the IBM-supplied template, it is recommended that you switch to using the template directly from the z/OSMF sample directory.

Then, do the following:

- If your current template is in draft state, select the template and perform **“Refresh Template...”** to pull in the template changes. Add the updated properties to your user directory, so that it replaces the previous version of the properties file.
- If your current template is in published state, create a new version of template that uses the z/OS provisioning workflow from z/OSMF samples directory and the updated properties file from your user directory. Select the template and choose **“Create”** then **“New Version...”** to create a new version of the published template. After you review and test the new template, you can publish it again.

### Scenario 3: You use a modified copy of the z/OS provisioning template from your own directory

Besides updating the properties file, you must also apply your changes to your copy of the z/OS provisioning workflow, based on the new files from the PTF. Make a copy of z/OS provisioning workflow from z/OSMF sample directory and modify the copy as you require. Depending on whether the template is in "Draft" state or "Published" state, follow either of the preceding scenarios to update the provisioning template with the latest changes to the workflow file and properties file.

# Chapter 4. Example scenario: CICS SMSS

The following scenario shows an example of using IBM Cloud Provisioning and Management for z/OS to prepare and test a software services template that provisions a CICS System Management Single Server (SMSS) instance.

The steps in this scenario are typically performed by a domain administrator, who is a middleware system programmer. The approver, who completes the step to approve the software services template, might be a security administrator.

With the zTrial Program, you can work through this scenario on a z/OS system, at no cost, and with no installation required. The values shown in these instructions are specific to the zTrial program, and are included here for illustration purposes only. For more information about zTrial, see IBM Z Trial Program (www.ibm.com/systems/z/trials.html).

## Overview

Use IBM Cloud Provisioning and Management for z/OS to prepare and test a software services template that provisions a CICS System Management Single Server (SMSS) instance.

CICS SMSS is a CICS region with the CICS management client interface (CMCI) enabled within it. CMCI is a system management application programming interface, for use by HTTP client applications, including IBM CICS Explorer.

This scenario begins after the template files have been obtained from the software provider, including documentation provided by the software provider that describes things that might need to be modified, such as input variables, JCL, and approvers.

The steps in this scenario are:

- Create the software services template.
- Evaluate the workflow that is used to provision the CICS SMSS instance.
- Connect the template to resources.
- Test run the template to provision the CICS SMSS instance.
- Verify the CICS SMSS instance.
- Deprovision and remove the CICS SMSS instance to free resources.
- Publish the software services template to make it available to consumers.

## Create the software services template

Create a software services template that can be used to provision a CICS SMSS instance.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then click **Software Services**.

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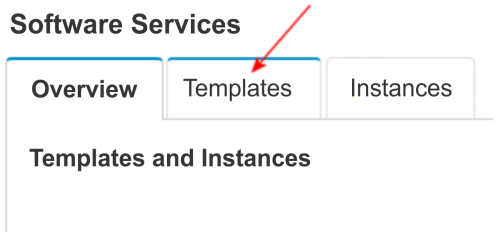
The Software Services page is displayed.

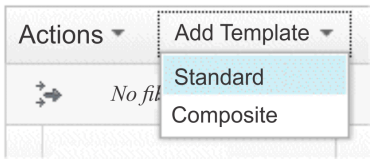
The Overview tab shows summary information in graphic form. The Templates tab shows templates, which consist of z/OMF workflows and associated actions and variables that can be used to provision middleware. The Instances tab shows instances, which represent middleware that has been provisioned using templates.

2. Click the **Templates** tab.



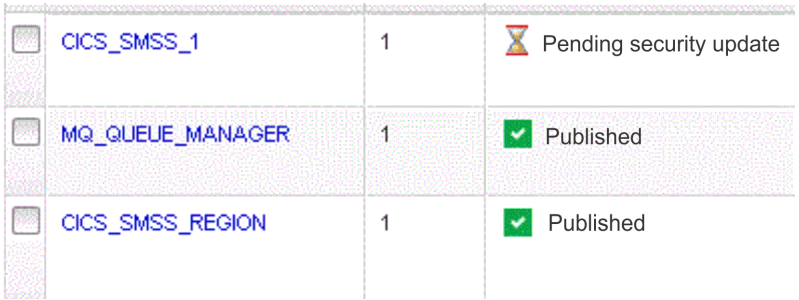

The Templates tab shows a table of software services templates. The template you add will appear in this table.

3. Click **Add Template**, at the top of the table, then select **Standard**.
This displays the Add Template page.




4. On the Add Template page, specify a template source file, which supplies values for many of the fields, as follows:
   a) In the Template Source File field, select or type the path for the template source file:`/u/ibmuser/CPM/cics/smss.mf`
   b) Click **Load**.
   Values are supplied for many of the fields.

5. Note that the target domain is set to default.
A domain defines the management scope for tenants, services, and resource pools.
6. In the Template Name field, type CICS_SMSS_1.
7. Click **OK**.
You are returned to the Software Service Templates page. A template named CICS_SMSS_1 is displayed in the table. As z/OSMF processes the request to create the template, the state of this template begins as Pending Security Update.




This may take several minutes.

8. Click **Refresh** below the table to update the table with the most recent values. The state changes to Draft Pending Approvals.

# Evaluate the workflow

You can use the Workflow Editor to review the z/OSMF workflow and its input variables.

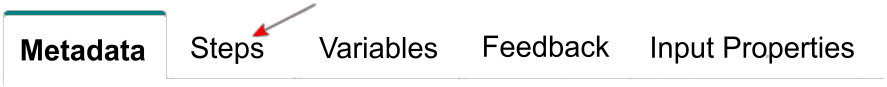
## About this task

To customize the provisioning for your installation, you might modify input variables that are used by the workflow. Typically, documentation provided by the software vendor describes the input variables that you need to review and potentially customize.

## Procedure

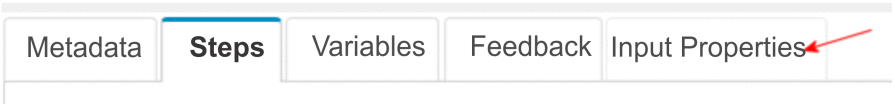
1. In the Templates table, use the Modify action for the template.
   a) Click the checkbox for the template named CICS_SMSS_1, to select that template.
   b) Click **Actions** to display a menu.
   c) Select **Modify**.
   The Modify page is displayed.

   A warning message indicates that updates to the definition files will reset approvals. You can click the X at the right side of the message to remove it.
2. On the Modify page, click **Edit** for the Workflow file field.
   This opens the workflow file in the Workflow Editor. The Workflow Editor lets you view and edit the workflow definition, without needing to know the syntax of workflow XML. It organizes information about the workflow on tabs. The Metadata tab contains metadata for the workflow.
3. In the Workflow Editor, click the **Steps** tab.

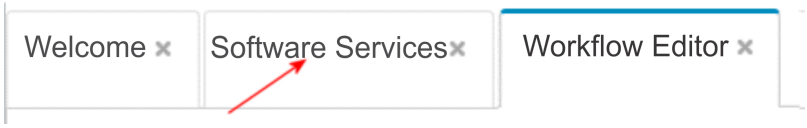



   This displays the steps of the workflow. A step is a logical unit of work. It describes a specific activity that the workflow performs.
4. Select any step by clicking the radio button next to it.

   A properties pane that appears to the right. It allows you to evaluate additional properties of the workflow. You can explore the properties by clicking the tabs.
5. Click the **Input Properties** tab.




   The Input Properties tab shows the input properties file, which supplies default values for input variables that are defined in the workflow definition file. It is a series of name and value pairs. You can change a value by typing over the existing value.
6. Click **Cancel** to close the Workflow Editor.
7. Click the Software Services tab.




8. To return to the Templates table, click **Cancel** at the bottom of the page.

Although it is not part of this example scenario, you might in some cases use an editor in z/OSMF to modify the actions definition file. You would do that as follows.

9. On the templates table, select the template, click **Actions**, then select **Modify Template**.

10. On the **Modify Template** window, click **Edit** for the Actions file field.
    Use the editor to make changes. Note that there is also an Edit button for the Workflow file field.

## Connect the template to resources

Before you use the template to provision a CICS SMSS instance, you must connect it to cloud provisioning resources using the Resource Management task.

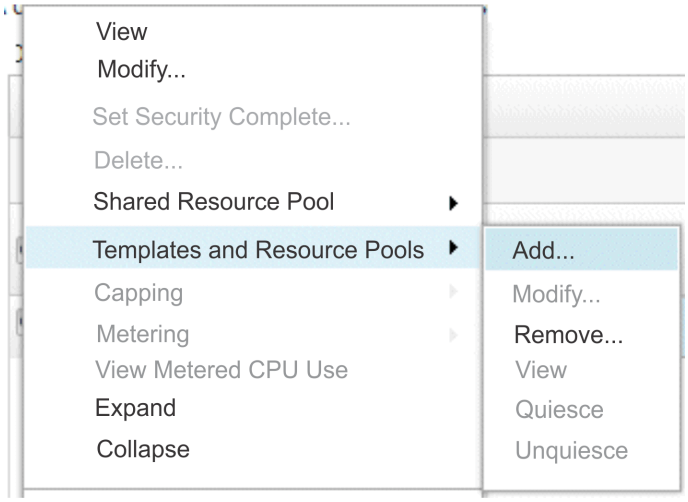
### About this task

You connect the software services template with resources that it requires by adding the template and *resource pools* to a *tenant*. Resource pools are pooled z/OS resources. Tenants consist of a user or group of users that have contracted for the use of specified services. Tenants are associated with *domains*, which are sets of systems.

### Procedure

1. In the navigation area, click **Resource Management**.

   The Resources page is displayed. A default domain is always available. You may recall selecting the default domain when you added the template. You need to connect the template to a tenant for the default domain.
2. Select the default domain (the domain that you specified when adding the template) and tenant.
   a) Click the checkbox for the default domain to select it.
   b) Scroll down the page to view the tenants that are associated with this domain.
   c) Click the checkbox for the default tenant to select it.
3. Associate the template to the tenant.
   a) In the tenants table, select the default tenant.
   b) Click **Actions** to display a menu.
   c) Select **Template and Resource Pools** and then select **Add**.
   The Add Template and Resource Pools for Tenant window is displayed.




4. On the Add Template and Resource Pool for Tenant page, specify the required values as follows:

   **Select template**
   Click the arrow to show the list, then select the template that you added: CICS_SMSS_1.

   **Software service instance name prefix**
   Use SNA APPLID

   **Maximum number of software services instances**
   1

5. Scroll the page to the bottom and click **OK**.
6. The network administrator is notified through the z/OSMF Notifications task, and an email if that is configured. The network administrator then completes the setup of the network resource pool.
   The role of the network administrator is explained in a pop-up window. Click **OK** to dismiss the pop-up window. This returns you to the Resources page.

## Create the network resource pool

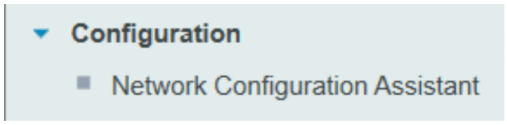
The network administrator completes the setup of the network resource pool that is required by the template.

### About this task

To complete the definition of the network resource pool, you use the Network Configuration Assistant task. The network resource pool for your CICS SMSS template will need ports and a SNA Application name, and it is here where that connection is made.

### Procedure

1. Expand the Configuration category, then select Network Configuration Assistant.




2. On the Welcome page, select **Manage z/OS Cloud configuration**, then click **Proceed**.
   The Work with a Cloud Domain page is displayed.

   On the Work with a Cloud Domain page, you can see that the default is selected as the cloud domain. Click **Proceed**.

   The Network Resource Pools tab is displayed. Note the network resource pool created in the Resource Management task, default.default.CICS_SMSS_1, and that the completion status is Incomplete.
3. Modify the network resource pool.

In this exercise, you will use previously defined port and ranges.

a) Select default.default.CICS_SMSS_1.

b) Click **Actions**, then select **Modify...**

4. On the Modify Network Resource Pool page, specify values as described below.

   a) Select the **Attributes** tab, then select **Is Complete** for Quiesced status.

   b) Click the **Port Allocation** tab, then select General_Port_Range in the table.

   c) Click the **SNA Application Name Range** tab, then select CICSAPPL in the table.

5. Scroll the page to the bottom, then click **Save**.
   The network resource pool completion status is now complete, and the network resources have been connected to the CICS_SMSS_1 template that you are in the process of creating. You will now resume the creation of the template in Software Services.

   The network resource pool is now defined, completing the connection of the template with cloud provisioning network resources. For a detailed tutorial, see “Defining network resource pools” on page 121.

## Approve the software services template

The state of the template that you are working with is Draft Pending Approvals. The approval must be completed by the appropriate approver before you can use the template to provision a CICS SMSS instance. You are filling the approver role today.

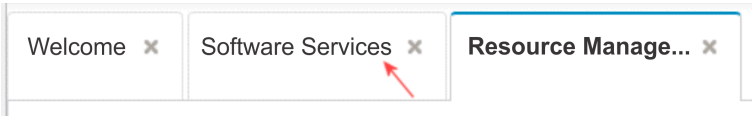
### About this task

Approval records are created for a template when a workflow or action definition file contains an element that identifies a user ID under which a workflow step or action is to be performed (a runAsUser ID). They can also be defined for the template in general, and for a domain.

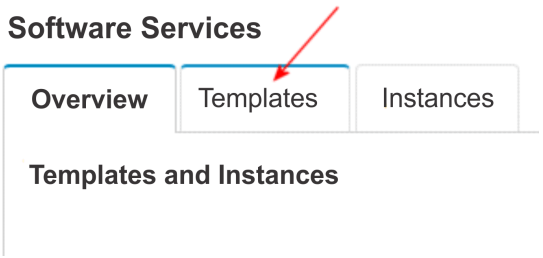
### Procedure

1. Return to the templates table.

   - If the Software Services tab is still open, click it.

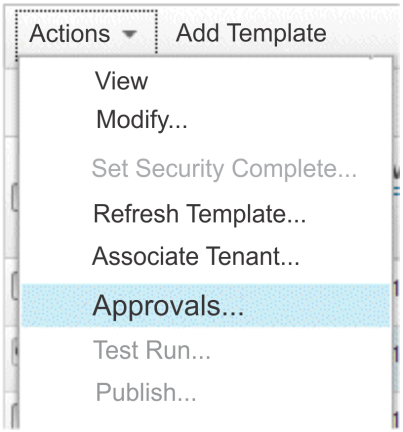
     Then click the Templates tab.




- Otherwise, in the navigation area, select **Software Services** in the Cloud Provisioning category, then click the Templates tab.

The state of the template is still Draft Pending Approvals.

2. In the software service templates table, click the checkbox for template CICS_SMSS_1, click **Actions** to display a menu, then select **Approvals**.




The Approvers table is displayed. The Approvals page shows the approvals that are required. You should see the domain approver user ID, ibmuser, in the first column of the table.

3. In the Approvers table, use the **Approve** action for the approval, as follows:
   a) Click the checkbox for the user ID, ibmuser, in the table.
   b) Click **Actions** to display a menu.
   c) Select **Approve**.
   A confirmation dialog is displayed. In this case, the approval is for the domain approver. In other cases, approvals might be required for individual workflow steps or for actions.
   d) Click **OK**.
   The approval is complete, and the status is updated to Approved.
4. Click the **Close** button at the bottom of the page to return to the Templates table.
   The state of the template is now Draft Approved. You are done with your job as an approver.

   Your template is ready to use!

## Test run the software services template

You test run the template to be sure that it successfully creates a software instance.

### About this task

Test run creates a workflow, starts the workflow, and creates a software services instance. It leaves the template open for further changes.

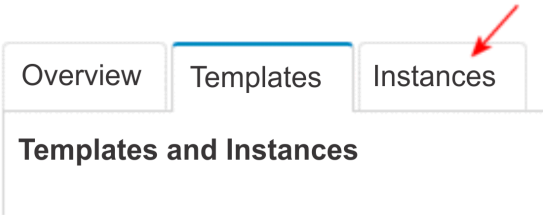
### Procedure

1. In the software service templates table, use the **Test Run** action for the template.
   a) Click the checkbox for the template CICS_SMSS_1 in the templates table.

b) Click **Actions** to display a menu.

c) Select **Test Run**.
The Test Run page is displayed.

2. On the Test Run page, verify that the Associated Tenant is set to default.
3. Click **OK** to perform a test run of the template.
This tells z/OSMF to provision the software, which creates a software services instance of the selected template. When the process is complete, a message indicates the name of the software services instance that was created. The name varies.
4. Click the **Instances** tab.




5. Scroll the page down to display the **Refresh** button. Click **Refresh** to update the table.
The state of the instance changes to Provisioned.

Your CICS SMS region is now active!

## Verify the software services instance

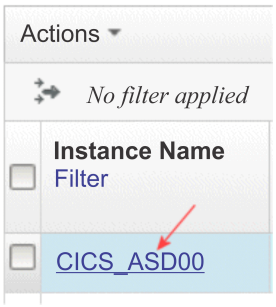
To verify the CICS SMSS instance, view its properties.

### About this task

The properties of a software services instance include its variables, as well as actions that can be performed against it. These properties can be reviewed using by viewing the instance.

### Procedure

1. In the software service instances table, click the name of the instance that you created, then on the View page, review the properties of the software services instance, including variables and actions.




The name of the instance is:

- For a standard template: *software-type_prefix-for-resource-poolnumber*, for example, Standard_M03.
- For a composite template: *prefix-for-resource-pool_prefix-for-resource-poolnumber*, for example, C_C03.

In the name, *prefix-for-resource-pool* is the value that is specified for software service instance name prefix field on the **Add Template and Resource Pool** page or the **Create Shared Resource Pool** page, and *number* is assigned by z/OSMF.

To identify an instance that you created, you might use the information in the Created On and Created By columns, in addition to the name.

2. Click **Close** to return to the instances table.

# Deprovision the software services instance

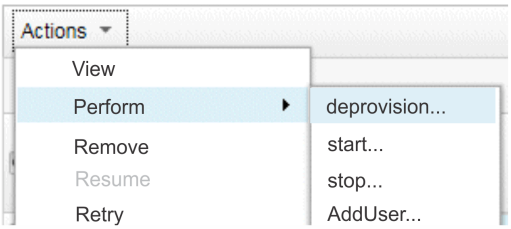
Deprovision the test instance to free up resources.

## About this task

Remember, this instance was the result of your test run, which you did to ensure that the template worked correctly. So, you do not need to keep the provisioned instance around. The ultimate goal is to make the template available for consumers to use, to provision software that they require. Deprovisioning the instance also means that it no longer counts toward the limit defined for your CICS SMSS service in Resource Management.

## Procedure

1. In the software service instances table, select the **deprovision** action for the instance.
   a) Click the checkbox for the instance in the instances table.
   b) Click **Actions** to display a menu.
   c) Select **Perform**, then **deprovision**.
   The actions that are available with **Perform** are defined in the actions definition file that is associated with the template. These typically include deprovision.
   d) On the Perform deprovision page, click **OK** to deprovision the instance.




2. Click **Close**.
   This returns you to the Software Services Instances page. The current status of the software service instance is deprovision-in-Progress. It will take approximately 5 minutes for the state to change to provisioned.
3. On the Software Services Instances page, click **Refresh** until the status of the instance changes to Deprovisioned.

# Remove the software services instance

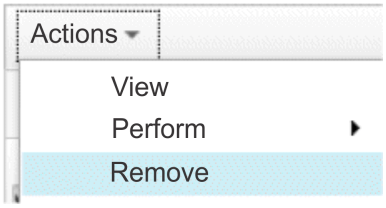
Remove the test instance to complete your clean-up.

## About this task

You have the option of now removing your CICS SMSS subscription as it is now deprovisioned.

## Procedure

1. In the software service instances table, select the **Remove** action for the instance.
   a) Click the checkbox for the instance in the instances table.
   b) Click **Actions** to display a menu.
   c) Select **Remove**.
   This displays a confirmation dialog.




2. On the confirmation dialog, click **OK**.

# Publish the software services tempate

Publish the template. This prepares the template for making it available to consumers in a marketplace.

## About this task

Publishing the template allows your consumers, application developers and function testers as examples, to now have access to your template. This also allows the template to be added to the marketplace available with Cloud Provisioning and Management.

## Procedure

1. Click the **Templates** tab.
2. In the templates table, select the **Publish** action for the template.
   a) Click the checkbox for the template, CICS_SMSS_1, in the templates table.
   b) Click **Actions** to display a menu.
   c) Select **Publish**.
   The state changes to Published. This means that the template is available to consumers. The template is also locked. No further changes can be made.

## Results

You are done with this scenario!

Now that you have published the template, it is ready to be made available in a marketplace.

# Chapter 5. Managing domains, tenants, and resource pools

Use the Resource Management task in the Cloud Provisioning category of z/OSMF to define the cloud domain and the administrators for the domain. You also define the tenants (classes of users), and associate software services templates with tenants. When associating a template with a tenant, you can request that resource pools be defined. Resource pools identify z/OS resources that are required by the software service.

To get started with the Resource Management task, expand the Cloud Provisioning category in the navigation area, then select Resource Management.

### Default domain

A default domain is provided, which has a default tenant. This allows you to quickly get started with Cloud Provisioning.

The default domain is fully operational without any configuration, and is accessible to any z/OSMF administrator (that is, a user with a user ID that is connected to the security group IZUADMIN). A default tenant, which includes all users in security group IZUUSER, is associated with the default domain. Both the default domain and tenant are named `default`.

## Resource management tasks – domains and tenants

This topic describes the things that you can do with the Resource Management task to manage domains and tenants.

The help for the Resource Management task provides context-sensitive information about using the task.

## Create a domain

To create a domain, use the **Create Domain** action provided in the Domains table.

### Before you begin

You must be a provisioning administrator. To make multiple systems available as targets for provisioning, ensure that those systems are included in the group of systems named IYUCLOUD in the **Systems** task of the **z/OSMF Settings** category.

A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the primary z/OSMF system. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.

Observe the following rules for a multiple sysplex environment:

- Multiple sysplex domains, tenants, templates, and resource pools can be created and modified only from the primary sysplex. These objects should be removed from a secondary sysplex only in the event of an error, if they cannot be removed from the primary sysplex. Only the domain administrator can perform these actions.
- The primary sysplex and the secondary sysplexes must use the same cloud security mode: automatic or manual. A mix of automatic and manual cloud security modes between the primary and secondary sysplex is not supported.
- User IDs and group IDs that are used within the domain must exist in both the primary and the secondary sysplex. If the sysplexes have separate security databases, the user and group IDs must be defined in each security database. For example, consider consumer user IDs.

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- Each sysplex has its own default domain. A primary sysplex cannot manage the default domain in a secondary sysplex.
- Lower-level network resources to be used in the secondary sysplex must be configured by using the z/OSMF Network Configuration Assistant task in the secondary sysplex, not the primary sysplex.
- A multiple sysplex domain in a secondary sysplex includes only the z/OS systems in its local sysplex.
- The z/OSMF system settings in the primary sysplex must contain system definitions for all of the systems in the multiple sysplex domain. The z/OSMF system settings in the secondary sysplex must contain the system definitions for the systems in the secondary sysplex. The system definition for a system in the z/OSMF system settings in the secondary sysplex must match the system definition for a system in the z/OSMF system settings in the primary sysplex. That is, the system nicknames, systems, and sysplex names must be identical in the primary sysplex and the secondary sysplex.
- No more than one primary sysplex can be used to manage other secondary sysplexes.

### About this task

The provisioning administrator is a z/OS System Programmer who has z/OSMF administration access. A domain defines a system or set of systems in the sysplex.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed in the desktop, select it from the App Center in the taskbar.
2. In the Domains table, click **Actions**, then select **Create Domain**.
3. On the **Create Domain** window, supply values. Asterisks (*) preceding labels for tabs or fields are used to indicate fields that are required. See “Values on the Create Domain window ” on page 56.
4. Click **OK** to create the domain.

## Values on the Create Domain window

### Domain Details

**Domain name**
Name of the domain. It can be up to 32 characters, which can include alphanumeric characters and these special characters:

@
$
_ (not valid for the first or last character)
- (not valid for the first or last character)

**Description**
Description of the domain.

**Enable history logging**
Indicates whether history logging is enabled for the domain (true or false). If so, z/OSMF maintains a history log of the actions that are performed on this domain. History logging is enabled by default.

If this option is deselected, z/OSMF retains the existing history log and adds an entry to indicate that logging is disabled. No additional actions are logged until history logging is enabled.

**Maximum number of history entries**
If history logging is enabled, this field indicates the maximum number of history log entries to be retained. Specify a value in the range of 10 - 200. By default, this value is set to 50.

If the maximum number is reached, z/OSMF trims the history log by 10 percent to allow for the addition of new entries. Here, z/OSMF removes the oldest entries from the history log.

If the maximum number is reduced from a larger value, and more than the maximum number of log entries exist, z/OSMF trims the history log down to the maximum value minus 10 percent. If the

reduction of the maximum number would result in the loss of existing entries, you are prompted to confirm this change.

**History archive directory path**
Specifies the directory path to store archived history entries. No default value is set.

If the archive directory path is specified, entries are removed from the history based on the maximum number of history entries and then archived. If no archive directory path is specified, then history entries are removed but not archived.

The user ID of the z/OSMF started task must have write permission to the archive directory path to create files to store the archived history entries. The default user ID of the z/OSMF started task is IZUSVR.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

## Administrators and Approvers

Administrators and approvers for the domain. These roles can be assigned to user IDs or SAF groups, or a combination of both.

- To add a user ID or SAF group, type the value in the appropriate field, then click **Add**.
- To remove a user ID or SAF group, click the user ID or group name in the list, then click **Remove**.

Administrators are specified in the following fields:

**Domain administrators**
User IDs of the domain administrators for the domain.

**Domain administrator groups**
SAF group names of the domain administrators for the domain.

**Network administrators**
User IDs of the network administrators for the domain. A network administrator must be specified if a network resource pool is to be created.

**Network administrator groups**
SAF group names for network administrators for the domain. A network administrator must be specified if a network resource pool is to be created.

**Workload administrators**
User IDs of the workload administrators for the domain. A workload administrator must be specified if a WLM resource pool is to be created.

To enable metering and capping for a tenant, you must specify a workload administrator for the associated domain.

**Workload administrator groups**
SAF group names for workload administrators for the domain. A workload administrator must be specified if a WLM resource pool is to be created.

To enable metering and capping for a tenant, you must specify a workload administrator for the associated domain.

Approvers are specified in the following fields:

**Approvers for templates**
User IDs of the approvers for templates for the domain. These approvers apply to all templates that are associated with the domain while the template is in any of the draft states.

**Approver groups**
SAF group names for template approvers for the domain. These approvers apply to all templates that are associated with the domain while the template is in any of the draft states.

## History

The **History** tab shows a history of the actions that were performed on the domain.

If history logging is not enabled for the domain, the table indicates that no data is available to display.

*Table 11. Columns in the History table*

| Column | Description |
|---|---|
| **Type** | Type of action that was taken on the domain, such as "modify." |
| **Ran by User** | User ID under which the action was performed. |
| **Ran at Time** | Time at which the action occurred. |
| **Details** | Description of the action. |

## Systems

**Available Systems**
**Systems for this domain**
Define the systems to include in the domain. The Available systems table shows the systems that are available to be included, in the form *sysplex-name.system-name*. LOCAL indicates the system that you are logged on to. The available systems are the group of systems named IYUCLOUD.

A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the primary z/OSMF system. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.

To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf).

If there are no systems to select, update the group of systems that are named IYUCLOUD with the **Systems** task of the **z/OSMF Settings** category. Then, on the **Create Domain** page, click **Refresh** to update the table of systems.

Use **Add** or **Remove** to build the set of systems for the domain.

## Shared Resource Pool

You can define a resource pool for the domain. If so, the resource pool is shared with the tenants in the domain. Here, the resource pool is referred to as a *domain-shared resource pool*. When you define a domain-shared resource pool, you can also select the templates to be associated with the resource pool.

From this tab, you can select actions to create and manage a domain-shared resource pool.

**Templates associated with the Shared Resource Pool for Domain**
A table shows the templates that are associated with the shared resource pool for this domain. See Table 12 on page 59.

Table 12 on page 59 shows the columns in the table.

*Table 12. Columns in the Templates associated with the Shared Resource Pool for Domain table.*

| Column | Description |
|---|---|
| **Resource Pool** | Name of the domain-shared resource pool. The resource pool name is in the form *domain-name*.*.*, where asterisks (*.*) are used to indicate that the resource pool is shared across the domain.<br><br>A quiesced resource pool is indicated by this image before the resource pool name: . |
| **Tenant.Template** | Names of the templates associated with the resource pool for the specified tenant. |
| **Instances Limit** | Maximum number of software services instances that are allowed to be created from the template. |
| **Instances Actual** | Actual number of software services instances created from the template. |
| **Sysplex.System** | Sysplex and system for provisioning. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

### Actions for the Shared Resource Pool tab

*Table 13. Targeted actions for the Templates associated with the Shared Resource Pool for Domain table.*

| Action | Description |
|---|---|
| **Add Template** | Display a window to add a template to the domain-shared resource pool. If this action is not available, it might be because no shared pool is defined. |
| **Remove Template** | Display a window to remove a template from the domain-shared resource pool. If this action is not available, it might be because no shared pool is defined. |

*Table 14. General actions for the Templates associated with the Shared Resource Pool for Domain table.*

| Action | Description |
|---|---|
| **Create Shared Pool** | Display the **Shared Resource Pool** window to add a shared resource pool to the domain. |
| **Delete Shared Pool** | Display a window to delete the domain-shared resource pool. There must not be any currently provisioned resources for the pool. You can use Quiesce to prevent new provisioning of the template. |
| **View Shared Pool** | View the properties of the domain-shared resource pool. |
| **Modify Shared Pool** | Display a window to modify the domain-shared resource pool. |

*Table 14. General actions for the Templates associated with the Shared Resource Pool for Domain table. (continued)*

| Action | Description |
|---|---|
| **Quiesce Shared Pool** | Quiesce the domain-shared resource pool. |
| **Unquiesce Shared Pool** | Unquiesce the domain-shared resource pool.<br>A quiesced resource pool is indicated by this image before the resource pool name: . |

*Table 15. Table actions for the Templates associated with the Shared Resource Pool for Domain table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Security

**Security definition**

Type of security definition:

**Automatic**

z/OSMF uses an XML descriptor file or a REXX exec to perform security setup dynamically.

**Manual**

Security setup must be performed manually. This mode is used when no value for a cloud security administrator is specified on the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member.

To see the relevant SAF resources, use the **View** action for the domain.

For more information, see Chapter 2, “Enabling the plug-ins and setting up security for IBM Cloud Provisioning for z/OS,” on page 9.

If you later decide to change the security mode for the domain, it is possible to do so, by editing the CLOUD_SEC_ADMIN statement in IZUPRMxx and restarting the z/OSMF server. Edit the IZUPRMxx parmlib member, as follows:

**For automatic security...**

On the CLOUD_SEC_ADMIN statement, specify the user ID of the security administrator who is to be notified of required security updates.

**For manual security...**
Ensure that no user ID is specified on the CLOUD_SEC_ADMIN statement.

You can switch a domain from automatic security to manual security, and vice versa. Your changes to the CLOUD_SEC_ADMIN statement affect the security mode of all existing domains. The suggested practice is that you run domains in automatic security mode.

It is possible to change the security mode of a domain after it is created. You can switch a domain from automatic security to manual security, and vice versa.

To make this change effective, the system programmer must restart the z/OSMF server. The new security mode is applied to all domains in your cloud provisioning environment.

**Security administrator**
The user ID of the security administrator, specified in parmlib, with option CLOUD_SEC_ADMIN.

For manual security, supply the user ID of the security administrator who is to be notified of required security updates. A group is not allowed.

The security administrator ID must be a member of the z/OSMF security administrator group (IZUSECAD, by default).

**Security workflow disposition**
Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

Select **Delete successful workflows on completion** to cause the workflow that is used for security to be deleted automatically after it completes successfully. The default is to delete successful workflows after they complete.

If you do not specify that the workflows should be deleted automatically, you can manually delete workflows from the workflows table in the Workflows task.

**Security jobs disposition**
Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

Select **Delete jobs on completion** to cause the jobs that are dynamically submitted for security to be deleted automatically after they complete. The default is to keep jobs after they complete.

If you do not specify that the jobs should be deleted automatically, you can manually delete the jobs.

**Specify customized security JCL JOB statement**
Select this to supply JOB statement JCL for jobs that manage security definitions for cloud resources such as domains and templates. These jobs are submitted dynamically when the cloud resources are created, modified, or deleted.

Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

**JOB statement JCL**
Supply JOB statement JCL to be used in jobs that manage security definitions for cloud resources such as domains and templates. z/OSMF creates and submits the jobs for you when cloud resources are created, modified, or deleted.

Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Account information can be a maximum of 143 characters, including commas, quotation marks, and parentheses. When a subparameter contains characters other than alphanumeric characters or #, $, @, it must be enclosed in apostrophes.

Separate subparameters with commas and enclose them in parentheses, for example (5438,GROUP6) or '5438,GROUOP6'. When enclosed in apostrophes, additional apostrophes must be added in pairs, for example, 'DEPT''58'.

Click **Restore Default** to discard any changes you have made and restore the default JCL.

The **SAF Resources** tab shows the SAF resources that are used to protect the domain and associated elements, such as resource pools and approvers. You can expand or collapse the sections for all resources, or for a single resource, to show or hide details.

**User access**
Access level that is required for the resources.

***resource-name* (*count*)**
Name of the SAF resource, followed by a count of the number of associated classes, if there is more than 1. Expand the resource to see details:

**Class**
Class the resource belongs to.

**User IDs**
User IDs that require access to the resource.

**Roles**
Roles for the user IDs.

**RACF Commands**
Expand this field to display sample RACF commands that grant access to the resource.

# Modify a domain

To modify a domain, use the **Modify** action that is provided in the Domains table.

## Before you begin

You must be a provisioning administrator to modify a domain.

## Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed in the desktop, select it from the App Center in the taskbar.
2. In the Domains table, click **Actions**, then select **Modify**.
3. On the **Modify** window, supply values. Asterisks (*) preceding labels for tabs or fields are used to indicate fields that are required. See “Values on the Modify window ” on page 62.
4. Click **OK** to create the domain.

## Values on the Modify window

### Domain Details

**Domain name**
Name of the domain. It can be up to 32 characters, which can include alphanumeric characters and these special characters:

@
$
_ (not valid for the first or last character)
- (not valid for the first or last character)

**Description**
Description of the domain.

**Enable history logging**
Indicates whether history logging is enabled for the domain (true or false). If so, z/OSMF maintains a history log of the actions that are performed on this domain. History logging is enabled by default.

If this option is deselected, z/OSMF retains the existing history log and adds an entry to indicate that logging is disabled. No additional actions are logged until history logging is enabled.

**Maximum number of history entries**
If history logging is enabled, this field indicates the maximum number of history log entries to be retained. Specify a value in the range of 10 - 200. By default, this value is set to 50.

If the maximum number is reached, z/OSMF trims the history log by 10 percent to allow for the addition of new entries. Here, z/OSMF removes the oldest entries from the history log.

If the maximum number is reduced from a larger value, and more than the maximum number of log entries exist, z/OSMF trims the history log down to the maximum value minus 10 percent. If the reduction of the maximum number would result in the loss of existing entries, you are prompted to confirm this change.

**History archive directory path**
Specifies the directory path to store archived history entries. No default value is set.

If the archive directory path is specified, entries are removed from the history based on the maximum number of history entries and then archived. If no archive directory path is specified, then history entries are removed but not archived.

The user ID of the z/OSMF started task must have write permission to the archive directory path to create files to store the archived history entries. The default user ID of the z/OSMF started task is IZUSVR.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

## Tenants

Tenants define the users who are able to run templates and create software services instances. The properties of the tenants for the selected domain are shown in a table. You can associate templates and resource pools to tenants. A resource pool is a high-level pool of shared z/OS resources within a cloud domain.

For details, see "Tenants tab" on page 69.

## Administrators and Approvers

Administrators and approvers for the domain. These roles can be assigned to user IDs or SAF groups, or a combination of both.

- To add a user ID or SAF group, type the value in the appropriate field, then click **Add**.
- To remove a user ID or SAF group, click the user ID or group name in the list, then click **Remove**.

Administrators are specified in the following fields:

**Domain administrators**
User IDs of the domain administrators for the domain.

**Domain administrator groups**
SAF group names of the domain administrators for the domain.

**Network administrators**
User IDs of the network administrators for the domain. A network administrator must be specified if a network resource pool is to be created.

**Network administrator groups**
SAF group names for network administrators for the domain. A network administrator must be specified if a network resource pool is to be created.

**Workload administrators**
User IDs of the workload administrators for the domain. A workload administrator must be specified if a WLM resource pool is to be created.

To enable metering and capping for a tenant, you must specify a workload administrator for the associated domain.

**Workload administrator groups**
SAF group names for workload administrators for the domain. A workload administrator must be specified if a WLM resource pool is to be created.

To enable metering and capping for a tenant, you must specify a workload administrator for the associated domain.

Approvers are specified in the following fields:

**Approvers for templates**
User IDs of the approvers for templates for the domain. These approvers apply to all templates that are associated with the domain while the template is in any of the draft states.

**Approver groups**
SAF group names for template approvers for the domain. These approvers apply to all templates that are associated with the domain while the template is in any of the draft states.

## History

The **History** tab shows a history of the actions that were performed on the domain.

If history logging is not enabled for the domain, the table indicates that no data is available to display.

*Table 16. Columns in the History table*

| Column | Description |
|---|---|
| **Type** | Type of action that was taken on the domain, such as "modify.” |
| **Ran by User** | User ID under which the action was performed. |
| **Ran at Time** | Time at which the action occurred. |
| **Details** | Description of the action. |

## Systems

**Available Systems**
**Systems for this domain**
Define the systems to include in the domain. The Available systems table shows the systems that are available to be included, in the form *sysplex-name.system-name*. LOCAL indicates the system that you are logged on to. The available systems are the group of systems named IYUCLOUD.

A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the primary z/OSMF system. Objects that are created on the secondary systems are managed by the

primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.

To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf).

If there are no systems to select, update the group of systems that are named IYUCLOUD with the **Systems** task of the **z/OSMF Settings** category. Then, on the **Create Domain** page, click **Refresh** to update the table of systems.

Use **Add** or **Remove** to build the set of systems for the domain.

## Removing systems from a domain

Removing a system from a domain prevents that system from being assigned to new resource pools. However, existing resource pools are not modified when the system is removed from the domain. Therefore, it is still possible for templates for those resource pools to provision instances on the system that was removed from the domain.

To prevent further provisioning of instances on the system that you remove from the domain, modify the template and resource pools for the appropriate tenants to remove that system from the set of systems for provisioning. The template must not have any existing instances that are already provisioned on the system that you want to remove.

## Shared Resource Pool

You can define a resource pool for the domain. If so, the resource pool is shared with the tenants in the domain. Here, the resource pool is referred to as a *domain-shared resource pool*. When you define a domain-shared resource pool, you can also select the templates to be associated with the resource pool.

From this tab, you can select actions to modify a domain-shared resource pool.

**Templates associated with the Shared Resource Pool for Domain**
A table shows the templates that are associated with the shared resource pool for this domain. See Table 17 on page 65.

Table 17 on page 65 shows the columns in the table.

*Table 17. Columns in the Templates associated with the Shared Resource Pool for Domain table.*

| Column | Description |
|---|---|
| **Resource Pool** | Name of the domain-shared resource pool. The resource pool name is in the form *domain-name*.*.*, where asterisks (*.*) are used to indicate that the resource pool is shared across the domain.<br><br>A quiesced resource pool is indicated by this image before the resource pool name: . |
| **Tenant.Template** | Names of the templates associated with the resource pool for the specified tenant. |
| **Instances Limit** | Maximum number of software services instances that are allowed to be created from the template. |
| **Instances Actual** | Actual number of software services instances created from the template. |
| **Sysplex.System** | Sysplex and system for provisioning. |

*Table 17. Columns in the Templates associated with the Shared Resource Pool for Domain table. (continued)*

| Column | Description |
|---|---|
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

### Actions for the Shared Resource Pool tab

*Table 18. Targeted actions for the Templates associated with the Shared Resource Pool for Domain table.*

| Action | Description |
|---|---|
| **Add Template** | Display a window to add a template to the domain-shared resource pool. If this action is not available, it might be because no shared pool is defined. |
| **Remove Template** | Display a window to remove a template from the domain-shared resource pool. If this action is not available, it might be because no shared pool is defined. |

*Table 19. General actions for the Templates associated with the Shared Resource Pool for Domain table.*

| Action | Description |
|---|---|
| **Create Shared Pool** | Display the **Shared Resource Pool** window to add a shared resource pool to the domain. |
| **Delete Shared Pool** | Display a window to delete the domain-shared resource pool. There must not be any currently provisioned resources for the pool. You can use Quiesce to prevent new provisioning of the template. |
| **View Shared Pool** | View the properties of the domain-shared resource pool. |
| **Modify Shared Pool** | Display a window to modify the domain-shared resource pool. |
| **Quiesce Shared Pool** | Quiesce the domain-shared resource pool. |
| **Unquiesce Shared Pool** | Unquiesce the domain-shared resource pool.<br><br>A quiesced resource pool is indicated by this image before the resource pool name: . |

*Table 20. Table actions for the Templates associated with the Shared Resource Pool for Domain table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |

*Table 20. Table actions for the Templates associated with the Shared Resource Pool for Domain table (continued)*

| Action | Description |
|---|---|
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Security

**Security definition**

Type of security definition:

**Automatic**
z/OSMF uses an XML descriptor file or a REXX exec to perform security setup dynamically.

**Manual**
Security setup must be performed manually. This mode is used when no value for a cloud security administrator is specified on the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member.

To see the relevant SAF resources, use the **View** action for the domain.

For more information, see Chapter 2, "Enabling the plug-ins and setting up security for IBM Cloud Provisioning for z/OS," on page 9.

If you later decide to change the security mode for the domain, it is possible to do so, by editing the CLOUD_SEC_ADMIN statement in IZUPRMxx and restarting the z/OSMF server. Edit the IZUPRMxx parmlib member, as follows:

**For automatic security...**
On the CLOUD_SEC_ADMIN statement, specify the user ID of the security administrator who is to be notified of required security updates.

**For manual security...**
Ensure that no user ID is specified on the CLOUD_SEC_ADMIN statement.

You can switch a domain from automatic security to manual security, and vice versa. Your changes to the CLOUD_SEC_ADMIN statement affect the security mode of all existing domains. The suggested practice is that you run domains in automatic security mode.

It is possible to change the security mode of a domain after it is created. You can switch a domain from automatic security to manual security, and vice versa.

To make this change effective, the system programmer must restart the z/OSMF server. The new security mode is applied to all domains in your cloud provisioning environment.

**Security administrator**

The user ID of the security administrator, specified in parmlib, with option CLOUD_SEC_ADMIN.

For manual security, supply the user ID of the security administrator who is to be notified of required security updates. A group is not allowed.

The security administrator ID must be a member of the z/OSMF security administrator group (IZUSECAD, by default).

**Security workflow disposition**
Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

Select **Delete successful workflows on completion** to cause the workflow that is used for security to be deleted automatically after it completes successfully. The default is to delete successful workflows after they complete.

If you do not specify that the workflows should be deleted automatically, you can manually delete workflows from the workflows table in the Workflows task.

**Security jobs disposition**
Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

Select **Delete jobs on completion** to cause the jobs that are dynamically submitted for security to be deleted automatically after they complete. The default is to keep jobs after they complete.

If you do not specify that the jobs should be deleted automatically, you can manually delete the jobs.

**Specify customized security JCL JOB statement**
Select this to supply JOB statement JCL for jobs that manage security definitions for cloud resources such as domains and templates. These jobs are submitted dynamically when the cloud resources are created, modified, or deleted.

Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

**JOB statement JCL**
Supply JOB statement JCL to be used in jobs that manage security definitions for cloud resources such as domains and templates. z/OSMF creates and submits the jobs for you when cloud resources are created, modified, or deleted.

Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Account information can be a maximum of 143 characters, including commas, quotation marks, and parentheses. When a subparameter contains characters other than alphanumeric characters or #, $, @, it must be enclosed in apostrophes.

Separate subparameters with commas and enclose them in parentheses, for example (5438,GROUP6) or '5438,GROUOP6'. When enclosed in apostrophes, additional apostrophes must be added in pairs, for example, 'DEPT''58'.

Click **Restore Default** to discard any changes you have made and restore the default JCL.

The **SAF Resources** tab shows the SAF resources that are used to protect the domain and associated elements, such as resource pools and approvers. You can expand or collapse the sections for all resources, or for a single resource, to show or hide details.

**User access**
Access level that is required for the resources.

***resource-name* (*count*)**
Name of the SAF resource, followed by a count of the number of associated classes, if there is more than 1. Expand the resource to see details:

**Class**
Class the resource belongs to.

**User IDs**
User IDs that require access to the resource.

**Roles**
Roles for the user IDs.

**RACF Commands**
Expand this field to display sample RACF commands that grant access to the resource.

## Tenants tab

This topic describes the contents of the Tenants tab.

*Table 21. Columns in the Tenants table*

| Column | Description |
|---|---|
| **Tenant Name** | Name of the tenant. |
| **State** | State of the tenant.<br><br>Security Update Failed indicates that the security workflow that provides automatic security failed. The accompanying error message indicates the workflow name and workflow key. To understand why the security workflow failed, use the Workflows task to review the failed workflow step status and the workflow history. (To view the workflow steps, click the workflow name on the Workflows page. Then click the **History** link to view the history.) Make corrections as necessary, then use the Set Security Complete action for the domain.<br><br>Pending Security Update indicates the following:<br><br>• The Automatic Security workflow did not complete within 60 seconds. Use the Workflows task to see whether the workflow for the domain completed successfully, failed, or is still running. Make corrections as necessary, then use the **Set Security Complete** action for the tenant.<br><br>WLM Update Failed indicates that an attempt to modify the Workload Management (WLM) service definition that is associated with the tenant failed. The attempted modification included one of these:<br><br>• Specifying a Solution ID, enabling metering, or enabling capping<br>• Modifying existing Workload Management resource pools.<br><br>Review the accompanying error messages, make corrections as necessary, and use the **Set Security Complete** action to try the Workload Management modification for the tenant and accompanying Workload Management resource pools again. Or, reverse the modification (for example, disable metering) and, if necessary, use the **Set Security Complete** action to return the state to Operational.<br><br>Operational indicates that the tenant is ready for use. |
| **Groups** | List of groups in the tenant. |
| **User IDs** | List of user IDs in the tenant. |
| **CPU Capping** | Indicates whether the tenant is participating in CPU capping. Capping lets you limit the use of resources by the tenant. |

*Table 21. Columns in the Tenants table (continued)*

| Column | Description |
|---|---|
| **Memory Capping** | Indicates whether the tenant is participating in memory capping. Capping lets you limit the use of resources by the tenant. |
| **Metering** | Indicates whether the tenant is participating in metering. Metering helps you manage the use of resources by the tenant. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

The actions are described in the following tables:

- General actions. Actions that apply to tenants. No selection is required. See Table 22 on page 70.
- Targeted actions. Actions that apply to the selected items. To use a targeted action, you must select one or more items. See Table 23 on page 70.
- Table actions. Actions that apply to the entire table. No selection of table items is required. See Table 24 on page 71.

*Table 22. General actions for the tenants table*

| Action | Description |
|---|---|
| **Create Tenant** | Display the **Create Tenant** window to create a new tenant. |

*Table 23. Targeted actions for the tenants table*

| Action | Description |
|---|---|
| **View** | Display the properties of a selected tenant. |
| **Modify** | Display the **Modify** window so that you can modify the properties of a selected tenant. You must have selected a domain. |
| **Set Security Complete** | Indicate that the security definition is complete and the tenant is ready for use. To see the relevant SAF resources, use the **View** action for the tenant. |
| **Delete** | Delete the selected tenants. You cannot delete the default tenant. |
| **Shared Resource Pool** | Select **Create Shared Pool**, **Modify Shared Pool**, **Delete Shared Pool**, **View Shared Pool**, **Quiesce Shared Pool**, or **Unquiesce Shared Pool** for selected tenants.<br><br>To delete a shared resource pool, there must not be any currently provisioned resources for the pool. You can use **Quiesce** to prevent new provisioning of the template. |

*Table 23. Targeted actions for the tenants table (continued)*

| Action | Description |
|---|---|
| **Templates and Resource Pools** | Select **Add Template and Pool** . |
| **Capping** | Select **CPU** or **Memory**, then **Enable** or **Disable**, to control capping for the selected tenant. **Enable** displays a window that lets you specify values. You can use capping to limit the use of resources by the tenant. |
| **Metering** | Select **Enable** or **Disable** to control metering for the selected tenant. You can use metering to help manage the use of resources by the tenant. Select **View Metered Usage** to display a graph of the metered usage. |
| **View Metered Usage** | Select **Memory Usage** or **CPU Usage** to display a graph of the appropriate metered usage. |

*Table 24. Table actions for the tenants table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

# View a domain

You can view details about a domain that is shown in the Domains table.

## Procedure

1. Select the Cloud Provisioning icon in the z/OSMF desktop, then select **Resource Management**.
2. In the Domains table, either:
   - Select the domain, then click **Actions**, then select **View**.
   - Click the domain name.

## Values on the View Domain window

### Domain Details

**Domain name**
Name of the domain.

**Domain ID**
An internal identifier that z/OSMF assigned to the domain.

**Description**
Description of the domain.

**Enable history logging**
Indication of whether history logging is enabled for the domain. If so, z/OSMF maintains a history log of the actions that are performed on this domain.

**Maximum number of history entries**
If history logging is enabled for the domain, this field shows the maximum number of actions that can be logged. When this number is reached, the oldest history log entries are overwritten by new entries.

**History archive directory path**
Specifies the directory path to store archived history entries. No default value is set.

If the archive directory path is specified, entries are removed from the history based on the maximum number of history entries and then archived. If no archive directory path is specified, then history entries are removed but not archived.

The user ID of the z/OSMF started task must have write permission to the archive directory path to create files to store the archived history entries. The default user ID of the z/OSMF started task is IZUSVR.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

**Domain error details**
Details about the error state of the domain. This field is displayed only if the domain is in an error state.

### Tenants

Tenants define the users who are able to run templates and create software services instances. The properties of the tenants for the selected domain are shown in a table. You can associate templates and resource pools to tenants. A resource pool is a high-level pool of shared z/OS resources within a cloud domain.

For details, see "Tenants tab" on page 77.

### Administrators and Approvers

**Domain administrators**
User IDs of the domain administrators for the domain.

**Domain administrator groups**
SAF groups for the domain administrators for the domain.

**Network administrators**
User IDs of the network administrators for the domain.

**Network administrator groups**
SAF groups for the network administrators for the domain.

**Workload administrators**
User IDs of the workload administrators for the domain.

**Workload administrator groups**
SAF groups for the workload administrators for the domain.

**Approvers for templates**
User IDs of the approvers for templates for the domain.

**Approver groups**
SAF groups for the template approvers for the domain.

## History

The **History** tab shows a history of the actions that were performed on this domain.

If history logging is not enabled for the domain, the table indicates that no data is available to display.

*Table 25. Columns in the History table*

| Column | Description |
|---|---|
| **Type** | Type of action that was taken on the domain, such as "modify." |
| **Ran by User** | User ID under which the action was performed. |
| **Ran at Time** | Time at which the action occurred. |
| **Details** | Description of the action. |

## Systems

**Systems**
Systems in the domain, including the sysplex name and the system nicknames. LOCAL indicates the system that you are logged on to.

In a domain that includes systems from other sysplexes (a multi-sysplex domain), this field includes the names of the participating systems on the other sysplexes, in the form *sysplex-name.system-name*.

## Shared Resource Pool

From this tab, you can view the attributes of a domain-shared resource pool.

**Templates associated with the Shared Resource Pool for Domain**
A table shows the templates that are associated with the shared resource pool for this domain. See Table 26 on page 73.

Table 26 on page 73 shows the columns in the table.

*Table 26. Columns in the Templates associated with the Shared Resource Pool for Domain table.*

| Column | Description |
|---|---|
| **Resource Pool** | Name of the domain-shared resource pool. The resource pool name is in the form *domain-name*.*.*, where asterisks (*.*) are used to indicate that the resource pool is shared across the domain.<br><br>A quiesced resource pool is indicated by this image before the resource pool name: . |

*Table 26. Columns in the Templates associated with the Shared Resource Pool for Domain table. (continued)*

| Column | Description |
|---|---|
| **Tenant.Template** | Names of the templates associated with the resource pool for the specified tenant. |
| **Instances Limit** | Maximum number of software services instances that are allowed to be created from the template. |
| **Instances Actual** | Actual number of software services instances created from the template. |
| **Sysplex.System** | Sysplex and system for provisioning. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

## Actions for the Shared Resource Pool tab

*Table 27. Targeted actions for the Templates associated with the Shared Resource Pool for Domain table.*

| Action | Description |
|---|---|
| **Add Template** | Display a window to add a template to the domain-shared resource pool. If this action is not available, it might be because no shared pool is defined. |
| **Remove Template** | Display a window to remove a template from the domain-shared resource pool. If this action is not available, it might be because no shared pool is defined. |

*Table 28. General actions for the Templates associated with the Shared Resource Pool for Domain table.*

| Action | Description |
|---|---|
| **Create Shared Pool** | Display the **Shared Resource Pool** window to add a shared resource pool to the domain. |
| **Delete Shared Pool** | Display a window to delete the domain-shared resource pool. There must not be any currently provisioned resources for the pool. You can use Quiesce to prevent new provisioning of the template. |
| **View Shared Pool** | View the properties of the domain-shared resource pool. |
| **Modify Shared Pool** | Display a window to modify the domain-shared resource pool. |
| **Quiesce Shared Pool** | Quiesce the domain-shared resource pool. |
| **Unquiesce Shared Pool** | Unquiesce the domain-shared resource pool.<br><br>A quiesced resource pool is indicated by this image before the resource pool name: . |

*Table 29. Table actions for the Templates associated with the Shared Resource Pool for Domain table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Security

**Security definition**

Type of security definition:

**Automatic**
z/OSMF uses an XML descriptor file or a REXX exec to perform security setup dynamically.

**Manual**
Security setup must be performed manually. This mode is used when no value for a cloud security administrator is specified on the CLOUD_SEC_ADMIN statement in the IZUPRMxx parmlib member.

To see the relevant SAF resources, use the **View** action for the domain.

For more information, see Chapter 2, “Enabling the plug-ins and setting up security for IBM Cloud Provisioning for z/OS,” on page 9.

If you later decide to change the security mode for the domain, it is possible to do so, by editing the CLOUD_SEC_ADMIN statement in IZUPRMxx and restarting the z/OSMF server. Edit the IZUPRMxx parmlib member, as follows:

**For automatic security...**
On the CLOUD_SEC_ADMIN statement, specify the user ID of the security administrator who is to be notified of required security updates.

**For manual security...**
Ensure that no user ID is specified on the CLOUD_SEC_ADMIN statement.

You can switch a domain from automatic security to manual security, and vice versa. Your changes to the CLOUD_SEC_ADMIN statement affect the security mode of all existing domains. The suggested practice is that you run domains in automatic security mode.

It is possible to change the security mode of a domain after it is created. You can switch a domain from automatic security to manual security, and vice versa.

To make this change effective, the system programmer must restart the z/OSMF server. The new security mode is applied to all domains in your cloud provisioning environment.

**Security administrator**
The user ID of the security administrator, specified in parmlib, with option CLOUD_SEC_ADMIN.

For manual security, supply the user ID of the security administrator who is to be notified of required security updates. A group is not allowed.

The security administrator ID must be a member of the z/OSMF security administrator group (IZUSECAD, by default).

**Security workflow disposition**
Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

Select **Delete successful workflows on completion** to cause the workflow that is used for security to be deleted automatically after it completes successfully. The default is to delete successful workflows after they complete.

If you do not specify that the workflows should be deleted automatically, you can manually delete workflows from the workflows table in the Workflows task.

**Security jobs disposition**
Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

Select **Delete jobs on completion** to cause the jobs that are dynamically submitted for security to be deleted automatically after they complete. The default is to keep jobs after they complete.

If you do not specify that the jobs should be deleted automatically, you can manually delete the jobs.

**Specify customized security JCL JOB statement**
Select this to supply JOB statement JCL for jobs that manage security definitions for cloud resources such as domains and templates. These jobs are submitted dynamically when the cloud resources are created, modified, or deleted.

Shown only for Automatic security when the security REXX exec is being used to enable automatic security management.

**JOB statement JCL**
Supply JOB statement JCL to be used in jobs that manage security definitions for cloud resources such as domains and templates. z/OSMF creates and submits the jobs for you when cloud resources are created, modified, or deleted.

Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Account information can be a maximum of 143 characters, including commas, quotation marks, and parentheses. When a subparameter contains characters other than alphanumeric characters or #, $, @, it must be enclosed in apostrophes.

Separate subparameters with commas and enclose them in parentheses, for example (5438,GROUP6) or '5438,GROUOP6'. When enclosed in apostrophes, additional apostrophes must be added in pairs, for example, 'DEPT''58'.

Click **Restore Default** to discard any changes you have made and restore the default JCL.

The **SAF Resources** tab shows the SAF resources that are used to protect the domain and associated elements, such as resource pools and approvers. You can expand or collapse the sections for all resources, or for a single resource, to show or hide details.

**User access**
Access level that is required for the resources.

***resource-name* (*count*)**
Name of the SAF resource, followed by a count of the number of associated classes, if there is more than 1. Expand the resource to see details:

**Class**
Class the resource belongs to.

**User IDs**
User IDs that require access to the resource.

**Roles**
Roles for the user IDs.

**RACF Commands**
Expand this field to display sample RACF commands that grant access to the resource.

## Tenants tab

This topic describes the contents of the Tenants tab. For a description of the columns in the Tenants table, see Table 30 on page 77. For a description of the actions that you can take for tenants, refer to Table 31 on page 78, Table 32 on page 78, and Table 33 on page 79.

*Table 30. Columns in the Tenants table*

| Column | Description |
|---|---|
| **Tenant Name** | Name of the tenant. |
| **State** | State of the tenant.<br><br>Security Update Failed indicates that the security workflow that provides automatic security failed. The accompanying error message indicates the workflow name and workflow key. To understand why the security workflow failed, use the Workflows task to review the failed workflow step status and the workflow history. (To view the workflow steps, click the workflow name on the Workflows page. Then click the **History** link to view the history.) Make corrections as necessary, then use the Set Security Complete action for the domain.<br><br>Pending Security Update indicates the following:<br><br>• The Automatic Security workflow did not complete within 60 seconds. Use the Workflows task to see whether the workflow for the domain completed successfully, failed, or is still running. Make corrections as necessary, then use the **Set Security Complete** action for the tenant.<br><br>WLM Update Failed indicates that an attempt to modify the Workload Management (WLM) service definition that is associated with the tenant failed. The attempted modification included one of these:<br><br>• Specifying a Solution ID, enabling metering, or enabling capping<br>• Modifying existing Workload Management resource pools.<br><br>Review the accompanying error messages, make corrections as necessary, and use the **Set Security Complete** action to try the Workload Management modification for the tenant and accompanying Workload Management resource pools again. Or, reverse the modification (for example, disable metering) and, if necessary, use the **Set Security Complete** action to return the state to Operational.<br><br>Operational indicates that the tenant is ready for use. |
| **Groups** | List of groups in the tenant. |
| **User IDs** | List of user IDs in the tenant. |

*Table 30. Columns in the Tenants table (continued)*

| Column | Description |
|---|---|
| **CPU Capping** | Indicates whether the tenant is participating in CPU capping. Capping lets you limit the use of resources by the tenant. |
| **Memory Capping** | Indicates whether the tenant is participating in memory capping. Capping lets you limit the use of resources by the tenant. |
| **Metering** | Indicates whether the tenant is participating in metering. Metering helps you manage the use of resources by the tenant. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

The actions are described in the following tables:

- General actions. Actions that apply to tenants. No selection is required. See Table 31 on page 78.
- Targeted actions. Actions that apply to the selected items. To use a targeted action, you must select one or more items. See Table 32 on page 78.
- Table actions. Actions that apply to the entire table. No selection of table items is required. See Table 33 on page 79.

The Resource Management task saves a provisioning version with each tenant object and resource pool object. For an action to be valid for a tenant or resource pool, the provisioning version associated with the object must not be higher than the provisioning version of the code for the Resource Management task.

*Table 31. General actions for the tenants table*

| Action | Description |
|---|---|
| **Create Tenant** | Display the **Create Tenant** window to create a new tenant. |

*Table 32. Targeted actions for the tenants table*

| Action | Description |
|---|---|
| **View** | Display the properties of a selected tenant. |
| **Modify** | Display the **Modify** window so that you can modify the properties of a selected tenant. You must have selected a domain. |
| **Set Security Complete** | Indicate that the security definition is complete and the tenant is ready for use. To see the relevant SAF resources, use the **View** action for the tenant. |
| **Delete** | Delete the selected tenants. You cannot delete the default tenant. |

*Table 32. Targeted actions for the tenants table (continued)*

| Action | Description |
|---|---|
| **Shared Resource Pool** | Select **Create Shared Pool**, **Modify Shared Pool**, **Delete Shared Pool**, **View Shared Pool**, **Quiesce Shared Pool**, or **Unquiesce Shared Pool** for selected tenants.<br>To delete a shared resource pool, there must not be any currently provisioned resources for the pool. You can use **Quiesce** to prevent new provisioning of the template. |
| **Templates and Resource Pools** | Select **Add Template and Pool** . |
| **Capping** | Select **CPU** or **Memory**, then **Enable** or **Disable**, to control capping for the selected tenant. **Enable** displays a window that lets you specify values. You can use capping to limit the use of resources by the tenant. |
| **Metering** | Select **Enable** or **Disable** to control metering for the selected tenant. You can use metering to help manage the use of resources by the tenant. Select **View Metered Usage** to display a graph of the metered usage. |
| **View Metered Usage** | Select **Memory Usage** or **CPU Usage** to display a graph of the appropriate metered usage. |

*Table 33. Table actions for the tenants table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Create a tenant

To create a tenant, use the **Create Tenant** action that is provided in the Domains table or the Tenants table.

### Before you begin

You must be a domain administrator to create a tenant. If you would like to complete these steps using a video see How to create a tenant and resource pool using IBM Cloud Provisioning and Management for z/OS (mediacenter.ibm.com/media/

How+to+create+a+tenant+and+resource+pool+using+IBM+Cloud+Provisioning+and+Management+for+z+OS/0_tarv9ew3/101043781).

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Create Tenant**.
4. On the resulting window, supply values. Asterisks (*) preceding labels for tabs or fields are used to indicate fields that are required. See "Values on the Create Tenant window " on page 80.
5. Click **OK** to create the tenant.

## Values on the Create Tenant window

### Tenant Details

**Tenant name**
Name of the tenant. It can be up to 32 characters, which can include alphanumeric characters and these special characters:

@
$
_ (not valid for the first or last character)
- (not valid for the first or last character)

**Description**
Description of the tenant.

**Solution ID**
Supply the solution ID that corresponds to your Tailored Fit Pricing for IBM Z solution as defined in the License Management Support (LMS) web portal. To ensure that the value is correct, copy the value from LMS and then paste it into this field.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

### Consumers

**Groups**
Define the groups to include in the tenant. To add a group, type or select a group in the Groups field, then click **Add**. To remove a group, select it in the list of groups, then click **Remove**.

**User IDs**
Define the users to include in the tenant. To add a user ID, type or select a user ID in the User IDs field, then click **Add**. To remove a user ID, select it in the list of user IDs, then click **Remove**.

## Metering and Capping

**Enable metering**

Select this option to enable metering for the tenant, which can help you manage the use of resources by the tenant. A workload administrator must have been specified for the domain. If you cannot select this option, verify that a workload administrator was specified for the domain.

**Enable CPU capping**

Select this option to enable CPU capping for the tenant, which you can use to limit the use of resources by the tenant. After selecting this option, specify values for CPU capping type and CPU capping limit. A workload administrator must have been specified for the domain. If you cannot select this option, verify that a workload administrator was specified for the domain.

**CPU capping type and CPU capping limit**

Select a capping type and then specify the value for the capping limit. These fields are available only when Enable CPU capping has been selected.

*Table 34. CPU capping types and values*

| CPU Capping Type | Description | Values for Capping Limit |
|---|---|---|
| **LPAR share percentage** | The capacity is specified as a percentage of the LPAR share in the general-purpose processor pool. | 0.01-999.99 |
| **Service unit** | The capacity is specified in unweighted CPU service units per second. | 1-99,999,999 |
| **CP** | A number of general-purpose processors (CPs), including numbers with up to two decimal places. | 0.01 to 9,999.99 |
| **MSU** | The capacity is specified as millions of service units per hour. | 1-999,999 |

**Enable memory capping**

Select this option to enable memory capping for the tenant, which you can use to limit the use of resources by the tenant. After selecting this option, specify a value for the memory capping limit.

A workload administrator must have been specified for the domain. If you cannot select this option, verify that a workload administrator was specified for the domain.

## Dedicated Resource Pools

**Templates that are associated with the Dedicated Resource Pool for the tenant**

A table shows shared resource pools for the tenant, along with templates that are associated with the resource pools. See Table 35 on page 81.

Table 35 on page 81 shows the columns in the table.

*Table 35. Columns in the Templates and Resource Pools for Tenant table on the Create Tenants window*

| Column | Description |
|---|---|
| **Resource Pool** | Name of the resource pool. The resource pool name is in the form *domain-name.tenant-name.template-name*, where *template-name* is an asterisk (*) for a shared resource pool.<br><br>A quiesced resource pool is indicated by this image before the resource pool name: . |
| **Templates** | Names of the templates associated with the resource pool. |
| **Instances Limit** | Maximum number of software services instances that are allowed to be created from the template. |

*Table 35. Columns in the Templates and Resource Pools for Tenant table on the Create Tenants window (continued)*

| Column | Description |
|---|---|
| **Instances Actual** | Actual number of software services instances created from the template. |
| **Sysplex.System** | Sysplex and system for provisioning. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

The actions are described in the following tables:

- General actions. Actions that apply to templates. No selection is required. See Table 36 on page 82.
- Targeted actions. Actions that apply to the selected items. To use a targeted action, you must select one or more items. See Table 37 on page 82.
- Table actions. Actions that apply to the entire table. No selection of table items is required. See Table 38 on page 82.

*Table 36. General actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Add Template and Resource Pool** | Display the **Add Template and Resource Pool** window to add a template and resource pool to the tenant. If this action is not available, it might be because no templates have been added. |

*Table 37. Targeted actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Remove Template and Pool** | Display the **Remove Resource Pool** window so that you can remove the selected resource pool. |
| **View Template and Pool** | Display the properties of the selected template and resource pool. |
| **Modify Template and Pool** | Display the **Modify Resource Pool** window so that you can modify the properties of the selected resource pool. |
| **Quiesce Dedicated Pool** | Quiesce the resource pool. |
| **Quiesce Dedicated Pool** | Unquiesce the resource pool. |

*Table 38. Table actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |

*Table 38. Table actions for the Templates and Resource Pools for Tenant table (continued)*

| Action | Description |
|---|---|
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

# Modify a tenant

To modify a tenant, use the **Modify** action that is provided in the Tenants table.

## Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Modify**.
4. Click the Tenants tab.
5. In the Tenants table, select a tenant.
6. Click **Actions**, then select **Modify**.
7. On the **Modify** window, supply values. Asterisks (*) preceding labels for tabs or fields are used to indicate fields that are required. See “Values on the Modify window ” on page 83.
8. Click **OK** to modify the tenant.

## Values on the Modify window

### Tenant Details

**Tenant name**
Name of the tenant. It can be up to 32 characters, which can include alphanumeric characters and these special characters:

@
$
_ (not valid for the first or last character)
- (not valid for the first or last character)

**Description**
Description of the tenant.

**Solution ID**
Supply the solution ID that corresponds to your Tailored Fit Pricing for IBM Z solution as defined in the License Management Support (LMS) web portal. To ensure that the value is correct, copy the value from LMS and then paste it into this field.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

## Consumers

**Groups**
Define the groups to include in the tenant. To add a group, type or select a group in the Groups field, then click **Add**. To remove a group, select it in the list of groups, then click **Remove**.

**User IDs**
Define the users to include in the tenant. To add a user ID, type or select a user ID in the User IDs field, then click **Add**. To remove a user ID, select it in the list of user IDs, then click **Remove**.

## Metering and Capping

**Enable metering**
Select this option to enable metering for the tenant, which can help you manage the use of resources by the tenant. A workload administrator must have been specified for the domain. If you cannot select this option, verify that a workload administrator was specified for the domain.

**Enable CPU capping**
Select this option to enable CPU capping for the tenant, which you can use to limit the use of resources by the tenant. After selecting this option, specify values for CPU capping type and CPU capping limit. A workload administrator must have been specified for the domain. If you cannot select this option, verify that a workload administrator was specified for the domain.

**CPU capping type and CPU capping limit**
Select a capping type and then specify the value for the capping limit. These fields are available only when Enable CPU capping has been selected.

*Table 39. CPU capping types and values*

| CPU Capping Type | Description | Values for Capping Limit |
|---|---|---|
| **LPAR share percentage** | The capacity is specified as a percentage of the LPAR share in the general-purpose processor pool. | 0.01-999.99 |
| **Service unit** | The capacity is specified in unweighted CPU service units per second. | 1-99,999,999 |
| **CP** | A number of general-purpose processors (CPs), including numbers with up to two decimal places. | 0.01 to 9,999.99 |
| **MSU** | The capacity is specified as millions of service units per hour. | 1-999,999 |

**Enable memory capping**
Select this option to enable memory capping for the tenant, which you can use to limit the use of resources by the tenant. After selecting this option, specify a value for the memory capping limit.

A workload administrator must have been specified for the domain. If you cannot select this option, verify that a workload administrator was specified for the domain.

## Shared Resource Pool

**Templates associated with the Shared Resource Pool for the tenant**
A table shows shared resource pools for the tenant, along with templates that are associated with the resource pools.See Table 48 on page 89.

*Table 40. Columns in the Templates and Resource Pools for Tenant table on the View Tenants window*

| Column | Description |
|---|---|
| **Resource Pool** | Name of the resource pool. The resource pool name is in the form *domain-name.tenant-name.template-name*, where *template-name* is an asterisk (*) for a shared resource pool.<br><br>A quiesced resource pool is indicated by this prior to the resource pool name: . |
| **Templates** | Names of the templates associated with the resource pool. |
| **Instances Limit** | Maximum number of software services instances that are allowed to be created from the template. |
| **Instances Actual** | Actual number of software services instances created from the template. |
| **Sysplex.System** | Sysplex and system for provisioning. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

## Actions for the Shared Resource Pool tab

*Table 41. Targeted actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Add Template** | Display a window to add a template to the to the shared resource pool. If this action is not available, it might be because there is no shared pool. |
| **Remove Template** | Display a window to remove a template from the shared resource pool. If this action is not available, it might be because there is no shared pool. |

*Table 42. General actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Create Shared Pool** | Display a window to create a shared resource pool. |
| **Delete Shared Pool** | Display a window to delete the shared resource pool. There must not be any currently provisioned resources for the pool. You can use Quiesce to prevent new provisioning of the template. |
| **View Shared Pool** | View the properties of the shared resource pool. |
| **Modify Shared Pool** | Display a window to modify the shared resource pool. |
| **Quiesce Shared Pool** | Quiesce the shared resource pool. |
| **Unquiesce Shared Pool** | Unquiesce the shared resource pool.<br>A quiesced resource pool is indicated by this prior to the resource pool name: . |

*Table 43. Table actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Dedicated Resource Pools

*Table 44. Targeted actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Add Template and Pool** | Display a window to add templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **Remove Template and Pool** | Display a window to add templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **View Template and Pool** | View the properties of templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **Modify Template and Pool** | Display a window to modify templates and resource pools. If this action is not available, it might be because no templates have been added. |

*Table 44. Targeted actions for the Templates and Resource Pools for Tenant table (continued)*

| Action | Description |
|---|---|
| **Quiesce Dedicated Pool** | Quiesce the resource pool.<br><br>A quiesced resource pool is indicated by this prior to the resource pool name: ⏸. |
| **Unquiesce Dedicated Pool** | Unquiesce the resource pool.<br><br>A quiesced resource pool is indicated by this prior to the resource pool name: ⏸. |

*Table 45. Table actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br><br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br><br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

# View a tenant

View a tenant to see details of its properties.

## Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, click the name of a domain.
3. Click the Tenants tab.
4. In the Tenants table, click the name of a tenant.

## Values on the View Tenant window

### Tenant Details

**Tenant name**
Name of the tenant.

**Tenant ID**
An internal identifier that z/OSMF assigned to the tenant.

**Description**
Description of the tenant.

**Solution ID**
The solution ID associated with the tenant. This corresponds to your Tailored Fit Pricing for IBM Z solution as defined in the License Management Support (LMS) web portal.

**Tenant resource group name**
Name of the tenant resource group for the tenant.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

## Consumers

**Groups**
Groups that are included in the tenant.

**User IDs**
Users IDs that are included in the tenant.

## Metering and Capping

**Metering**
Indicates if the tenant is participating in metering. Metering helps you manage the use of resources by the tenant.

**CPU**
Indicates if the tenant is participating in CPU capping. Capping lets you limit the use of resources by the tenant.

**CPU capping type and CPU capping limit**
Capping type and capping limit.

*Table 46. CPU capping types and values*

| CPU Capping Type | Description | Values for Capping Limit |
|---|---|---|
| **LPAR share percentage** | The capacity is specified as a percentage of the LPAR share in the general-purpose processor pool. | 0.01-999.99 |
| **Service unit** | The capacity is specified in unweighted CPU service units per second. | 1-99,999,999 |
| **CP** | A number of general-purpose processors (CPs), including numbers with up to two decimal places. | 0.01 to 9,999.99 |
| **MSU** | The capacity is specified as millions of service units per hour. | 1-999,999 |

**Memory**
Indicates if the tenant is participating in memory capping. Capping lets you limit the use of resources by the tenant.

**Memory capping limit**
Indicates the limit for memory capping.

## History

The **History** tab shows a history of the actions that were performed on the tenant.

*Table 47. Columns in the History table*

| Column | Description |
|---|---|
| **Type** | Type of action that was taken on the tenant, such as "modify." |
| **Ran by User** | User ID under which the action was performed. |
| **Ran at Time** | Time at which the action occurred. |
| **Details** | Description of the action. |

## Shared Resource Pool

**Templates associated with the Shared Resource Pool for the tenant**
A table shows shared resource pools for the tenant, along with templates that are associated with the resource pools.See Table 48 on page 89.

*Table 48. Columns in the Templates and Resource Pools for Tenant table on the View Tenants window*

| Column | Description |
|---|---|
| **Resource Pool** | Name of the resource pool. The resource pool name is in the form *domain-name.tenant-name.template-name*, where *template-name* is an asterisk (*) for a shared resource pool.<br><br>A quiesced resource pool is indicated by this prior to the resource pool name: . |
| **Templates** | Names of the templates associated with the resource pool. |
| **Instances Limit** | Maximum number of software services instances that are allowed to be created from the template. |
| **Instances Actual** | Actual number of software services instances created from the template. |
| **Sysplex.System** | Sysplex and system for provisioning. |
| **Managed By** | For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.<br><br>A domain can be defined to include systems from more than one sysplex. In this configuration, creating and modifying templates and other objects is done from a sysplex that you designate as the *primary z/OSMF system*. Objects that are created on the secondary systems are managed by the primary z/OSMF system. Managed objects are viewable and usable on the sysplex where they reside, but they can be modified and removed only from the primary system.<br><br>To participate in a multi-sysplex domain, the systems must be defined through the z/OSMF Systems task, and be enabled for single sign-on. For more information, see Defining your systems to z/OSMF (www.ibm.com/docs/en/zos/2.5.0?topic=systems-defining-your-zosmf). |

### Actions for the Shared Resource Pool tab

*Table 49. Targeted actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Add Template** | Display a window to add a template to the to the shared resource pool. If this action is not available, it might be because there is no shared pool. |
| **Remove Template** | Display a window to remove a template from the shared resource pool. If this action is not available, it might be because there is no shared pool. |

*Table 50. General actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Create Shared Pool** | Display a window to create a shared resource pool. |
| **Delete Shared Pool** | Display a window to delete the shared resource pool. There must not be any currently provisioned resources for the pool. You can use Quiesce to prevent new provisioning of the template. |
| **View Shared Pool** | View the properties of the shared resource pool. |
| **Modify Shared Pool** | Display a window to modify the shared resource pool. |
| **Quiesce Shared Pool** | Quiesce the shared resource pool. |
| **Unquiesce Shared Pool** | Unquiesce the shared resource pool.<br>A quiesced resource pool is indicated by this prior to the resource pool name: . |

*Table 51. Table actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Dedicated Resource Pools

The contents of this tab are the same as the contents of the Shared Resource Pool tab, except that they are for dedicated resource pools.

*Table 52. Targeted actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Add Template and Pool** | Display a window to add templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **Remove Template and Pool** | Display a window to add templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **View Template and Pool** | View the properties of templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **Modify Template and Pool** | Display a window to modify templates and resource pools. If this action is not available, it might be because no templates have been added. |
| **Quiesce Dedicated Pool** | Quiesce the resource pool.<br>A quiesced resource pool is indicated by this prior to the resource pool name: . |
| **Unquiesce Dedicated Pool** | Unquiesce the resource pool.<br>A quiesced resource pool is indicated by this prior to the resource pool name: . |

*Table 53. Table actions for the Templates and Resource Pools for Tenant table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Show Filter Row** | Display the filter row.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## SAF Resources

This tab shows the SAF resources that are used to protect the tenant and associated elements, such as resource pools. You can expand or collapse the sections for all resources, or for a single resource, to show or hide details.

**User access**
Access level that is required for the resources.

***resource-name* (*count*)**
Name of the SAF resource, followed by a count of the number of associated classes, if there is more than 1. Expand the resource to see details:

**Class**
Class the resource belongs to.

**User IDs**
User IDs that require access to the resource.

**Roles**
Roles for the user IDs.

**RACF Commands**
Expand this field to display sample RACF commands that grant access to the resource.

# Resource management tasks – resource pools

You can use the Resource Management task to manage resource pools.

Resource pools are sets of z/OS resources that are required by a software service. For example, you can have resource pools of ports that are dynamically allocated when software is provisioned. A resource pool can be:

**Dedicated**
Dedicated to the template.

**Shared**
Shared among templates.

You can define these types of resource pools:

**Network**
The network administrator must complete the network resource pool definition using the Network Configuration Assistant task, in the Configuration category. For more information, see "Defining network resource pools" on page 121 or the Getting Started Tutorial for Cloud in the Network Configuration help. If you would like to complete these steps using a video see How to configure a Network Resource Pool in z/OSMF (mediacenter.ibm.com/media/How+to+configure+a+network+resource+pool+in+z+OSMF/0_b9hz9t6s/101043781).

**WLM**
The workload management administrator must complete the WLM pool definition.

1. Select the Workload Management task in the Performance category.
2. Click **WLM Resource Pools**.
3. In the WLM Resource Pools table, select the resource pool, then click **Actions**, then **Modify**.
4. Supply values, then click **Complete**.

For more information, see "Defining workload management resource pools" on page 119.

## Add a template and resource pool

To add a template and resource pool to a tenant, use the **Template and Resource Pool** action of the Tenants table.

### Before you begin

To perform this task, the template must already have been added. If you haven't yet added the template, you can associate the template with the tenant from the Software Services task, as described in Chapter 6, "Defining software services with templates," on page 139.

### Procedure

1. From the z/OSMF Desktop, select **Resource Management**.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Modify**.
4. Click the Tenants tab.

5. In the Tenants table, select a tenant.
6. Click **Actions**, select **Templates and Resource Pools**, then select **Add Template and Pool**.
   - If a shared resource pool exists, a dialog is displayed. There, you select the template and an option for the resource pool:

     **Create a dedicated resource pool**
     Select this option to create a resource pool that is dedicated to the template. Clicking **OK** displays the **Add Template and Resource Pool** window.

     **Use an existing shared resource pool**
     Select this option to use a shared resource pool that has already been created and can be shared among templates. Clicking **OK** closes the dialog and returns you to the tenants table.
7. On the **Add Template and Resource Pool** window, supply values, then click **OK**. See "Values on the Add Template and Resource Pool window " on page 93.

   You can also add a template and dedicated resource pool to a tenant when you create the tenant, using the **Add Template and Resource Pool** action in the table on the Tenants tab.

## Values on the Add Template and Resource Pool window

### Template Details

**Select template**
Select a template from the list, if you have not already selected a template while navigating to this page. If the template you want to add to the tenant is not in the list, use the Software Services task to add a template.

**Template type**
Type of template to add to the tenant. The type affects the fields that are displayed on the rest of the page.

### Instance Details

**Software services instance name prefix**
Character string to use as the beginning of the names of instances when they are created from templates. The requirements and the fields that are displayed for the prefix vary with the software type and vendor. For a shared resource pool, all three fields are required because the shared resource pool might be used when you provision any software type, for example, CICS, Db2, or WebSphere Application Server Liberty.

Descriptions of each of the possible fields follow. For help on specifying the prefix, you can also hover the mouse pointer on for the field.

**Use SNA APPLID (standard templates only)**
Derive the character string from the SNA application ID. This option requires a network pool to be created, and is displayed only if a network administrator was specified for the domain. Used if the software type is CICS and the SNA APPLID is available from the shared resource pool.

**Specify general name prefix**
Specify a character string that is up to six alphanumeric characters. The first character must be alphabetic. You can specify a wildcard character (*) as the last character.

**Specify subsystem name prefix (standard templates only)**
Specify a character string that is up to 2 characters.

**Maximum number of software services instances**
Maximum number of software services instances that are allowed: Up to 1296 for a standard template, or up to the lowest maximum that was set for the associated child templates, for a composite template.

**Maximum number of software services instances for a user**
Maximum number of software services instances that are allowed for a single user. If you do not specify a value, the only limit for a standard template is the one that is specified for Maximum number of software services instances. For a composite template, if a child template set a maximum other than 1, the valid maximum is shown in parentheses.

**Maximum days to keep provisioned software services instances**
Maximum number of days until a provisioned instance expires. When a provisioned instance exceeds this time limit, it is marked as expired, and the instance is placed in *provisioned-expired* state. This limit applies to both standard and composite templates.

When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.

The domain administrator can modify this time limit. Doing so changes the time limit for provisioned instances that are created after the modification. Existing instances are not affected.

If you do not specify a value, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Allow members of the tenant to access and run actions for software services instances**
Allow members of the tenant to view and perform actions against software services instances that are provisioned from the template. If you do not select this option, users must be owners of the template or domain administrators to have that authority.

## Allow Modify Account

**Allow account information to be modified when the template is provisioned**
Specifies whether the account information can be modified when a template is provisioned, with a **Test Run** or **Run** action. For a composite template, this option is selected if it is selected for any of the child templates.

## Job Statement JCL

**Specify customized JOB statement JCL (standard templates only)**
Select this to supply JOB statement JCL that will be used in all provisioning jobs. Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-softwareServiceInstanceName}**
  Software service instance name

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Click **Restore Default** to discard any changes you have made and restore the default JCL.

## Resource Pools

**Create network resource pool**
Select this option to cause a resource pool for the template to be created with network resources. A network resource pool defines shared network resources within the domain.

This option is enabled only if a network administrator is defined for the domain and the template is a standard template or a composite cluster template.

The network administrator must complete the network resource pool definition by using the Network Configuration Assistant task, in the Configuration category.

See the documentation from the software provider for information about whether the template requires a network pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Create workload management pool (standard templates only)**
Select this option to cause a workload management resource pool to be created. The resource pool is created with the name *domain.tenant.template-type*.

This option is enabled only if a workload management administrator is defined for the domain.

The workload management administrator must complete the workload management pool definition by using the Workload Management task, in the Performance category.

See the documentation from the software provider for information about whether the template requires a workload management pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Service Level Agreement (standard templates only)** Select a value to specify the level of performance that the software services instance requires.

**PLATINUM**
Highest

**GOLD**
High

**SILVER**
Intermediate

**BRONZE**
Low

The WLM administrator must associate the service level agreement that is specified in the WLM resource pool for the tenant with a service class that provides the appropriate level of performance. This option is available only if a workload administrator was specified for the domain.

**Create storage resource pool**
Check this box to create a storage resource pool to manage your storage resources. This option creates a table that allows you to add, modify, or remove data set attributes for your storage resources. After the storage resource pool is defined with the appropriate data set attributes as described by the template, at provisioning time the template can dynamically obtain data set attributes by using the Resource Management services *Get data set attributes* REST API. See *IBM z/OS Management Facility Programming Guide* for information about the REST API. S

**Create LPAR resource pool**
Select this option to cause a logical partition (LPAR) resource pool for the template to be created. An LPAR pool defines LPAR resources within the domain. This option creates a table that allows you to add, modify, or remove volumes and other resources for the LPAR pool.

The LPAR pool can only be used by z/OS provisioning templates.

## Systems

**System selection for provisioning**
Select an option for selecting the system on which the software service is provisioned.

**Use a specific system**
Select a system on which the template is to be provisioned, in the System field.

**Assign system automatically**
Select a system from a list of available systems.

**Systems for domain: *domain-name***
The available systems are shown in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

The Systems for domain table shows the set of systems for the domain, for a standard template, and the systems that are common to all of the child templates, for a composite template.

Use **Add** or **Remove** to build the set of systems from which one will be automatically assigned for provisioning.

For a clustered composite template, all of the selected systems must exist in the same sysplex.

**Systems for automatic assignment**
The Systems for automatic assignment table shows the set of systems from which a system is assigned.

**Prompt user for system**
Use tables of available and selected systems to control the systems to be displayed in a prompt in response to the **Run** or **Test Run** action for a template.

**Systems for domain: *domain-name***
The Systems for domain table shows the full set of systems for the domain, in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

Use **Add** or **Remove** to build the list of systems that will be included in the user prompt. The user can select from that list.

**Systems for user prompt**
The Systems for user prompt table shows the systems that are included in the user prompt.

**Allow resources to be relocated to other systems**
Select this to specify that the template's instances can be relocated to another system in the sysplex, meaning that the template's instances can each run on a system in the sysplex other than the system that it was provisioned on. The candidate systems are managed in the resource pool for the tenant in which the template is created. You cannot select this option for a standard template if there are provisioned instances for the template.

## Modify template and resource pool

To modify a template and resource pool, use the **Template and Resource Pool** action of the Tenants table.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Modify**.
4. Click the Tenants tab.
5. In the Tenants table, select a tenant.
6. Click **Actions**, then select **Modify**.
7. Click the tab for a shared or dedicated resource pool.
8. Select a row in the table.
9. Click **Actions**, then select the appropriate Modify action.
10. Supply values on the **Modify Template and Resource Pool** window. See “Values on the Modify Template and Resource Pool window ” on page 97.

### What to do next

Removing a system from the set of systems for provisioning prevents further provisioning of instances on that system. The template must not have any existing instances that are already provisioned on the system that you want to remove. For more information, see "Removing systems from a domain" on page 65.

## Values on the Modify Template and Resource Pool window

### Template Details

**Select template**
Select a template from the list, if you have not already selected a template while navigating to this page. If the template you want to add to the tenant is not in the list, use the Software Services task to add a template.

**Template type**
Type of template to add to the tenant. The type affects the fields that are displayed on the rest of the page.

### Instance Details

**Software services instance name prefix**
Character string to use as the beginning of the names of instances when they are created from templates. The requirements and the fields that are displayed for the prefix vary with the software type and vendor. For a shared resource pool, all three fields are required because the shared resource pool might be used when you provision any software type, for example, CICS, Db2, or WebSphere Application Server Liberty.

Notice that you can modify the software services instance name prefix. You can specify a different general name prefix, or switch to using the SNA application ID as the prefix. After the prefix is in use by existing instances, you can no longer modify it.

Descriptions for each of the possible fields follow. For help on specifying the prefix, you can also hover the mouse pointer on for the field.

**Use SNA APPLID (standard templates only)**
Derive the character string from the SNA application ID. This option requires a network pool to be created, and is displayed only if a network administrator was specified for the domain. Used if the software type is CICS and the SNA APPLID is available from the shared resource pool.

**Specify general name prefix**
Specify a character string that is up to six alphanumeric characters. The first character must be alphabetic. You can specify a wildcard character (*) as the last character.

**Specify subsystem name prefix (standard templates only)**
Specify a character string that is up to 2 characters.

**Maximum number of software services instances**
Maximum number of software services instances that are allowed: Up to 1296 for a standard template, or up to the lowest maximum that was set for the associated child templates, for a composite template.

**Maximum number of software services instances for a user**
Maximum number of software services instances that are allowed for a single user. If you do not specify a value, the only limit for a standard template is the one that is specified for Maximum number of software services instances. For a composite template, if a child template set a maximum other than 1, the valid maximum is shown in parentheses.

**Maximum days to keep provisioned software services instances**
Maximum number of days until a provisioned instance expires. When a provisioned instance exceeds this time limit, it is marked as expired, and the instance is placed in *provisioned-expired* state. This limit applies to both standard and composite templates.

When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.

The domain administrator can modify this value, to extend or reduce the time limit as needed. Doing so changes the time limit for provisioned instances that are created after the modification. Existing instances are not affected.

If you do not specify a value, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Allow members of the tenant to access and run actions for software services instances**
Allow members of the tenant to view and perform actions against software services instances that are provisioned from the template. If you do not select this option, users must be owners of the template or domain administrators to have that authority.

## Allow Modify Account

**Allow account information to be modified when the template is provisioned**
Specifies whether the account information can be modified when a template is provisioned, with a **Test Run** or **Run** action. For a composite template, this option is selected if it is selected for any of the child templates.

## Job Statement JCL

**Specify customized JOB statement JCL (standard templates only)**
Select this to supply JOB statement JCL that will be used in all provisioning jobs. Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-softwareServiceInstanceName}**
  Software service instance name

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Click **Restore Default** to discard any changes you have made and restore the default JCL.

## Resource Pools

**Create network resource pool**
Select this option to cause a resource pool for the template to be created with network resources. A network resource pool defines shared network resources within the domain.

This option is enabled only if a network administrator is defined for the domain and the template is a standard template or a composite cluster template.

The network administrator must complete the network resource pool definition by using the Network Configuration Assistant task, in the Configuration category.

See the documentation from the software provider for information about whether the template requires a network pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Create workload management pool (standard templates only)**
Select this option to cause a workload management resource pool to be created. The resource pool is created with the name *domain*.*tenant*.*template-type*.

This option is enabled only if a workload management administrator is defined for the domain.

The workload management administrator must complete the workload management pool definition by using the Workload Management task, in the Performance category.

See the documentation from the software provider for information about whether the template requires a workload management pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Service Level Agreement (standard templates only)** Select a value to specify the level of performance that the software services instance requires.

**PLATINUM**
Highest

**GOLD**
High

**SILVER**
Intermediate

**BRONZE**
Low

The WLM administrator must associate the service level agreement that is specified in the WLM resource pool for the tenant with a service class that provides the appropriate level of performance. This option is available only if a workload administrator was specified for the domain.

**Create storage resource pool**
Check this box to create a storage resource pool to manage your storage resources. This option creates a table that allows you to add, modify, or remove data set attributes for your storage resources. After the storage resource pool is defined with the appropriate data set attributes as described by the template, at provisioning time the template can dynamically obtain data set attributes by using the Resource Management services *Get data set attributes* REST API. See *IBM z/OS Management Facility Programming Guide* for information about the REST API. S

**Create LPAR resource pool**
Select this option to cause a logical partition (LPAR) resource pool for the template to be created. An LPAR pool defines LPAR resources within the domain. This option creates a table that allows you to add, modify, or remove volumes and other resources for the LPAR pool.

The LPAR pool can only be used by z/OS provisioning templates.

## Systems

**System selection for provisioning**
Select an option for selecting the system on which the software service is provisioned.

**Use a specific system**
Select a system on which the template is to be provisioned, in the System field.

**Assign system automatically**
Select a system from a list of available systems.

**Systems for domain: *domain-name***
The available systems are shown in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

The Systems for domain table shows the set of systems for the domain, for a standard template, and the systems that are common to all of the child templates, for a composite template.

Use **Add** or **Remove** to build the set of systems from which one will be automatically assigned for provisioning.

For a clustered composite template, all of the selected systems must exist in the same sysplex.

**Systems for automatic assignment**
The Systems for automatic assignment table shows the set of systems from which a system is assigned.

**Prompt user for system**
Use tables of available and selected systems to control the systems to be displayed in a prompt in response to the **Run** or **Test Run** action for a template.

**Systems for domain: *domain-name***
The Systems for domain table shows the full set of systems for the domain, in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

Use **Add** or **Remove** to build the list of systems that will be included in the user prompt. The user can select from that list.

**Systems for user prompt**
The Systems for user prompt table shows the systems that are included in the user prompt.

**Allow resources to be relocated to other systems**
Select this to specify that the template's instances can be relocated to another system in the sysplex, meaning that the template's instances can each run on a system in the sysplex other than the system that it was provisioned on. The candidate systems are managed in the resource pool for the tenant in which the template is created. You cannot select this option for a standard template if there are provisioned instances for the template.

# View template and resource pool

To view a template and resource pool, use the **Template and Resource Pool** action of the Tenants table.

## Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **View**.
4. Click the Tenants tab.
5. In the Tenants table, select a tenant.
6. Click **Actions**, then select **View**.
7. Click the tab for a shared or dedicated resource pool.
8. Select a row in the table.
9. Click **Actions**, then select the appropriate View action.

## Values on the View Template and Resource Pool window

### Template Details

**Template name**
Name of the selected template.

**Template type**
Type of the template to add to the tenant. The type affects the fields that are displayed on the rest of the page.

**Template information**
Table showing the versions of the template.

## Resource Pool Details

**Resource pool name**
Name of the resource pool that is associated with the template. The name is in the form *domain-name.tenant-name.template-name*.

**Resource pool ID**
An internal identifier that z/OSMF assigned to the resource pool.

**Resource pool ready**

**true**
The resource pool is ready.

**false**
The resource pool is not ready.

**Resource pool quiesced**

**true**
The resource pool is quiesced. No new resources are provisioned for the resource pool.

**false**
The resource pool is not quiesced.

## Instance Details

**Use SNA APPLID (standard templates only)**

**true**
Derive the software service instance name prefix from the SNA application ID.

**false**
Do not derive the software service instance name prefix from the SNA application ID.

This value is always false if a network administrator was not specified for the domain.

**Software service instance name prefix**
Character string to be used as the software service instance name prefix. This is used as the beginning of the names of software services instances that are created from templates. This value is blank if Use SNA APPLID is true.

**Maximum number of software services instances**
Maximum number of software services instances that are allowed: up to 1296 for a standard template, or up to the lowest maximum that was set for the associated child templates, for a composite template.

**Maximum number of software services instances for a user**
Maximum number of software services instances that are allowed for a single user. If no value is specified, the only limit for a standard template is the one for Maximum number of software services instances.

**Maximum days to keep provisioned software services instances**
Maximum number of days until a provisioned instance expires. When a provisioned instance exceeds this time limit, it is marked as expired, and the instance is placed in *provisioned-expired* state. This limit applies to both standard and composite templates.

When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.

The domain administrator can modify this value to extend or reduce the time limit as needed. Doing so changes the time limit for provisioned instances that are created after the modification. Existing instances are not affected.

If you do not specify a value, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Allow members of the tenant to access and run actions for software services instances**
Indicates whether members of the tenant can view and perform actions against software services instances that are provisioned from the template. If this option is not selected, users must be owners of the template or domain administrators to have that authority.

**Actual number of software services instances**
Actual number of software services instances that exist.

**Provisioned software services instances**
Shows the instances that have the “provisioned” state and are associated with the resource pool.

*Table 54. Columns in the Provisioned Software Service Instances table*

| Column | Description |
|---|---|
| **Instance name** | Name of the software services instance.” |
| **State** | State of the software services instance. |
| **Last Action Status** | The state of the last action that was performed. |
| **System** | System that the software is provisioned on. |
| **Cluster** | Name of the cluster instance. |
| **Software Type** | Type of the software. The value is null for composite parent registry instances. |
| **Template Name** | Name of the template that was used when partitioning the software represented by this instance. |
| **Domain** | Name of the domain. |
| **Tenant** | Name of the tenant. |
| **Created On** | Date and time the software services instance was created. |
| **Expiration Date** | Date and time the software services instance expires. |
| **Created By** | User that created the software services instance. |
| **Composite Related** | Indicates whether the instance is either a composite cluster parent or a member. |
| **Managed By** | Primary or managing system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank. |

## Allow Modify Account

**Allow account information to be modified when the template is provisioned**
Indicates if the account information can be modified when a template is provisioned with a **Test Run** or **Run** action. For a composite template, this option is true if it is true for any of its child templates.

## History

The **History** tab shows a history of the actions that were performed on the template and resource pool.

*Table 55. Columns in the History table*

| Column | Description |
|---|---|
| **Type** | Type of action that is taken on the template or resource pool, such as "modify.” |

*Table 55. Columns in the History table (continued)*

| Column | Description |
|---|---|
| **Ran by User** | User ID under which the action was performed. |
| **Ran at Time** | Time at which the action occurred. |
| **Details** | Description of the action. |

## Job Statement JCL

**Customized JOB statement JCL (standard templates only)**
JCL that will be used in jobs for the resource pool. The job name can use workflow variables:

**${_workflow-softwareServiceInstanceName}**
Software service instance name

**${_workflow-workflowOwner}**
Workflow owner

**${_step-stepOwner}**
Workflow step owner

## Resource Pools

**Create network resource pool (standard templates only)**
Indicates if a network pool should be created. This value is always false if a network administrator was not specified for the domain.

**Network pool status**
Status of the network pool.

**Create workload management pool (standard templates only)**
Indicates if a workload management pool should be created.

**Workload management pool status**
Status of the workload management pool.

**Service level agreement (standard templates only)**
Service level agreement for the workload management pool. Specifies the level of performance that the software services instance requires.

**PLATINUM**
Highest

**GOLD**
High

**SILVER**
Intermediate

**BRONZE**
Low

**Report class**
WLM report class for the workload management pool.

**Create storage resource pool**
If you have created a storage resource pool, the data set attributes table is displayed.

## Systems

**System selection for provisioning**
Select an option for selecting the system on which the software service is provisioned.

**Use a specific system**
Select a system on which the template is to be provisioned, in the System field.

**Assign system automatically**
Select a system from a list of available systems.

**Systems for domain: *domain-name***
The available systems are shown in the form *sysplex-name.system-name*. LOCAL indicates the system that you are logged on to.

The Systems for domain table shows the set of systems for the domain, for a standard template, and the systems that are common to all of the child templates, for a composite template.

Use **Add** or **Remove** to build the set of systems from which one will be automatically assigned for provisioning.

For a clustered composite template, all of the selected systems must exist in the same sysplex.

**Systems for automatic assignment**
The Systems for automatic assignment table shows the set of systems from which a system is assigned.

**Prompt user for system**
Use tables of available and selected systems to control the systems to be displayed in a prompt in response to the **Run** or **Test Run** action for a template.

**Systems for domain: *domain-name***
The Systems for domain table shows the full set of systems for the domain, in the form *sysplex-name.system-name*. LOCAL indicates the system that you are logged on to.

Use **Add** or **Remove** to build the list of systems that will be included in the user prompt. The user can select from that list.

**Systems for user prompt**
The Systems for user prompt table shows the systems that are included in the user prompt.

**Allow resources to be relocated to other systems**
Select this to specify that the template's instances can be relocated to another system in the sysplex, meaning that the template's instances can each run on a system in the sysplex other than the system that it was provisioned on. The candidate systems are managed in the resource pool for the tenant in which the template is created. You cannot select this option for a standard template if there are provisioned instances for the template.

## Create storage resource pool

When you add or modify a template and resource pool for tenants, or for a domain-shared resource pool, you have the option to create a storage resource pool. To do so, use the Resource Pools tab.

### Data set attributes table

When you check the box to create a storage resource pool while on the Resource Pools tab, you are able to use the data set attributes table to add, modify, or remove data set attributes associated with your storage resources. After the storage resource pool is defined with the appropriate data set attributes as described by the template, at provisioning time the template can dynamically obtain data set attributes by using the Resource Management services *Get data set attributes* REST API. See the *IBM z/OS Management Facility Programming Guide* for information about the REST API.

*Table 56. Fields on the data set attributes table*

| Field | Description |
|---|---|
| Type | The type of data set to be allocated. |
| Size | The size of the allocated data set. You can allocate a SMALL, MEDIUM, or LARGE data set. |

| *Table 56. Fields on the data set attributes table (continued)* | |
|---|---|
| **Field** | **Description** |
| Volume | The volume on which the data set resides. |
| Data Class | The name of the data set allocation attribute that SMS assigns to a data set when it is created. |
| Storage Class | The name of the data set storage service attribute that identifies performance and availability requirements. SMS uses these attributes to control data placement. |
| Management Class | The name of the management attribute that SMS uses to control DFSMShsm actions for data set retention, migration, backup, and release of allocated but unused space. |
| Description | A description of the storage resource. |

| *Table 57. Actions on the data set attributes table* | |
|---|---|
| **Action** | **Description** |
| Add | Using the **Add** action, you can add storage resources to the data set attributes table. See "Add storage resources to the data set attributes table" on page 105. |
| Modify | Using the **Modify** action, you can modify storage resources on the data set attributes table. See "Modify storage resources on the data set attributes table" on page 106. |
| Remove | Storage resources on the data set attributes table can be removed by selecting **Remove** from the table actions menu. You can also remove everything in the data attributes table by unchecking the checkbox next to *Create storage resource pool*. If you click OK, all of the entries from the data set attributes table are removed. |

## Add storage resources to the data set attributes table

When you create a shared or dedicated pool, you can add storage resources. Storage resources can be added to the data set attributes table by selecting **Add** from the table actions menu.

### Add storage resource

| *Table 58. Fields on the add storage resource page* | |
|---|---|
| **Field** | **Description** |
| Type | Type of data set to be allocated. You can select from one of the predefined types: SEQUENTIAL, PDS, PDSE, VSAM. Or, you can define a different data set type in this field. |
| Size | Size of the allocated data set. Select `SMALL`, `MEDIUM`, or `LARGE`. |

| *Table 58. Fields on the add storage resource page (continued)* | |
|---|---|
| **Field** | **Description** |
| Volume | If you plan to use a volume for the data set, enter the volume name in this field. It must follow the z/OS naming convention. If you specify a volume, it is assumed that the storage resource is non-SMS managed.<br>Otherwise, if you plan to use SMS-managed storage, leave this field empty. |
| Data Class | If you plan to use SMS-managed storage, you must enter a data class, storage class, or both. You can enter the data class in this field. This value is the data set allocation attribute that SMS assigns to the data set when it is created.<br>This field is disabled if you specify a volume. |
| Storage Class | If you plan to use SMS-managed storage, you must enter a data class, storage class, or both. You can enter the storage class in this field. This value is the name of the data set storage service attribute that identifies performance and availability requirements. SMS uses these attributes to control data placement.<br>This field is disabled if you specify a volume. |
| Management Class | If you plan to use SMS-managed storage, you can optionally specify a management class for the storage resource. This value is the name of the management attribute that SMS uses to control DFSMShsm actions for data set retention, migration, backup, and release of allocated but unused space.<br>Otherwise, you can leave this field empty.<br>This field is disabled if you specify a volume. |
| Description | You can optionally provide a description of the storage resource. |

## Modify storage resources on the data set attributes table

When you create a shared or dedicated pool, you can add storage resources. Storage resources on the data set attributes table can be modified by selecting **Modify** from the table actions menu.

### Modify storage resource

| *Table 59. Fields on the Modify storage resource page* | |
|---|---|
| **Field** | **Description** |
| Type | Type of data set to be allocated. You can select from one of the predefined types: SEQUENTIAL, PDS, PDSE, VSAM. Or, you can define a different data set type. |

| *Table 59. Fields on the Modify storage resource page (continued)* | |
|---|---|
| **Field** | **Description** |
| Size | Size of the allocated data set. Select `SMALL`, `MEDIUM`, or `LARGE`. |
| Volume | If you plan to use a volume for the data set, enter the volume name in this field. It must follow the z/OS naming convention. If you specify a volume, it is assumed that the storage resource is non-SMS managed.<br>Otherwise, if you plan to use SMS-managed storage, leave this field empty. |
| Data Class | If you plan to use SMS-managed storage, you must enter a data class, storage class, or both. You can enter the data class in this field. This value is the data set allocation attribute that SMS assigns to the data set when it is created.<br>This field is disabled if you specify a volume. |
| Storage Class | If you plan to use SMS-managed storage, you must enter a data class, storage class, or both. You can enter the storage class in this field. This value is the name of the data set storage service attribute that identifies performance and availability requirements. SMS uses these attributes to control data placement.<br>This field is disabled if you specify a volume. |
| Management Class | If you plan to use SMS-managed storage, you can optionally specify a management class for the storage resource. This value is the name of the management attribute that SMS uses to control DFSMShsm actions for data set retention, migration, backup, and release of allocated but unused space.<br>Otherwise, you can leave this field empty.<br>This field is disabled if you specify a volume. |
| Description | You can optionally provide a description of the storage resource. |

## Create a shared resource pool

To create a shared resource pool, use the **Shared Resource Pool** action.

### Before you begin

You must be a domain administrator.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed in the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.

3. Click **Actions**, then select **Modify**.
4. To create a shared resource pool for a tenant or domain, select the appropriate action, as follows:
   - For a tenant-shared resource pool:
     a. Click the **Tenants** tab. In the Tenants table, select a tenant.
     b. Click **Actions**, then select **Shared Resource Pools**, then select **Create Shared Pool**.
   - For a domain-shared resource pool:
     a. Click the **Shared Resource Pool** tab.
     b. In the table, click **Actions**, then select **Create Shared Pool**.

   You can also create a shared resource pool when you create a tenant or a domain.
5. On the **Create Shared Resource Pool** window, supply values, then click **OK**. See "Values on the Create Shared Resource Pool window " on page 108.
   The shared resource pool is created. In the tenants table, an asterisk (*) is displayed for the template name until you associate templates with the template and resource pool.

### What to do next

To associate a template with a shared resource pool:, in the Tenants table or Domains table, click **Actions**, then select **Shared Resource Pool**, then select **Add Template**. On the resulting window, select a tenant from the list.

To remove a template and the associated shared resource pool, in the Tenants table or Domains table, select **Shared Resource Pool**, then select **Remove Template**.

## Values on the Create Shared Resource Pool window

### Instance Details

**Software services instance name prefix**
Character string to use as the beginning of the names of instances when they are created from templates. The requirements and the fields that are displayed for the prefix vary with the software type and vendor. For a shared resource pool, all three fields are required because the shared resource pool might be used when you provision any software type, for example, CICS, Db2, or WebSphere Application Server Liberty. For help on specifying the prefix, you can also hover the mouse pointer on for the field.

**Use SNA APPLID**
Indicates that the character string should be derived from the SNA application ID. This option requires a network pool to be created, and is automatically selected if a network administrator was specified for the domain. This prefix is used for CICS templates when the SNA APPLID is available.

**Specify general name prefix**
Specify a character string that is up to six alphanumeric characters. The first character must be alphabetic. You can specify a wildcard character (*) as the last character.

**Specify subsystem name prefix**
Specify a character string that is up to 2 characters.

**Maximum number of software services instances**
Maximum number of software services instances that are allowed: Up to 1296 for a standard template, or up to the lowest maximum that was set for the associated child templates, for a composite template.

**Maximum number of software services instances for a user**
Maximum number of software services instances that are allowed for a single user. If you do not specify a value, the only limit for a standard template is the one that is specified for Maximum number

of software services instances. For a composite template, if a child template set a maximum other than 1, the valid maximum is shown in parentheses.

**Maximum days to keep provisioned software services instances**
Maximum number of days until a provisioned instance expires. When a provisioned instance exceeds this time limit, it is marked as expired, and the instance is placed in *provisioned-expired* state. This limit applies to both standard and composite templates.

When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.

The domain administrator can modify this time limit. Doing so changes the time limit for provisioned instances that are created after the modification. Existing instances are not affected.

If you do not specify a value, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Allow members of the tenant to access and run actions for software services instances**
Allow members of the tenant to view and perform actions against software services instances that are provisioned from the template. If you do not select this option, users must be owners of the template or domain administrators to have that authority.

## Allow Modify Account

**Allow account information to be modified when the template is provisioned**
Specifies whether the account information can be modified when a template is provisioned, with a **Test Run** or **Run** action. For a composite template, this option is selected if it is selected for any of the child templates.

## Job Statement JCL

**Specify customized JOB statement JCL (standard templates only)**
Select this to supply JOB statement JCL that will be used in all provisioning jobs. Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-softwareServiceInstanceName}**
  Software service instance name

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Click **Restore Default** to discard any changes you have made and restore the default JCL.

## Resource

**Create network resource pool**
Select this option to cause a resource pool for the template to be created with network resources. A network resource pool defines shared network resources within the domain.

This option is enabled only if a network administrator is defined for the domain and the template is a standard template or a composite cluster template.

The network administrator must complete the network resource pool definition by using the Network Configuration Assistant task, in the Configuration category.

See the documentation from the software provider for information about whether the template requires a network pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Create workload management pool (standard templates only)**
Select this option to cause a workload management resource pool to be created. The resource pool is created with the name *domain*.*tenant*.*template-type*.

This option is enabled only if a workload management administrator is defined for the domain.

The workload management administrator must complete the workload management pool definition by using the Workload Management task, in the Performance category.

See the documentation from the software provider for information about whether the template requires a workload management pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Service Level Agreement (standard templates only)** Select a value to specify the level of performance that the software services instance requires.

**PLATINUM**
Highest

**GOLD**
High

**SILVER**
Intermediate

**BRONZE**
Low

The WLM administrator must associate the service level agreement that is specified in the WLM resource pool for the tenant with a service class that provides the appropriate level of performance. This option is available only if a workload administrator was specified for the domain.

**Create storage resource pool**
Check this box to create a storage resource pool to manage your storage resources. This option creates a table that allows you to add, modify, or remove data set attributes for your storage resources. After the storage resource pool is defined with the appropriate data set attributes as described by the template, at provisioning time the template can dynamically obtain data set attributes by using the Resource Management services *Get data set attributes* REST API. See *IBM z/OS Management Facility Programming Guide* for information about the REST API. S

**Create LPAR resource pool**
Select this option to cause a logical partition (LPAR) resource pool for the template to be created. An LPAR pool defines LPAR resources within the domain. This option creates a table that allows you to add, modify, or remove volumes and other resources for the LPAR pool.

The LPAR pool can only be used by z/OS provisioning templates.

## Systems

**System selection for provisioning**
Select an option for selecting the system on which the software service is provisioned.

**Use a specific system**
Select a system on which the template is to be provisioned, in the System field.

**Assign system automatically**
Select a system from a list of available systems.

**Systems for domain: *domain-name***
The available systems are shown in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

The Systems for domain table shows the set of systems for the domain, for a standard template, and the systems that are common to all of the child templates, for a composite template.

Use **Add** or **Remove** to build the set of systems from which one will be automatically assigned for provisioning.

For a clustered composite template, all of the selected systems must exist in the same sysplex.

**Systems for automatic assignment**
The Systems for automatic assignment table shows the set of systems from which a system is assigned.

**Prompt user for system**
Use tables of available and selected systems to control the systems to be displayed in a prompt in response to the **Run** or **Test Run** action for a template.

**Systems for domain: *domain-name***
The Systems for domain table shows the full set of systems for the domain, in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

Use **Add** or **Remove** to build the list of systems that will be included in the user prompt. The user can select from that list.

**Systems for user prompt**
The Systems for user prompt table shows the systems that are included in the user prompt.

## Modify a shared resource pool

To modify a shared resource pool, use the **Shared Resource Pool** action. Modifying a shared resource pool affects all of the templates that are associated with the shared resource pool. For a domain-shared resource pool, this modification affects all of the tenants and templates that are associated with the shared resource pool.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed in the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Modify**.
4. To modify the shared resource pool for a tenant or domain, select the appropriate action, as follows:
   - For a tenant-shared resource pool:
     a. Click the **Tenants** tab. In the Tenants table, select the tenant with the shared resource pool.
     b. Click **Actions**, then select **Shared Resource Pools**, then select **Modify Shared Pool**.
   - For a domain-shared resource pool:
     a. Click the **Shared Resource Pool** tab.
     b. In the table, click **Actions**, then select **Modify Shared Pool**.

   You can also modify a shared resource pool when you modify a tenant or a domain.
5. Supply values on the **Modify Shared Resource Pool** window. See "Values on the Modify Shared Resource Pool window " on page 112.

### What to do next

To associate a template with a shared resource pool:, in the Tenants table or Domains table, click **Actions**, then select **Shared Resource Pool**, then select **Add Template**. On the resulting window, select a tenant from the list.

To remove a template and the associated shared resource pool, in the Tenants table or Domains table, select **Shared Resource Pool**, then select **Remove Template**.

For more information, see "Removing systems from a domain" on page 65.

## Values on the Modify Shared Resource Pool window

### Instance Details

**Software services instance name prefix**
Character string to use as the beginning of the names of instances when they are created from templates. The requirements and the fields that are displayed for the prefix vary with the software type and vendor. For a shared resource pool, all three fields are required because the shared resource pool might be used when you provision any software type, for example, CICS, Db2, or WebSphere Application Server Liberty. For help on specifying the prefix, you can also hover the mouse pointer on for the field.

**Use SNA APPLID**
Indicates that the character string should be derived from the SNA application ID. This option requires a network pool to be created, and is automatically selected if a network administrator was specified for the domain. This prefix is used for CICS templates when the SNA APPLID is available.

**Specify general name prefix**
Specify a character string that is up to six alphanumeric characters. The first character must be alphabetic. You can specify a wildcard character (*) as the last character.

**Specify subsystem name prefix**
Specify a character string that is up to 2 characters.

**Maximum number of software services instances**
Maximum number of software services instances that are allowed: Up to 1296 for a standard template, or up to the lowest maximum that was set for the associated child templates, for a composite template.

**Maximum number of software services instances for a user**
Maximum number of software services instances that are allowed for a single user. If you do not specify a value, the only limit for a standard template is the one that is specified for Maximum number of software services instances. For a composite template, if a child template set a maximum other than 1, the valid maximum is shown in parentheses.

**Maximum days to keep provisioned software services instances**
Maximum number of days until a provisioned instance expires. When a provisioned instance exceeds this time limit, it is marked as expired, and the instance is placed in *provisioned-expired* state. This limit applies to both standard and composite templates.

When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.

The domain administrator can modify this time limit. Doing so changes the time limit for provisioned instances that are created after the modification. Existing instances are not affected.

If you do not specify a value, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Allow members of the tenant to access and run actions for software services instances**
Allow members of the tenant to view and perform actions against software services instances that are provisioned from the template. If you do not select this option, users must be owners of the template or domain administrators to have that authority.

## Allow Modify Account

**Allow account information to be modified when the template is provisioned**
Specifies whether the account information can be modified when a template is provisioned, with a **Test Run** or **Run** action. For a composite template, this option is selected if it is selected for any of the child templates.

## Job Statement JCL

**Specify customized JOB statement JCL (standard templates only)**
Select this to supply JOB statement JCL that will be used in all provisioning jobs. Job names:

- Can be up to 8 characters, consisting of A-Z, a-z, 0-9, and these special characters: # $ @
- Must start with an alphabetic character or one of these special characters: # $ @
- Can use workflow variables, which you specify as follows:

  **${_workflow-softwareServiceInstanceName}**
  Software service instance name

  **${_workflow-workflowOwnerUpper}**
  Workflow owner

  **${_step-stepOwnerUpper}**
  Workflow step owner

Click **Restore Default** to discard any changes you have made and restore the default JCL.

## Resource Management

**Create network resource pool**
Select this option to cause a resource pool for the template to be created with network resources. A network resource pool defines shared network resources within the domain.

This option is enabled only if a network administrator is defined for the domain and the template is a standard template or a composite cluster template.

The network administrator must complete the network resource pool definition by using the Network Configuration Assistant task, in the Configuration category.

See the documentation from the software provider for information about whether the template requires a network pool. This documentation can include:

- A readme file
- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Create workload management pool (standard templates only)**
Select this option to cause a workload management resource pool to be created. The resource pool is created with the name *domain*.*tenant*.*template-type*.

This option is enabled only if a workload management administrator is defined for the domain.

The workload management administrator must complete the workload management pool definition by using the Workload Management task, in the Performance category.

See the documentation from the software provider for information about whether the template requires a workload management pool. This documentation can include:

- A readme file

- Administrator documentation, which you can access by viewing the template with the Software Services task.

**Service Level Agreement (standard templates only)** Select a value to specify the level of performance that the software services instance requires.

**PLATINUM**
Highest

**GOLD**
High

**SILVER**
Intermediate

**BRONZE**
Low

The WLM administrator must associate the service level agreement that is specified in the WLM resource pool for the tenant with a service class that provides the appropriate level of performance. This option is available only if a workload administrator was specified for the domain.

**Create LPAR resource pool**
Select this option to cause a logical partition (LPAR) resource pool for the template to be created. An LPAR pool defines LPAR resources within the domain. This option creates a table that allows you to add, modify, or remove volumes and other resources for the LPAR pool.

The LPAR pool can only be used by z/OS provisioning templates.

## Systems

**System selection for provisioning**
Select an option for selecting the system on which the software service is provisioned.

**Use a specific system**
Select a system on which the template is to be provisioned, in the System field.

**Assign system automatically**
Select a system from a list of available systems.

**Systems for domain: *domain-name***
The available systems are shown in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

The Systems for domain table shows the set of systems for the domain, for a standard template, and the systems that are common to all of the child templates, for a composite template.

Use **Add** or **Remove** to build the set of systems from which one will be automatically assigned for provisioning.

For a clustered composite template, all of the selected systems must exist in the same sysplex.

**Systems for automatic assignment**
The Systems for automatic assignment table shows the set of systems from which a system is assigned.

**Prompt user for system**
Use tables of available and selected systems to control the systems to be displayed in a prompt in response to the **Run** or **Test Run** action for a template.

**Systems for domain: *domain-name***
The Systems for domain table shows the full set of systems for the domain, in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

Use **Add** or **Remove** to build the list of systems that will be included in the user prompt. The user can select from that list.

**Systems for user prompt**
The Systems for user prompt table shows the systems that are included in the user prompt.

# View a shared resource pool

To view a shared resource pool, use the **Shared Resource Pool** action.

## Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Modify**.
4. To view the shared resource pool for a tenant or domain, select the appropriate action, as follows:
   - For a tenant-shared resource pool:
     a. Click the **Tenants** tab. In the Tenants table, click the name of the tenant with the shared resource pool.
     b. Click the **Shared Resource Pools** tab. In the Tenants table, select the tenant with the shared resource pool.
     c. Click **Actions**, then select **Shared Resource Pools**, then select **View**.
   - For a domain-shared resource pool:
     a. Click the **Shared Resource Pool** tab.
     b. In the table, click **Actions**, then select **View Shared Pool**.

## Values on the View Shared Resource Pool window

### Template Details

A table shows information about templates that are associated with the shared resource pool.

### Resource Pool Details

**Resource pool name**
Name of the resource pool that is associated with the templates. The name is in the form *domain-name.tenant-name.template-name*.

**Resource pool ID**
An internal identifier that z/OSMF assigned to the resource pool.

**Resource pool ready**

**true**
The resource pool is ready.

**false**
The resource pool is not ready.

**Resource pool quiesced**

**true**
The resource pool is quiesced. No new resources are provisioned for the resource pool.

**false**
The resource pool is not quiesced.

## Instance Details

**Use SNA APPLID (standard templates only)**

**true**
Derive the software service instance name prefix from the SNA application ID.

**false**
Do not derive the software service instance name prefix from the SNA application ID.

This value is always false if a network administrator was not specified for the domain.

**Software service instance subsystem name prefix**
The appropriate value is used in the name of a software services instance when it is created from a template that is associated with the shared resource pool.

**Maximum number of software services instances**
Maximum number of software services instances that are allowed: up to 1296 for a standard template, or up to the lowest maximum that was set for the associated child templates, for a composite template.

**Maximum number of software services instances for a user**
Maximum number of software services instances that are allowed for a single user. If no value is specified, the only limit for a standard template is the one for Maximum number of software services instances.

**Actual number of software services instances**
Actual number of software services instances that exist.

**Maximum days to keep provisioned software services instances**
Maximum number of days until a provisioned instance expires. When a provisioned instance exceeds this time limit, it is marked as expired, and the instance is placed in *provisioned-expired* state. This limit applies to both standard and composite templates.

When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance. By default, no time limit is set; a provisioning instance is retained until it is deleted explicitly by the domain administrator.

The domain administrator can modify this time limit. Doing so changes the time limit for provisioned instances that are created after the modification. Existing instances are not affected.

If you do not specify a value, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Allow members of the tenant to access and run actions for software services instances**
Indicates whether members of the tenant can view and perform actions against software services instances that are provisioned from the template. If this option is not selected, users must be owners of the template or domain administrators to have that authority.

## Allow Modify Account

**Allow account information to be modified when the template is provisioned**
Indicates if the account information can be modified when a template is provisioned with a **Test Run** or **Run** action. For a composite template, this option is true if it is true for any of its child templates.

## History

The **History** tab shows a history of the actions that were performed on the template and resource pool.

*Table 60. Columns in the History table*

| Column | Description |
|---|---|
| **Type** | Type of action that is taken on the template or resource pool, such as "modify.” |
| **Ran by User** | User ID under which the action was performed. |

*Table 60. Columns in the History table (continued)*

| Column | Description |
|---|---|
| **Ran at Time** | Time at which the action occurred. |
| **Details** | Description of the action. |

## Job Statement JCL

**Customized JOB statement JCL (standard templates only)**
JCL that will be used in jobs for the resource pool. The job name can use workflow variables:

**${_workflow-softwareServiceInstanceName}**
Software service instance name

**${_workflow-workflowOwner}**
Workflow owner

**${_step-stepOwner}**
Workflow step owner

## Resource Management

**Create network resource pool (standard templates only)**
Indicates if a network pool should be created. This value is always false if a network administrator was not specified for the domain.

**Network pool status**
Status of the network pool.

**Create workload management pool (standard templates only)**
Indicates if a workload management pool should be created.

**Workload management pool status**
Status of the workload management pool.

**Service level agreement**
Service level agreement for the workload management pool. Specifies the level of performance that the software services instance requires.

**PLATINUM**
Highest

**GOLD**
High

**SILVER**
Intermediate

**BRONZE**
Low

**Report class**
WLM report class for the workload management pool.

**Create LPAR resource pool**
Select this option to cause a logical partition (LPAR) resource pool for the template to be created. An LPAR pool defines LPAR resources within the domain. This option creates a table that allows you to add, modify, or remove volumes and other resources for the LPAR pool.

The LPAR pool can only be used by z/OS provisioning templates.

## Systems

**System selection for provisioning**
Select an option for selecting the system on which the software service is provisioned.

**Use a specific system**
Select a system on which the template is to be provisioned, in the System field.

**Assign system automatically**
Select a system from a list of available systems.

**Systems for domain: *domain-name***
The available systems are shown in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

The Systems for domain table shows the set of systems for the domain, for a standard template, and the systems that are common to all of the child templates, for a composite template.

Use **Add** or **Remove** to build the set of systems from which one will be automatically assigned for provisioning.

For a clustered composite template, all of the selected systems must exist in the same sysplex.

**Systems for automatic assignment**
The Systems for automatic assignment table shows the set of systems from which a system is assigned.

**Prompt user for system**
Use tables of available and selected systems to control the systems to be displayed in a prompt in response to the **Run** or **Test Run** action for a template.

**Systems for domain: *domain-name***
The Systems for domain table shows the full set of systems for the domain, in the form *sysplex-name*.*system-name*. LOCAL indicates the system that you are logged on to.

Use **Add** or **Remove** to build the list of systems that will be included in the user prompt. The user can select from that list.

**Systems for user prompt**
The Systems for user prompt table shows the systems that are included in the user prompt.

**Allow resources to be relocated to other systems**
Select this to specify that the template's instances can be relocated to another system in the sysplex, meaning that the template's instances can each run on a system in the sysplex other than the system that it was provisioned on. The candidate systems are managed in the resource pool for the tenant in which the template is created. You cannot select this option for a standard template if there are provisioned instances for the template.

## Quiesce a resource pool

To pause the provisioning of new resources for a resource pool, you can use the **Quiesce** action. You might quiesce a resource pool in preparation for deleting it, when there are no resources provisioned for the resource pool.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. Click **Actions**, then select **Modify**.
4. To quiesce a resource pool for a tenant or domain, select the appropriate action, as follows:
   - For a tenant:
     a. Click the **Tenants** tab.
     b. In the Tenants table, select the appropriate row, click **Actions**, and then select the appropriate action, as follows:

- For a shared resource pool, select the tenant and then use the **Shared Resource Pool** action with a Quiesce option. Shared resource pools have names ending with an asterisk (*).
- For a dedicated resource pool, select the tenant, then use the **Modify** action for the tenant. On the **Modify Tenant** window, click the Dedicated Resource Pools tab. In the resulting table, select the appropriate row, then use the **Quiesce Dedicate Pool** action.
- Click **Actions**, then select **Shared Resource Pools**, then select **Quiesce Shared Pool**.

- For a domain-shared resource pool:
  a. Click the **Shared Resource Pool** tab.
  b. In the table, click **Actions**, then select **Quiesce Shared Pool**.

### Results

The shared resource pool is quiesced, which is indicated by this before the resource pool name.

### What to do next

You can unquiesce a quiesced resource pool. Use the **Unquiesce** option of the appropriate action.

If you want to delete the shared resource pool, there must not be any currently provisioned resources for the pool.

# Defining workload management resource pools

The WLM resource pool administrator uses the Resource Pools tab of the Workload Management task to define workload management resource pools.

WLM resource pools associate cloud information, such as a tenant name and domain ID, with WLM elements, such as report classes and classification rules.

The workload management administrator modifies and completes the WLM pool definition.

## Modifying resource pools

To modify a resource pool, you can use the **Modify** action provided in the **Resource Pools** tab.

### Procedure

1. Select the **Workload Management task** under the Performance category in the navigation area. The **Workload Management** page opens.
2. In the **Overview** tab, click the **WLM Resource Pools** link. The **WLM Resource Pools** tab is displayed.
3. Select a resource pool. From the **Actions** menu or context menu, select **Modify**. You can select only one resource pool.
4. Make changes as needed.
5. Click **Save** or **Complete** to save your changes.
   - **Save** saves any changes that you made.
   - **Complete** saves the changes and indicates that the WLM resource pool definition is complete and ready for use by a provisioning and deprovisioning classification rule. The report class specified in the WLM resource pool is provisioned.

## Values on the Modify window

**WLM resource pool name**
Name of the WLM resource pool definition.

**Tenant name**
Name of the tenant that the WLM resource pool is associated with.

**Domain name**
Name of the domain that the WLM resource pool is associated with.

**Service class mapping**
Specify the service class mapping.

**Template name**
Name of the template that the resource pool is associated with.

**Subsystem**
Name of the subsystem.

**Qualifier type**
Specify the type of qualifier.

**Report class**
Specify the report class.

# WLM Resource Pools tab

You can use the **WLM Resource Pools** tab in the Workload Management task to view and modify WLM resource pools.

A WLM resource pool is used in support of IBM Cloud Provisioning and Management for z/OS. It associates cloud information, such as a tenant name and domain ID, with WLM elements, such as report classes and classification rules. You define domains and tenants with the Resource Management task in the Cloud Provisioning category.

## Columns in the WLM Resource Pools table

*Table 61. Columns in the WLM Resource Pools table*

| Column | Description |
|---|---|
| **Name** | Name of the WLM resource pool definition. |
| **Tenant Name** | Name of the tenant that the WLM resource pool is associated with. |
| **Template Type** | Type of template that the WLM resource pool is associated with. |
| **Created By** | User ID for the creator of the WLM resource pool. |
| **Created Time** | Time that the WLM resource pool was created. |
| **Status** | Status of the WLM resource pool. |
| **Last Modified (GMT)** | Date and time the item was last modified. |
| **Modified By** | User ID of the person who last modified the item. |

## Actions for WLM resource pools

The actions are described in the following tables:

- Targeted actions. Actions that apply to the selected resource pool. To use a targeted action, you must select a resource pool.
- Table actions. Actions that apply to the entire table. No selection is required.

*Table 62. Targeted actions*

| Action | Description |
|---|---|
| **View** | Display details about the selected resource pool. |

*Table 62. Targeted actions (continued)*

| Action | Description |
|---|---|
| **Modify** | Modify and complete the selected resource pool. If the action is not listed, the z/OSMF role to which your user ID is assigned might not be authorized to modify WLM resource pools. To obtain authorization, contact your z/OSMF administrator. |
| **Delete** | Delete the selected resource pool or resource pools. If the action is not listed, the z/OSMF role to which your user ID is assigned might not be authorized to delete WLM resource pools. To obtain authorization, contact your z/OSMF administrator. |

*Table 63. Table actions*

| Action | Description |
|---|---|
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns should be fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view. This action is listed only when the filter row is displayed in the table. |
| **Show Filter Row** | Display the filter row. This action is listed only when the filter row is not displayed in the table. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. |
| **Clear Search** | Clear the search. |

# Defining network resource pools

The network administrator uses the Network Configuration Assistant task to define network resource pools.

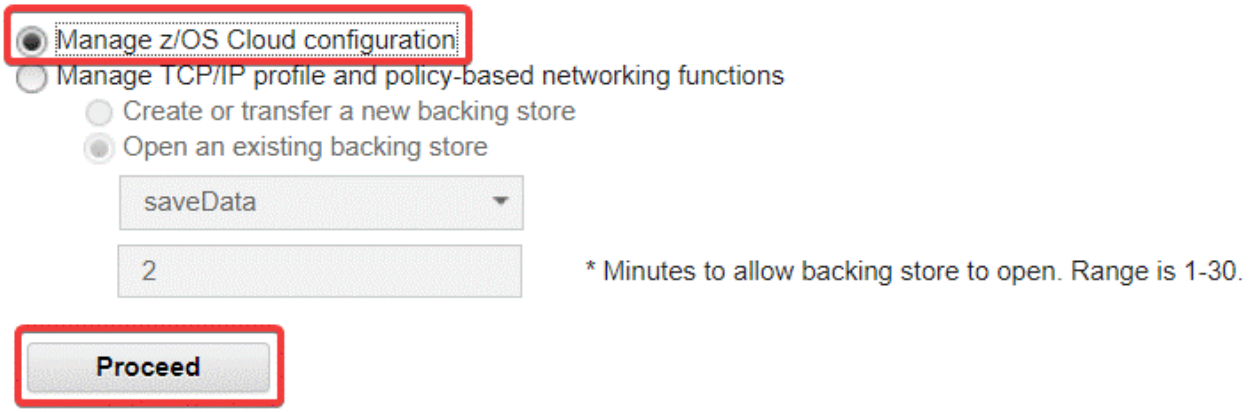
If you have already performed the initial setup of the Network Configuration Assistant task for Cloud Provisioning, as described in “Set up Network Configuration Assistant for Cloud Provisioning” on page 30, you can skip those steps, and proceed directly to “Calculate Network Resource Requirements ” on page 124.

## Getting Started Tutorial - Cloud

### Manage z/OS Cloud Configuration

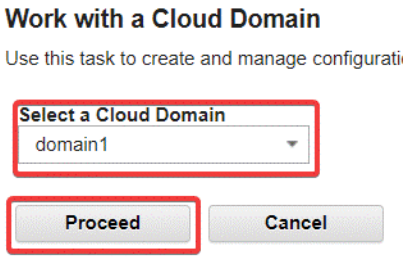
Before you can manage a cloud network configuration, one or more domains must be created by the Cloud Provisioning administrator using the Resource Management task in the Cloud Provisioning category and your z/OSMF user id must have been given appropriate privileges to manage the networking role for a domain. As part of this task, Network Administrator user IDs for the domain are identified and given the privileges to manage the networking resources for that domain. This task must be completed before Network Configuration Assistant can manage any Cloud networking resources. Only the user IDs authorized by this task have the privileges to manage a domain from Network Configuration Assistant.

You can see the welcome screen when the Network Configuration Assistant is started. From this screen, click the **Manage z/OS Cloud configuration** radio button, then click **Proceed**.




## Work with a Cloud Domain

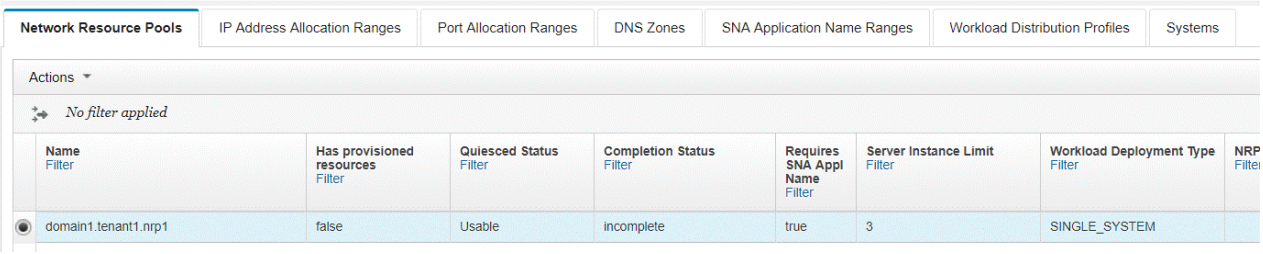
Select the cloud domain you want to work with then click, **Proceed**.




## Become Familiar with the Cloud Primary Tabs

1. Click the different tabs across the panel to access the reusable objects (Network Resource Pools, IP Address Allocation Ranges, Port Allocation Ranges, DNS Zones, SNA Application Name Ranges, and Systems).

   Each of the panels contains a table with an **Actions** menu on the table.
2. Click the **Tools** list to change logging levels for debug purposes.

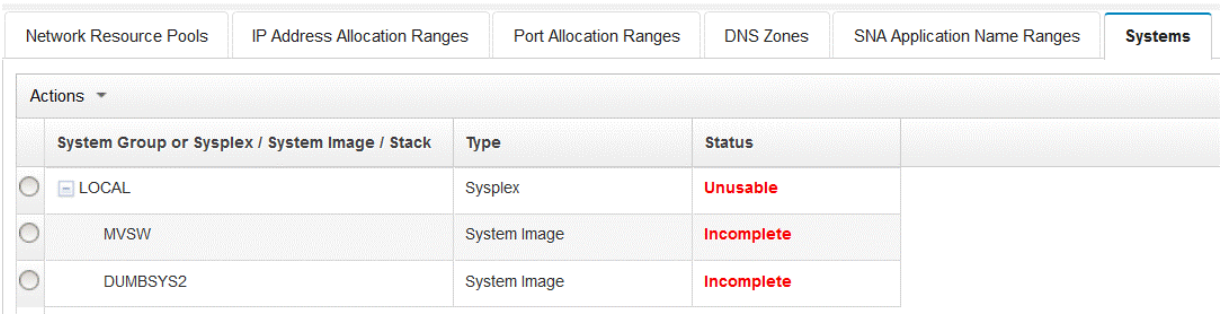



In the above screen capture, the Network Resource Pools tab contains one Network Resource Pool. The first time that you manage a Cloud Domain, you might see zero or more Network Resource Pools in the Network Resource Pools table. Network Resource Pools are created automatically from a Resource Management task outside of Network Configuration Assistant. This occurs in the task when a software services template is associated with a Tenant and the software services template requires networking resources. Subsequent pages in this tutorial discuss Network Resource Pools in more detail.

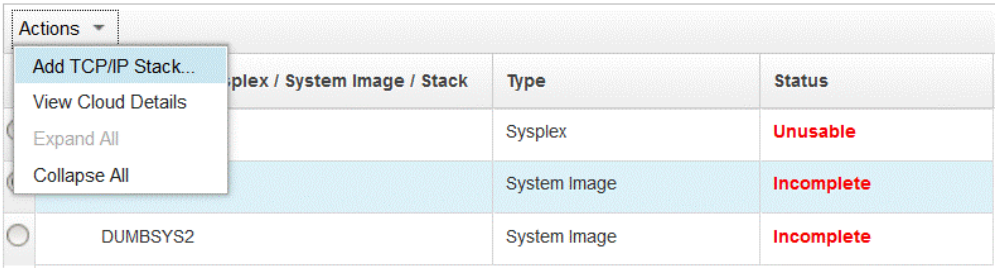
## Define a TCP/IP Stack Under a System Image in the Sysplex That Is Used for Network Resource Provisioning

Take the following steps to add a TCP/IP stack.

1. Click the **Systems** tab.

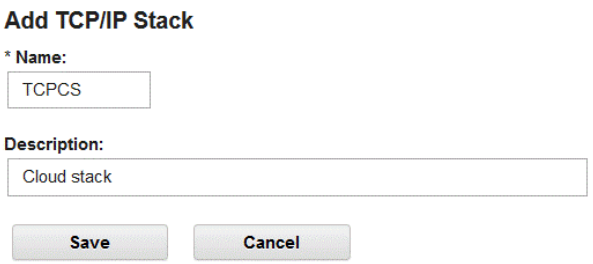



2. Select the system image you want to add a TCP/IP stack under.
3. Click the **Actions** menu then select **Add TCP/IP Stack...**.




4. In the **Name** field, specify the actual TCP/IP stack name. This can be determined from a 'DISPLAY TCPIP' command if unknown.

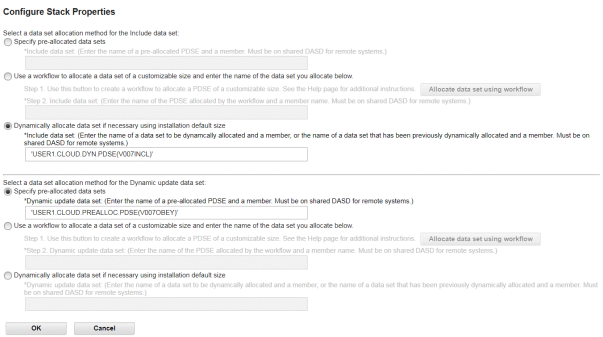
   **Restriction:** Only a single INET TCP/IP stack is supported on a system image that is used for network resource provisioning. Use of a CINET TCP/IP stack for network resource provisioning is not supported.
5. **Optional:** Add the description.
6. Click **Save**.




7. A message is displayed to ask whether to proceed to the next step. Click **Proceed**.

## Configure the TCP/IP Stack Cloud Data Sets

1. A panel to configure the stack's cloud data sets is displayed.



2. In the **Include data set** field, enter a previously allocated sequential data set or a member name of a previously allocated PDSE.

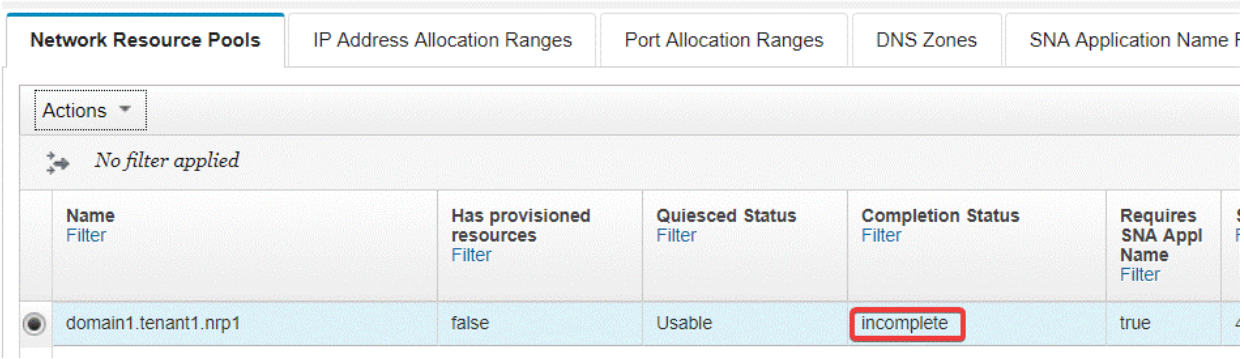
   The attributes of this data set must be similar to those of TCP profile data sets. If this TCP/IP stack is on a different system image than the system image running this z/OSMF server, the volume of this data set must be shared among the two system images. Remember the name of this data set because it will be used in a subsequent step. If your installation uses SAF data set profiles on this data set, you must grant the z/OSMF server's started task ID ALTER access to this data set profile.
3. In the **Dynamic update data set** field, enter a previously allocated sequential data set or a member name of a previously allocated PDSE.

   The attributes of this data set must be similar to those of TCP Profile data sets. If this TCP/IP stack is on a different system image than the system image running this z/OSMF server, the volume of this data set must be shared among the two system images. The dynamic update data set is used for TCP/IP OBEY files during provisioning. If your installation uses SAF data set profiles on this data set, you must grant the z/OSMF server's started task ID ALTER access to this data set profile and grant the TCP/IP started task ID READ access to the data set profile.
4. Click **Save**. A message is displayed, which discusses the expected behavior if the TCP/IP Profile technology of Network Configuration Assistant is used for this TCP/IP stack.
5. Click **OK** to close the message window and return to the Cloud perspective.

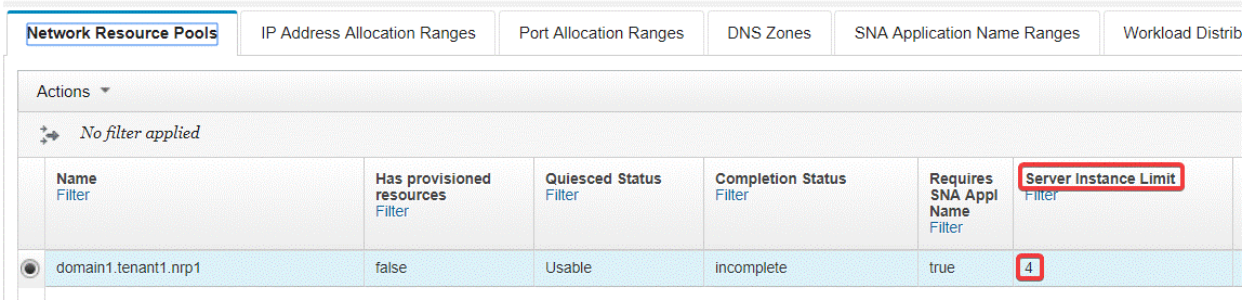
If you are not using the TCP/IP Profile technology to manage your TCP/IP Profile, edit the TCP/IP Profile data set on your system for the TCP/IP stack name that you entered. Add an Include statement that references the **Include data set** name that you entered. For example, if you entered an **Include data set** name of 'USER1.TCPIP.INCLUDE(TCPIP)', add the following Include statement to the+TCP/IP Profile data set: INCLUDE USER1.TCPIP.INCLUDE(TCPIP)

## Calculate Network Resource Requirements

- Click the **Network Resource Pools** tab. Find Network Resource Pools (NRPs) with an **Incomplete** status.




- Review the network resource requirements of the template associated with the network resource pool. Note the number of each type of network resource it requires. This represents the network resource requirements for one instance of a server built from this template.
- Note the Server instance limit of the NRP or its associated resource pool. Use this in combination with the resource template network resource requirements to understand the minimum number of each network resource type that will be required to satisfy the maximum number of servers allowed to be provisioned using this NRP. For example, multiply the number of IP addresses required in the resource template by the Server instance limit. This gives you the number of IP addresses that you need to make available to this NRP to provision the maximum number of server instances allowed by the domain administrator.

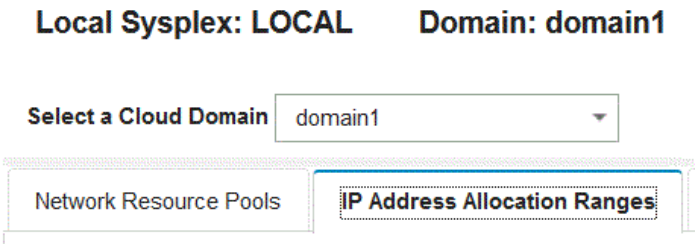



- Using the data collected and calculated above, configure IP Address Allocation Ranges, Port Allocation Ranges, and SNA Application Name Ranges with enough resources of each type to satisfy the numbers you calculated above.

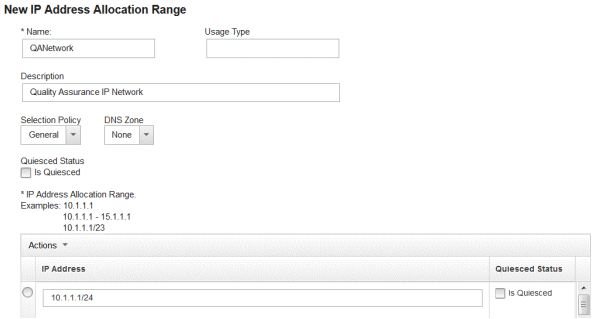
## Create an IP Address Allocation Range

If the networking requirements of the server template associated with the NRP require one or more IP addresses, create an IP Address Allocation Range or use an existing one that can satisfy the resource requirements. To create an IP Address Allocation Range, follow these steps:

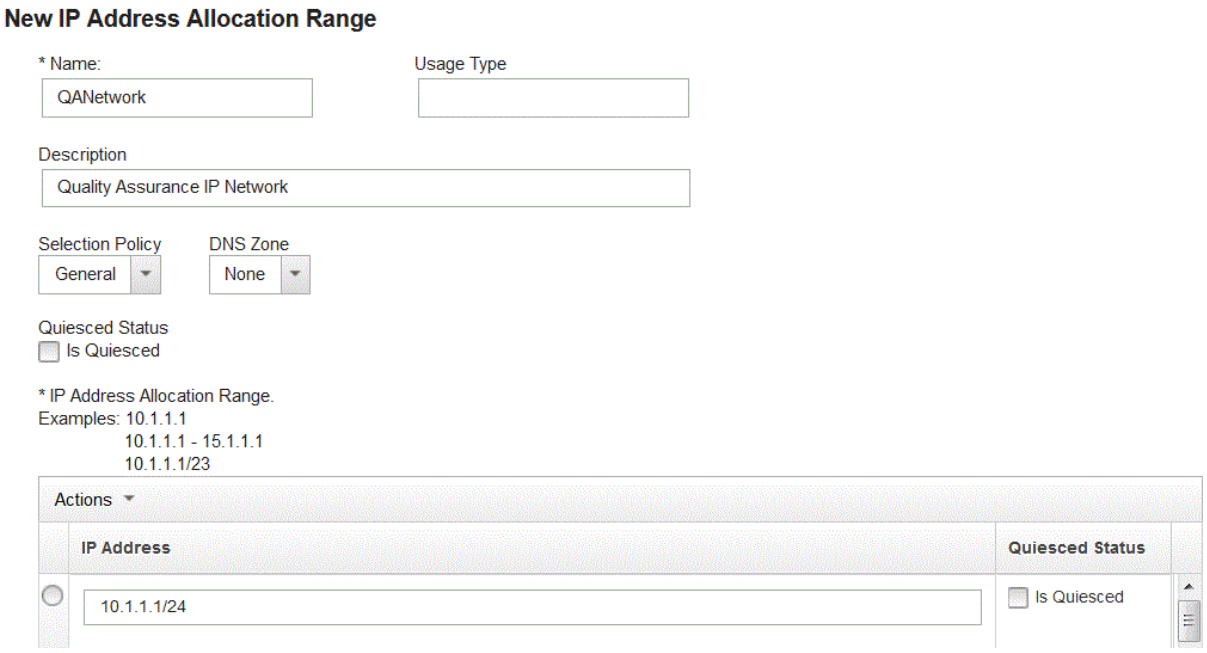
1. Click the **IP Address Allocation Ranges** tab.




2. From the **Actions** list, select **New**.



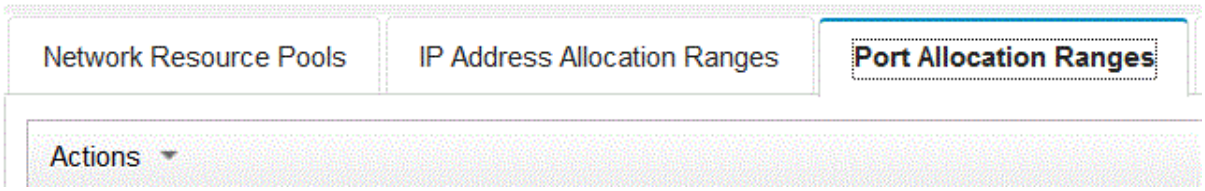

3. In the **Name** field, enter a name.
4. **Optional:** Add a description.
5. **Optional:** Enter a string in the **Usage Type** field. The entered value, even if no value is entered, must be coordinated with the usage type specified while provisioning the server instance. In most cases, leave the Usage Type field empty .
6. Clear the **Is Quiesced** check box. Quiesced resources cannot be used for provisioning requests.
7. In the **IP Address** table, enter a range of IP addresses. This can be a single IP address, a range in the format <low> - <high> or a subnet using CIDR notation. This example uses the subnet, 10.1.1.1/24 in the first row. This becomes a subnet reserved for cloud provisioning.
8. Clear the **Is Quiesced** check box in this table row.
9. Click **Save**.



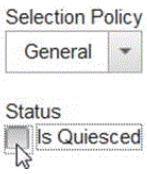

## Create a Port Allocation Range

If the networking requirements of the server template associated with the NRP require one or more ports, create a Port Allocation Range or use an existing one that can satisfy the resource requirements. To create a Port Allocation Range, follow these steps:

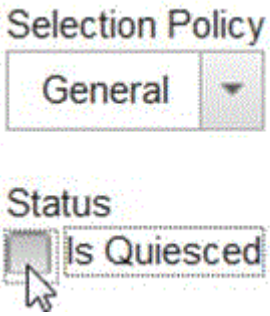
1. Click the **Port Allocation Ranges** tab.




2. From the **Actions** list, select **New**.
3. In the **Name** field, enter a unique name.
4. **Optional:** add a description.
5. **Optional:** Enter a string in the **Usage Type** field. The entered value, even if no value is entered, must be coordinated with the usage type specified while provisioning the server instance. In most cases, leave the Usage Type field here empty.
6. Clear the **Is Quiesced** check box.




7. Enter a set of individual port numbers or port ranges, one per row, in either or both of the TCP port range input table or UDP port range input table.
8. Clear the **Is Quiesced** check box in the rows where you entered ports.

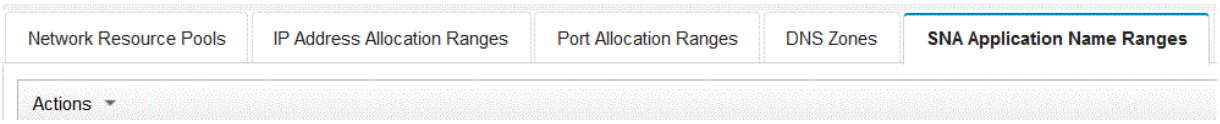



9. Click the **Help** link for more information on this panel and fill in the remainder of the panel according to your own requirements.
10. Click **Save**.

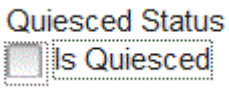
## Create a SNA Application Name Range

If the networking requirements of the server template associated with the NRP require one or more SNA application names, create a SNA Application Name Range or use an existing one that can satisfy the resource requirements. To create a SNA Application Name Range, follow these steps:

1. Click the **SNA Application Name Ranges** tab.




2. From the **Actions** list, select **New**.
3. In the **Name** field, enter a unique name.
4. **Optional:** add a description.
5. Clear the **Is Quiesced** check box.

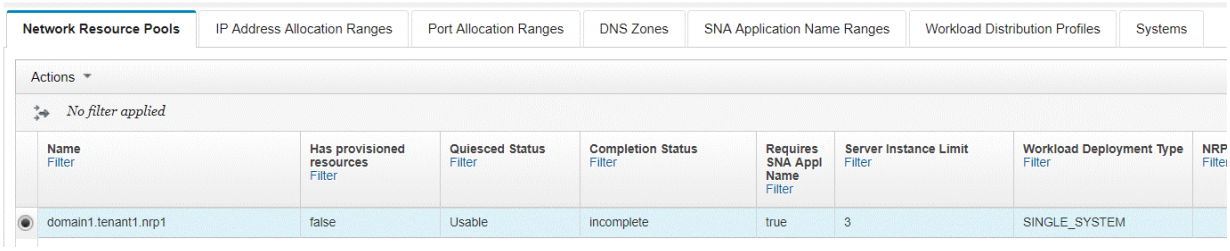



6. Enter a SNA application name range in the **SNA Range** box. The range must be a 1-5 character prefix followed by an asterisk, for example, CICSZ*. The valid characters are any that are valid for a VTAM® application name. The range you enter must match a VTAM model application name in a VTAM application major node that is available to the system where the associated server will be provisioned.
7. Click the **Help** link for more information on this panel.
8. Click **Save**.

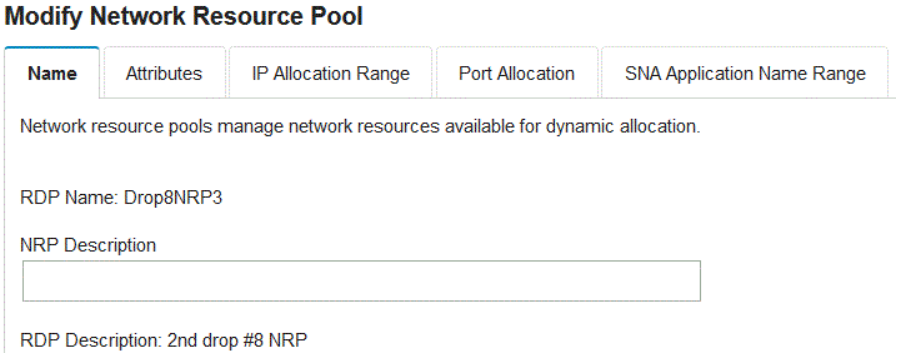
## Modify the Network Resource Pool

Modify the Network Resource Pool (NRP) to associate it with the required allocation ranges and assign attributes.

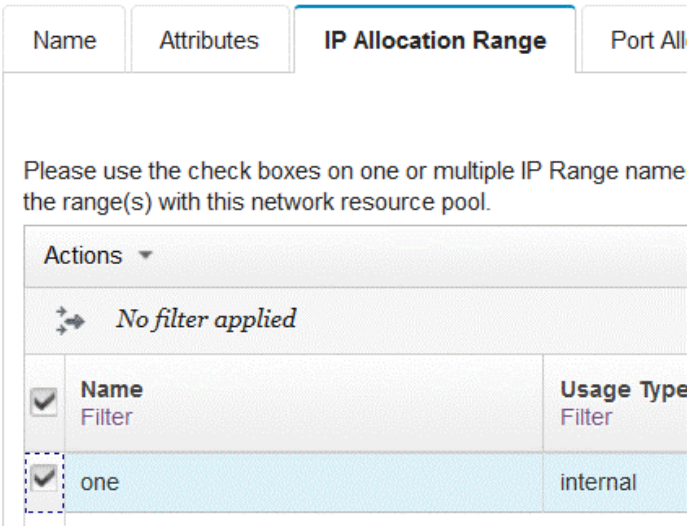
1. Click the **Network Resource Pools** tab.



2. Select the radio button of the desired NRP. New NRPs which require configuration have an "Incomplete" status.
3. From the **Actions** list, select **Modify**.
4. You should be on the **Name** tab. Enter an optional description of the NRP in the **NRP Description** field.

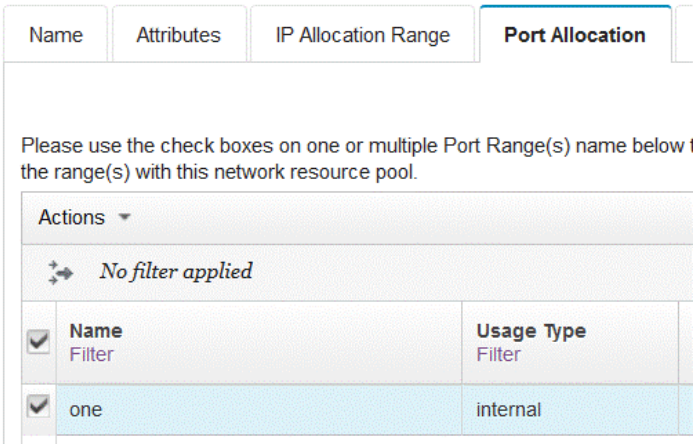



5. **Optional:** Click the **IP Allocation Range** tab if the server template represented by this NRP requires one or more IP addresses.



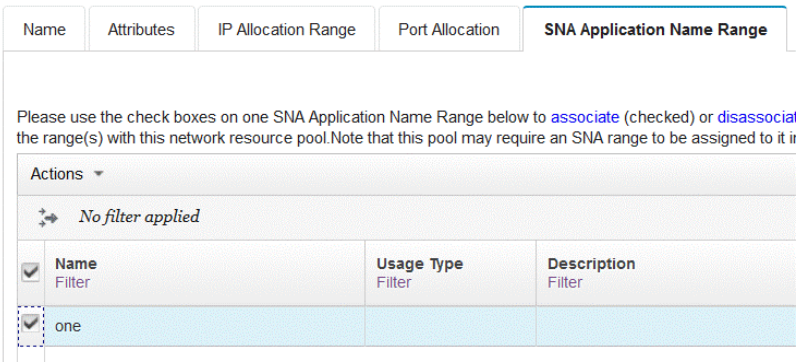

Select (with a check mark) any IP Address Allocation Ranges you want to associate with the NRP. Unchecked means not associated.

6. **Optional:** Click the **Port Allocation** tab if the server template represented by this NRP requires one or more ports.



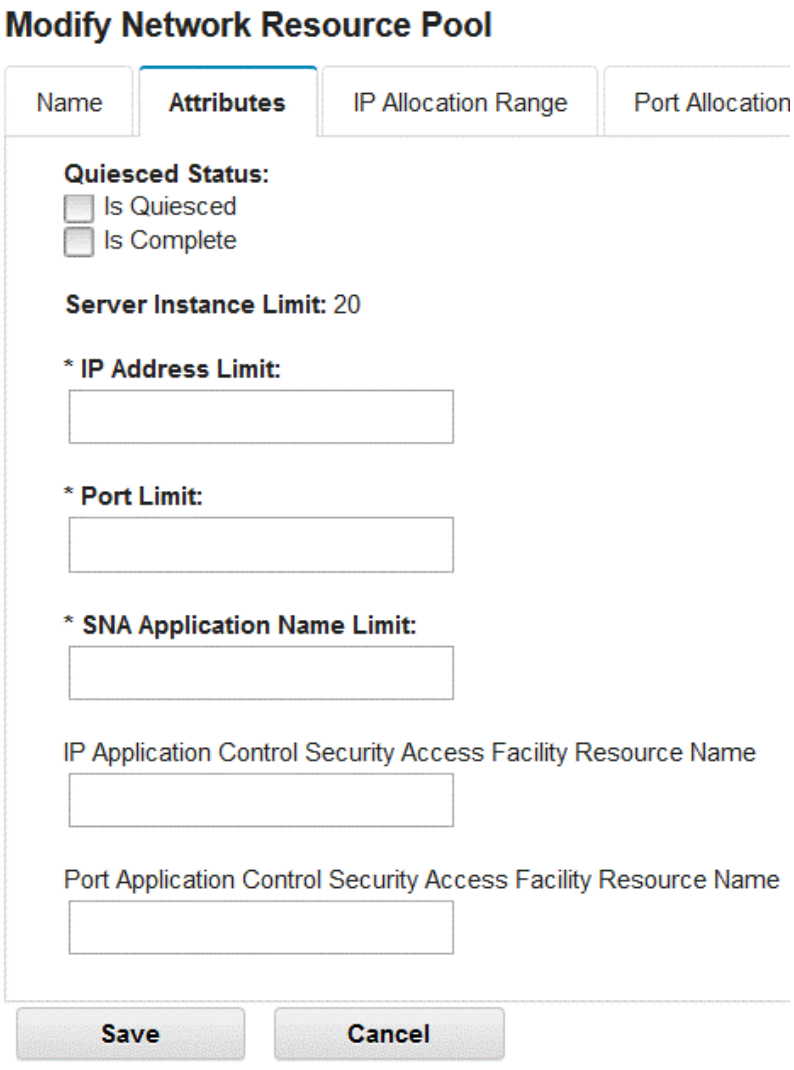

Select (with a check mark) any Port Ranges you want to associate with the NRP. Unchecked means not associated.

7. **Optional:** Click the **SNA Application Name Range** tab if the server template represented by this NRP requires one or more SNA application names.




Select (with a check mark) a single SNA Application Name Range you want to associate with the NRP. Unchecked means not associated.

8. Click the **Attributes** tab.

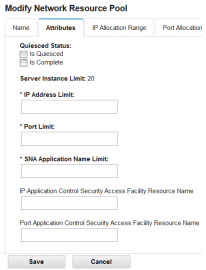



a. **Optional:** Enter resource limits in the **IP Address Limit**, **Port Limit**, and **SNA Application Name Limit** fields. An empty field or a value of zero (0) indicates no limit up until the available ranges are exhausted. These limits are primarily for cases where a pool of resources, such as an IP Address Allocation Range, is shared among more than one NRP. These limits prevent other NRPs

which share those resource pools from being starved of those resources by capping the number of resources this NRP can consume.

b. **Optional:** Enter a SAF resource name in the **IP Application Control Security Access Facility Resource Name**, and **Port Application Control Security Access Facility Resource Name** fields. These are SAF profiles that can be used by the TCP/IP stack at run time depending on TCP/IP Profile definitions.

c. Once you are satisfied that the NRP is complete and ready for provisioning, check the **Is Complete** check box. Once the check box is checked, it cannot be unchecked. The NRP status now becomes 'Complete'. The status might go to Attention at any point in the future if the networking requirements of the associated RDP are changed, including changes to the RDP's server instance limit, or changes to the RDP's need for SNA application names. When that case occurs, the NRP should be modified again and adjustments should be made to satisfy the new networking resource requirements of the RDP.




d. Click the **Save** button. Networking resources can now be provisioned by using this RDP for server templates that use the associated RDP.

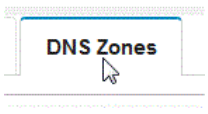
## Optionally Enable DNS Registration for Provisioned IP Addresses

**Optional:** Enable Network Configuration Assistant to update DNS dynamic to a domain name server for host-name-to-IP-address mappings.

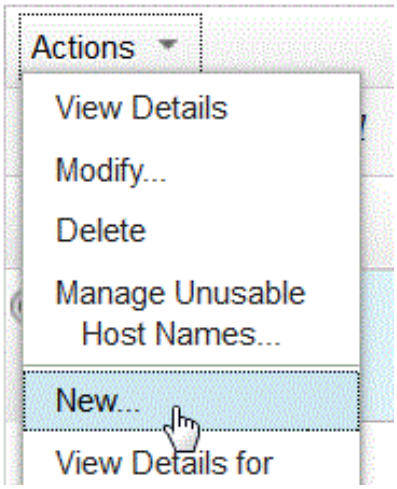
**Prerequisites:**

- An RFC 2136-compliant domain name server to be the authoritative name server for one or more DNS zones.
- Dynamic update capable zone definitions in this name server.
- Delegation of these zones from the zone's parent zone.
- Optionally, Transaction Signatures (TSIGs) defined for these zones for secure dynamic update:
- – If you create TSIG keys for these zones, FTP both the .key and .private keys to a z/OS UNIX directory where the z/OSMF server is running.
  – Under z/OS UNIX, edit the .private key and delete the last line that starts with "Bits". Leaving this line in makes the file incompatible with the z/OS version of nsupdate.
  – From z/OS UNIX, using a superuser ID, change the owner and group of both of the key files such that the z/OSMF started task ID is the owner of the files, for example:
  – - chown izusvr:izuadmin Kzcloud1.+157+59596.key
    - chown izusvr:izuadmin Kzcloud1.+157+59596.private
  – Ensure the file permission bits of both files are 400.
  – Start the name server.
- A network resource allocation provisioner that supplies **unique** host names on IP address REST provisioning requests.

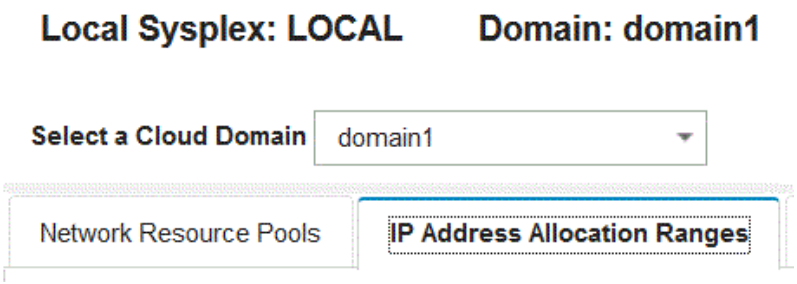
1. In Network Configuration Assistant, in the Cloud technology, click the **DNS Zones** tab.



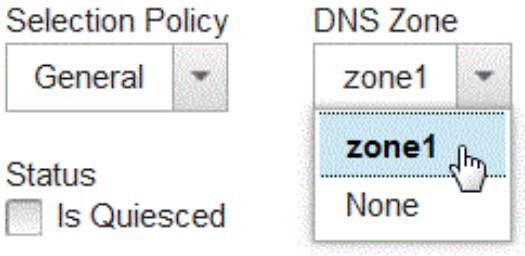
2. Click the **Actions** list and select **New**.




3. In the **Name** field, enter a name.
4. In the **Name Server Address** field, enter the IP address of the name server that is configured in the Prerequisites section.
5. **Optional:** Add a description.
6. Enter the name of the DNS zone that is configured in the name server in the **Zone Name** field, for example, 'dynamic.raleigh.ibm.com'.
7. If the zone configured in the name server is configured with a TSIG key, enter the z/OS UNIX path of the TSIG key in the **TSIG File** field. This is the z/OS UNIX path where you downloaded the TSIG key in the prerequisites section.
8. **Optional:** Enter a value in the **Time To Live** field.
9. Click **Save** to return to the Cloud perspective.
10. Click the **IP Address Allocation Ranges** tab.




11. Select an IP address allocation range to use for DNS registration and associate it with a DNS zone. Only the IP address allocation ranges that have no IP addresses currently allocated from that range can be associated with a DNS zone.
12. From the **Actions** list, select **Modify**.
13. From the **DNS Zone** list, select the name of the DNS zone that you entered.




14. Click **Save**. Repeat this step for other IP address allocation ranges to be associated with a DNS zone.

Any IP addresses provisioned from the IP Address Allocation Range configured above and which specify a unique host name in the request for its assigned DNS zone will have their host-name-to-IP-Address-mapping dynamically updated in the specified DNS server. For example, if the zone name is 'dynamic.raleigh.ibm.com' and the host name in the IP address provisioning request is 'host01', DNS queries for 'host01.dynamic.raleigh.ibm.com' would resolve to the IP address that was provisioned for that provisioned IP address.

### Configure OMPROUTE to Handle Provisioned IP Addresses

Perform this step outside of the Network Configuration Assistant GUI. This step is necessary to configure only the TCP/IP stacks that are used for Cloud and are running OMPROUTE unless OMPROUTE has already been configured for the IP addresses to be used for Cloud. The z/OS Cloud provisions IP addresses as dynamic VIPAs. See *Dynamic VIPAs and routing protocols* in the *z/OS Communications Server: IP Configuration Guide* for more information.

Use wildcarding in OMPROUTE configuration files to associate provisioned IP addresses with OSPF interfaces:

- For IPv4 interfaces, see the description of the **IP_ADDRESS** parameter of the **OSPF_Interface** statement in *OMPROUTE configuration file* in the *z/OS Communications Server: IP Configuration Reference*.
- For IPv6 interfaces, see the description of the Name parameter of the IPv6_OSPF_Interface statement in *OMPROUTE configuration file* in the *z/OS Communications Server: IP Configuration Reference*. Interface names for provisioned IPv6 addresses are dynamically generated and are of the format, "I<n>" where 'n' is composed of 1-15 digits in the range, 0-9, for example, I2467, I874972, etc.

# Resource management tasks – metering and capping

This topic describes the things that a domain administrator can do with the Resource Management task to manage metering and capping.

## Metering and capping

You can enable metering and capping for a tenant.

Metering provides CPU consumption for the tenant. Capping provides the ability to cap CPU resource consumption by the tenant for all services that are deployed by the tenant. You can enable either or both.

To enable metering or capping, you use fields on the Create Tenant or Modify Tenant pages. A workload administrator must have been specified for the domain that the tenant is associated with.

For capping, you specify a CPU capping type (based on LPAR share percentage, service units, number of CPs, or MSUs) and a CPU capping limit.

When metering is enabled, you can view the metered CPU use for a tenant by using the **View Metered Usage** action for the tenant in the tenant's table. Data for this view is retrieved from a single data server on one system in the sysplex. That data server gathers data from the RMF™ Monitor III data gatherer on each image in the sysplex. This function is called the Distributed Data Server (DDS). For more information, see the help for the Resource Monitoring task.

### Enabling metering

#### Before you begin

A workload administrator must have been defined for the domain.

#### About this task

You can enable metering when you create or modify a tenant. Use this procedure as a quick way to control metering.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. In the Tenants table, select a tenant.
4. Click **Actions**, select **Metering**, then select **Enable**.

   A WLM tenant resource group is created when a tenant is created with metering (or capping) enabled.

### What to do next

You can view metered CPU use for the tenant by selecting the **View Metered Usage** action for the tenant.

### *View Metered Usage window*

Use the **View Metered Usage** window to specify values for viewing CPU and memory use for the tenant.

**Time frame**

Using the time zone of the system the RMF DDS server is running on, specify either a beginning date and time or a date and time range for the data.

The view cannot include data for a time prior to when metering was enabled for the tenant.

**Data sample range**

Specify the range of a sample, in *hh*:*mm* format, where *hh* is a number of hours and *hh* is a number of minutes. The default is 00:15 (15 minutes).

### *Viewing metered usage*

The **View Metered Usage** page shows metered CPU use for the tenant in graphical form.

Each bar in the graph indicates a sample, the range (interval) for which you specified on the **View Metered Usage** window. A key below the graph describes the colors used in the graph, and lets you select either or both types of processor to include in the graph. When you select both, the bar is stacked, with IBM z Integrated Information Processor (zIIP) use on the top and general processor (CP) use on the bottom. Hover the mouse pointer over the bar to see the numerical value.

The time and date of the sample is indicated on the X (horizontal) axis. Use the **X axis scroll** to scroll the graph right and left.

Use the **Y axis scroll** to zoom the Y (vertical) axis. For example, when the bars are too short to be useful, zoom in to make them taller. You can control the units of the Y axis with the value that you select for **Metrics Display**.

There is a tab for each system, above the graph. Click a tab to see the graph for that system.

## Enabling memory and CPU capping

Use capping to limit the use of resources by a tenant.

### Memory capping

To enable memory capping, specify the value for the capping limit, in gigabytes.

### CPU capping

To enable CPU capping, specify a capping type and then specify the value for the capping limit.

*Table 64. CPU capping types and values*

| CPU Capping Type | Description | Values for Capping Limit |
|---|---|---|
| **LPAR share percentage** | The capacity is specified as a percentage of the LPAR share in the general-purpose processor pool. | 0.01-999.99 |
| **Service unit** | The capacity is specified in unweighted CPU service units per second. | 1-99,999,999 |
| **CP** | A number of general-purpose processors (CPs), including numbers with up to two decimal places. | 0.01 to 9,999.99 |
| **MSU** | The capacity is specified as millions of service units per hour. | 1-999,999 |

## How to enable capping

### Before you begin

A workload administrator must have been defined for the domain.

### About this task

You can enable capping when you create or modify a tenant. Use this procedure as a quick way to control capping.

### Procedure

1. Select and double-click the **Resource Management** task from the z/OSMF desktop. If the **Resource Management** task is not displayed on the desktop, select it from the App Center in the taskbar.
2. In the Domains table, select a domain.
3. In the Tenants table, select a tenant.
4. Click **Actions**, select **Capping**, then select **CPU** or **Memory**, then **Enable** .
5. On the resulting window, supply values.
6. Click **OK** to enable capping.

   A WLM tenant resource group is created when a tenant is created with capping (or metering) enabled.

## Restrictions and other considerations for Solution ID, Metering, and Capping

In some cases, the Resource Management task handles the creation or deletion of tenant resource groups in the WLM service definition for you. This has implications for modifying the solution ID, metering and capping.

**Supplying values or enabling options:** Supplying a solution ID or enabling metering or capping causes a tenant resource group to be created in the WLM service definition. A tenant resource group cannot be created when software instances are already provisioned for the tenant. So, you cannot supply a value for Solution ID, or enable metering or capping, if all of the following are true:

- Software instances have already been provisioned for the tenant
- No solution ID was previously supplied
- Metering was not previously enabled
- Capping was not previously enabled.

When you successfully supply a solution ID or enable metering or capping, the effect is as follows:

- If you specify a Solution ID, CPU use by current and future software instances that are associated with templates that exploit the WLM classification rule REST API is associated with the pricing container that is identified by the solution ID.
- If you enable metering, CPU use by current and future software instances that are associated with templates that exploit the WLM classification rule REST API is displayed with the **View Metered CPU Use** action for a tenant.
- If you enable capping, CPU use by current and future software instances that are associated with templates that exploit the WLM classification rule REST API is capped to the capping value that is specified for the tenant.

**Removing values or disabling options:** Similarly, removing a solution ID and disabling metering or capping causes a tenant resource group to be deleted from the WLM service definition. A tenant resource group cannot be deleted when software instances are already provisioned for the tenant. So, you cannot remove the Solution ID, or disable metering or capping, if all of the following are true:

- Software instances have already been provisioned for the tenant
- Removing the solution ID or disabling metering or capping would mean that the value for Solution ID would be blank and both metering or capping would be disabled. For example, if a solution ID is provided and both options are disabled, you can remove the solution ID and disable capping. You cannot then disable metering. Or, you could disable both options, but not then remove the solution ID.

When you successfully remove the solution ID or disable metering or capping, the effect is as follows:

- If the you remove a solution ID, all software instances that were previously associated with the pricing container are disassociated from the pricing container.
- If you disable metering, CPU use of current and future software instances is not reported when you use the **View Metered CPU Use** action for a tenant.
- If you disable capping, CPU use of current and future software instances is not capped.

## Considerations for a multiple sysplex domain

A domain can be defined to include systems from more than one sysplex. With a multiple sysplex domain, you can provision software instances across more than one sysplex in your enterprise, which allows your cloud provisioning environment to scale beyond the scope of a single sysplex.

In this configuration, you create the domain from a sysplex that you designate as the *primary z/OSMF system*. The objects that you create on the primary z/OSMF system are *managed domain objects* on the z/OSMF systems for the secondary sysplexes that are included in the domain.

Specifically:

- Tenants and templates that are created in the domain are *managed tenant and template objects* on the secondary z/OSMF systems.
- Resource pools that are created in the domain are *managed resource pool objects* on the secondary z/OSMF systems that are included in the resource pool system list.
- Registry instances that are created in the domain are *managed registry instances* on the secondary z/OSMF systems.

Managed domain objects can be viewed and used on any system in the domain. However, they are typically modified and removed only from the primary system.

### Planning the systems for the domain

To participate in a multi-sysplex domain, the primary and secondary systems must be defined in the Systems table of the z/OSMF Systems task, configured to communicate with each other, and enabled for single sign-on.

For information about how to perform these setup actions, see the following:

- *IBM z/OS Management Facility Configuration Guide*.

- The topic *"Defining your systems to z/OSMF"* in the online help for the z/OSMF Systems task.

For example, assume that your enterprise has three sysplexes and nine systems that are configured as shown in Figure 3 on page 136. In this configuration, the z/OSMF instance in sysplex A is the primary z/OSMF instance. It manages sysplexes B and C by communicating (through HTTPS requests) with the secondary z/OSMF instances in sysplexes B and C.

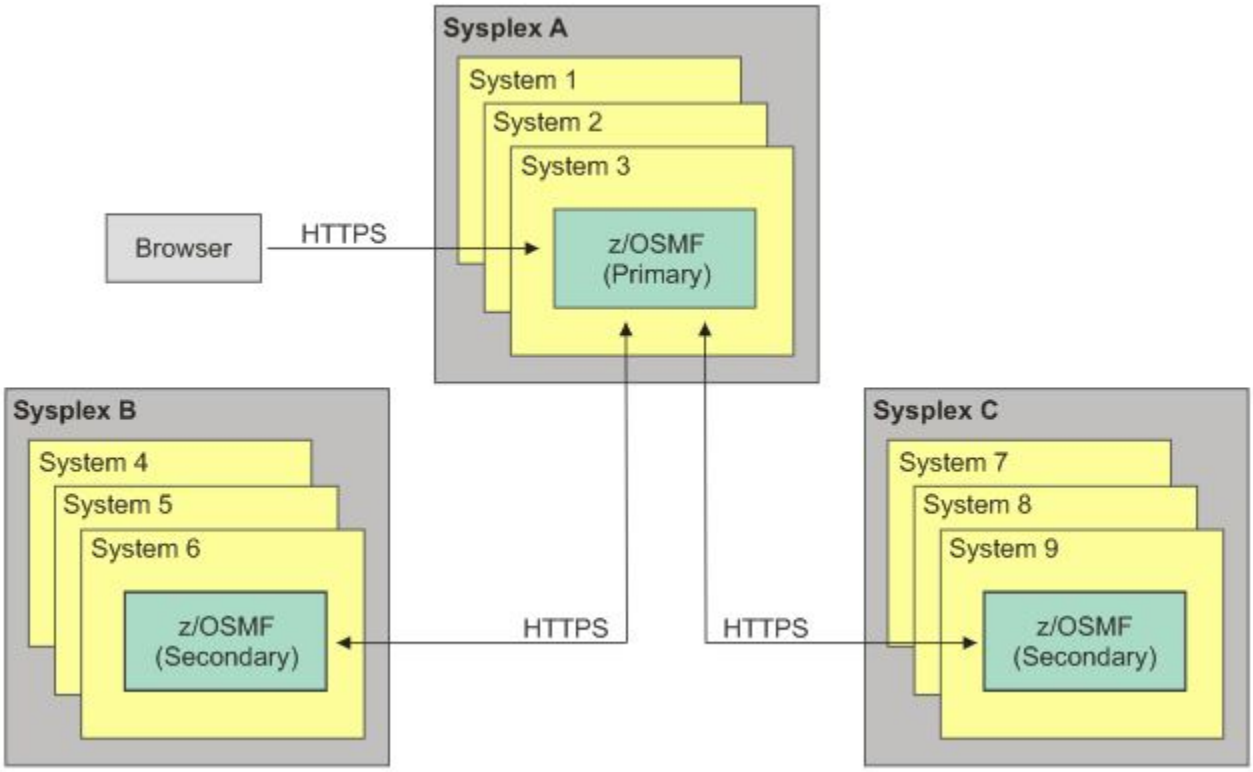



*Figure 3. A multiple sysplex configuration includes one primary z/OSMF system and one or more secondary z/OSMF systems*

The primary z/OSMF system is the one to which your web browser is connected, and it is the system that you use to create and modify objects in the domain. The other z/OSMF instances are referred to as secondary z/OSMF instances.

## How provisioning is performed

In a multiple system configuration, creating and modifying templates and other objects is done from the sysplex that you designate as the primary z/OSMF system. Objects that are created on the secondary systems are managed by the primary z/OSMF system. To define the domain, templates and other objects, you use the Cloud Provisioning Resource Management and Software Services tasks. In the user interface, the objects that are created on the secondary sysplex are shown as *managed*. Managed objects are viewable and usable on the sysplex where they reside, but they should be modified and removed only from the primary system.

Table 65 on page 136 shows the types of created objects that are managed from the primary system.

*Table 65. Managed object types in a secondary sysplex*

| Object | Description |
|---|---|
| Domain | Domain for provisioning. When a domain is created in Cloud Provisioning the systems that are part of the domain are included in the definition. During domain creation, for each system in the domain that resides in a secondary sysplex, a managed domain is created in the Cloud Provisioning image in the secondary sysplex. |

| *Table 65. Managed object types in a secondary sysplex (continued)* | |
|---|---|
| **Object** | **Description** |
| Tenant | Tenant for provisioning. When a tenant is created in Cloud Provisioning, for each system in the domain that resides in a secondary sysplex where a managed domain exists, a managed tenant is created in the managed domain in the secondary sysplex. |
| Resource pool | Resource pool for provisioning. A resource pool is created to define the resources in a template-to-tenant relationship. When a resource pool is created in a primary sysplex and the systems in the resource pool specify a secondary sysplex, the creation of the resource pool in the primary sysplex causes a managed resource pool to be created in the secondary sysplex.<br>• If a template requires network resources, the network administrator must complete the network resource pool from each sysplex for the systems that are specified in the resource pool.<br>• If a template requires WLM resources, the WLM administrator must complete the WLM resource pool from each sysplex for the systems that are specified in the resource pool. |
| Template | Template for provisioning. When a template is created in Cloud Provisioning, for each system in the domain that resides in a secondary sysplex where a managed domain exists, a managed template is created in the managed domain in the secondary sysplex.<br>Templates can be run only from the primary z/OSMF system. |
| Registry instance | Registry instance for provisioning. When a template run or test run operation is performed on a template, if the target system is in a secondary sysplex, the provisioning workflow runs on the secondary sysplex. In this case, a managed registry instance is created on the secondary sysplex and the registry instance on the primary sysplex is updated to state of provisioning on the secondary sysplex.<br>Registry instance actions must be performed on the primary z/OSMF system. Besides Deprovision, these actions can include Start, Stop, and Check Status. |

## Rules for a multiple sysplex environment

Observe the following rules for a multiple sysplex environment:

- Multiple sysplex domains, tenants, templates, and resource pools can be created and modified only from the primary sysplex. These objects should be removed from a secondary sysplex only in the event of an error, if they cannot be removed from the primary sysplex. Only the domain administrator can perform these actions.
- From z/OSMF on a secondary sysplex, do not create template, tenant, or resource pools in any "managed" domains. Templates, tenants, and resource pools for the managed domain must be created from the z/OSMF instance that is running in the primary sysplex.
- The primary sysplex and the secondary sysplexes must use the same cloud security mode: automatic or manual. A mix of automatic and manual cloud security modes between the primary and secondary sysplex is not supported.
- User IDs and group IDs that are used within the domain must exist in both the primary and the secondary sysplex. If the sysplexes have separate security databases, the user and group IDs must be defined in each security database. For example, consider consumer user IDs.
- Each sysplex has its own default domain. A primary sysplex cannot manage the default domain in a secondary sysplex. The multiple sysplex capability is not applicable to the default" domain. A default domain includes systems from the local sysplex only.

- Lower-level network resources to be used in the secondary sysplex must be configured by using the z/OSMF Network Configuration Assistant task in the secondary sysplex, not the primary sysplex.
- Lower-level WLM resources to be used in the secondary sysplex must be configured by using the z/OSMF Workload Management task in the secondary sysplex, not the primary sysplex.
- A multiple sysplex domain in a secondary sysplex includes only the z/OS systems in its local sysplex.
- The z/OSMF system settings in the primary sysplex must contain system definitions for all of the systems in the multiple sysplex domain. The z/OSMF system settings in the secondary sysplex must contain the system definitions for the systems in the secondary sysplex. The system definition for a system in the z/OSMF system settings in the secondary sysplex must match the system definition for a system in the z/OSMF system settings in the primary sysplex. That is, the system nicknames, systems, and sysplex names must be identical in the primary sysplex and the secondary sysplex.
- No more than one primary sysplex can be used to manage other secondary sysplexes.

# Chapter 6. Defining software services with templates

You can use the Software Services task of z/OSMF to provision z/OS software using templates.

To provision software, you work with templates. A software services template consists of workflows and associated actions and variables that can be used to provision z/OS software.

There are these types of templates:

**Standard**
Use these to provision a single software service.

**Composite**
Use these to provision more than one type of software service with a single Run operation. For more information about composite templates, see "Composite templates" on page 139.

## Composite templates

Use a composite template to provision multiple related software services with a single Run operation. For example, you might use a composite template to provision CICS and z/OS Connect. A composite template contains other templates that are:

- Published
- Standard type. A composite template cannot contain other composite templates.

A composite template is associated with a specific domain. The published standard templates that it contains must be in that domain.

The standard templates that are members of a composite template dictate the sequence that they provisioned in.

**Variables:** A provider can satisfy prompt variables that are associated with the standard template using the connectors field. If a prompt variable is also specified as a connector variable, the prompting of that variable is automatically disabled, because it is satisfied through the connectors field.

The composite template can also take in an optional variable input file, the composite properties file. This file contains atCreate variable values that are associated with the member standard templates. It is an alternative to providing the atCreate values with the Run action. The atCreate variable names are in this format: <*standard-template*>.<*atcreate-variable-name*>. If the composite properties file includes any variables that are associated with standard templates that are not members of the composite, those variables are ignored. All other variable names are validated to ensure they are atCreate variables associated with the member template. No validation is done on the values that are associated with the atCreate variables.

The precedence of values for the provisioning workflow is as follows. Values that are earlier in the list override values that are later in the list.

1. Connector and prompt values.
2. Values in the composite properties file.

The precedence of values for the action workflow is as follows:

1. Prompt values.
2. wfVar values that are specified in the actions definition.
3. Values in the composite properties file.

**Resource pools:** Like standard templates, composite templates must be associated with a tenant prior to being test run and run. The following describes values for the resource pools of a composite template:

**instance name prefix**
Specified by the resource pool for the composite template.

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**maximum number of instances**
Specified by the resource pool for the composite template. It cannot exceed the smallest maximum of all of the standard template resource pools.

**system selection**
Specified by the resource pool for the composite template. The system selection is limited to the common systems that are referenced by the resource pools of standard templates that are associated with the composite template. All of the standard templates that are associated with the composite template are provisioned on the same system.

**account information**
Obtained from the resource pool that is associated with the standard template.

**network resource pool**
Not specified by the resource pool for the composite template.

**workload management resource pool**
Not specified by the resource pool for the composite template.

The resource pools that are associated with the standard templates that are referenced by the composite template must exist in the same tenant as the composite template.

**Software services instances:** When you use the Run operation for a composite template, multiple catalog type registry instances are created, one parent and a child for each standard template in the sequence.

The composite resource pool prefix is applied to the parent software services instance only. The standard template resource pool prefix is applied to each child software services instance.

An instance count is updated for both the composite resource pool and for each of the standard template resource pools.

The parent software services instance contains an array of composite registry objects, and each child includes the parent registry instance object ID.

Once all of the child software services instances are provisioned, the parent software services instance moves to the provisioned state, and you can use the child software services instances, that is, you can perform actions against them. The deprovisioning action is allowed only against the parent instance. The deprovisioning sequence is the opposite of the provisioning sequence.

If any of the children fail provisioning, you can either:

- Deprovision the failed provisioning child along with any child instances that have already been provisioned. Any child in the being-initialized state will remain as is – no deprovision action is run against it.
- Restart the failed child instance. If the restart is successful, it resumes the provisioning of the remaining children instances.

Once you have deprovisioned the parent instance (by using the **Perform deprovision** action against it), you can delete the parent instance, which also deletes all of the child instances.

**Template Versions:** When a new version of a standard template that is included in a composite template is published, any composite template that includes the standard template as a member is archived. The user then has the option to either re-publish one or more of the affected composite templates or create a new version of them.

When a standard template that is a member of one or more composite templates is moved out of published state (with the Archive or Delete actions) and a new standard template is not provided simultaneously, all affected composite templates are put into missing_required_member state. The composite templates remain in that state until a version of the missing member is published. The new version must be a version of the original member that was included in the composite definition. Once the missing member template is in publish state, the composite template is put into archive state if only that member template was missing. Otherwise, the composite template remains in missing_required_member state until all of the member templates are present. From the archive state, the provider or user can chose to re-publish the archived composite templates if the content of the

standard templates and the connector information is still valid. If the content of the standard templates and the connector information is no longer valid, the user can create a new version of the archived composite template. The user should delete the previous version if it is no longer needed.

When all versions of a member template are deleted and a new unrelated standard template is published, all affected composite templates are put into missing_required_member state. The composite templates remain in that state indefinitely because there are no versions of the missing member template, and so the requirement that the member must be a version of the original member of the composite definition cannot be satisfied. The user can either delete the composite template or create a new version of it.

**Usage scenario:** Two published templates, template1 and template2, are located in the same domain, and are associated with the same tenant, with at least one system in common.

1. A provider creates a composite template from the published standard templates, specifying template1 as sequence 1, and template2 as sequence 2, with a connector value, TEMP2_VAR1 = TEMP1_VAR1 from template1.
2. The provider associates the composite template with the tenant, creates the resource pool, and then test runs the template.
3. The provider displays the instances table in the Software Services task. After the parent instance is in a provisioned state, the provider performs actions against the child instance for template1.
4. When the instance is no longer needed, the provider uses an action to deprovision the parent instance.
5. Once the parent instance is in a deprovisioned state, the provider removes it. This also removes all of the child instances.

# Files used to define software services templates

A standard software services template is defined with workflow definition files, action definition files, and variable input files. Documentation files describe the software services template, the content of the other files and the values that you might need to change. A composite software services template does not include workflow or action definition files, but includes a composite variable input file.

## Workflow definition file (standard templates)

A workflow definition file is the primary XML file for a workflow definition. It includes information about the workflow, such as name and version, as well as step and variable definitions.

For information about workflow definition files, see Creating workflow definitions for z/OS in *IBM z/OS Management Facility Programming Guide*.

You can use the Workflow Editor task to edit a workflow definition file.

You can also edit the workflow definition file for a template from the templates table. (The template must be in the draft or draft pending approvals state.) Select the **Modify** action for a template to display the **Modify** window. Then, click **Edit** for the workflow field to open the file in the workflow editor.

## Action definition file (standard templates)

An action definition file describes the actions that can be performed against the software services instance that is created from the software services templates.

You can use the actions editor to edit or create an actions definition file when modifying or adding a template.

## Variable input file (standard templates)

A workflow variable input file is a properties file that is used to specify in advance one or more of the input variables that are defined in the workflow definition.

For more information about variable input files, see Defining variables for your workflow in *IBM z/OS Management Facility Programming Guide*.

### Composite variable input file (composite templates)

Properties file that is used to specify in advance one or more of the input variables file for the composite template.

### Documentation files (standard and composite templates)

A documentation file is an optional text or PDF file that you can use to describe a template. There can be one for consumers and one for administrators.

You can use an editor of your choice to modify or create documentation files.

### Refreshing the files

You can use the **Refresh Template** action in the templates table to refresh any workflow definition, action definition, input variable, or documentation files that have been modified since the software services templates was created. **Refresh Template** is required before you use the Publish action, if those files have been modified since the software services templates was created.

# Software services tasks

This topic describes the things that you can do with the Software Services task.

The help for the Software Services task provides context-sensitive information for using the task.

## Add a template

To add template, click **Add Template** in the Templates table, then select either **Standard** or **Composite** to specify the type of template that you want to create. This is the first step in preparing a template for use in provisioning software.

### Before you begin

You must be a domain administrator to add a template. If you want to use a domain other than the default domain, you must have defined the domain with the Resource Management task. To create a composite template, you must have more than one standard template in the published state. If you would like to complete these steps using a video see How to create a template for IBM Cloud Provisioning and Management for z/OS (mediacenter.ibm.com/media/How+to+create+a+template+in+IBM+Cloud+Provisioning+and+Management+for+z+OS/0_ds5t1cbr/101043781).

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Services**.
2. Select the **Templates** tab.
3. In the table, click **Add Template**, then select either **Standard** or **Composite** to specify the type of template that you want to create.

   If **Add Template** is not available, it might be because you are not a domain administrator.
4. On the page that is displayed, supply values.

### Results

An entry for the template is created in the software services catalog.

### What to do next

To add the template to a tenant, use the Resource Management task.

## Values on the Add Standard Template window

**Template source file**

Optional file that describes the template and provides a shortcut for supplying values for other fields on the window. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, for example, /u/jsmith/loadmeup.prop, or the name of a partitioned or sequential data set. Then, click **Load** to supply values for other fields on the window.

The file must be in Java™ property file format:

- Each entry is a single line, in *property*=*value* or *property*:*value* format.
- The \ character is a continuation character so that a value can span lines.
- For newline, carriage return, and tab, use \n, \r, and \t.
- Comment characters are ! and #. Lines that start with those characters are ignored.

Example:

```
workflow-definition-file:/u/jsmith/workflow_definition.xml
workflow-variable-input-file:/u/jsmith/var_input_file
action-definition-file:/u/jsmith/actions_definition.xml
admin-documentation-file:/u/jsmith/documentation.txt
consumer-documentation-file:/u/jsmith/documentation.txt
```

**Note:** All relative paths that are specified in the manifest file are treated as being relative to the manifest file location.

**Target domain**

Name of the domain to associate with the template. Select a domain name from the list or accept the default domain. A domain name is required. Domains are defined with the Resource Management task.

**Template name**

Name of the template. A template name is required.

The name must be unique. It can include alphanumeric characters, or these special characters:

$
@
_
-

It can be up to 48 characters long.

**Workflow file**

Path for the workflow definition file. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, for example, /usr/lpp/zosmf/V2R2/workflows/workflow_sample.xml, or the name of a partitioned or sequential data set. A workflow file is required.

**Actions file**

Path for the actions definition file for use with the workflow. This file describes the actions that can be performed against the instance that is created from the template. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, for example, /usr/lpp/zosmf/V2R2/workflows/workflow_actions.xml, or the name of a partitioned or sequential data set. An actions file is required.

To create an actions definition file, click **Create New**. The Actions file field must be blank.

**Workflow variables input file**

Path for the variables input file to use with the workflow. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, for example, /usr/lpp/zosmf/V2R2/workflows/workflow_variables.xml, or the name of a partitioned or sequential data set.

**Consumer documentation file**
Path for the documentation file for consumers. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Administrator documentation file**
Path for the documentation file for administrators. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Template approver (groups or users)**
List of the user IDs or SAF groups of the template approvers. Separate these values with commas or blanks, for example `zosmfad,ibmuser,zmfgrp`. These are approvers for the template (sometimes called general approvers) as opposed to approvers for a specific step or action. Approvers receive a z/OSMF notification.

**Template description**
Description of the template.

**Workflows disposition**
Indicates the disposition of the workflow after the software is provisioned. This selection applies to the workflow that is used to provision the software, and its associated action workflows. Choose one of the following options:

**Archive successful workflows on completion**
Workflows are archived in the Workflows task after they complete. This option is the default.

**Delete successful workflows on completion**
Workflows are deleted after they complete.

**Keep successful workflows on completion**
Workflows are retained after they complete. You can manually delete them from the workflows table in the Workflows task.

If you do not specify a workflows disposition, the workflows are archived by default.

For action workflows, this setting can be overridden in the actions definition file.

**Jobs disposition**
Select **Delete jobs on completion** to cause the jobs that are dynamically submitted to be deleted automatically after they complete. The default is to keep the jobs.

If you do not specify that the jobs should be deleted automatically, you can manually delete the jobs.

**Instances disposition**
Select **Delete deprovisioned instances on completion** to cause the instance to be deleted automatically when it is deprovisioned. The default is to keep the instance.

The instances disposition is also applicable for composite templates. It applies to the instances for the composite instance and composite member instances.

If you do not specify that deprovisioned instances should be deleted automatically, you can manually delete them. To do so, navigate to the instances table, click **Actions**, then select **Remove**.

## Values on the Add Composite Template window

To create a composite template, you must have multiple published standard templates that will be the members of the composite template. On the **Add Composite Template** window, specify properties of the composite template, then click **Next** to display a second page for specifying the member templates. Click **Finish** when you are done specifying values. **Finish** is available only when you have supplied all of the required values.

**Target domain**
Name of the domain to associate with the template. Select a domain name from the list or accept the default domain. A domain name is required. Domains are defined with the Resource Management task.

**Template name**
Name of the template. A template name is required.

The name must be unique. It can include alphanumeric characters, or these special characters:

$
@
_
-

It can be up to 48 characters long.

**Use composite template to cluster instances on systems in a sysplex**
The template is a clustered composite template. It provisions clustered software services instances. Clustered software services instances are collections of instances that use the resources defined in a common resource pool that is associated with the clustered composite template. The instances are provisioned on the systems in the sysplex that are identified in the resource pool. .

**Composite variables input file**
Location of the properties file that you can use to specify in advance values for one or more of the atCreate variables that are defined in the member standard template workflow definition files.

Specify the fully qualified z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name. For example, specify /usr/lpp/zosmf/samples/composite.properties

The variable names are in the following format: <standard-template-name>.<atcreate-variable>

For example: `CICS.startup=10`

If the file includes any variables that are associated with standard templates that are not members of the composite, those variables are ignored. All other variable names are validated to ensure they are atCreate variables that associated with the member standard template. No validation is performed on the provided values.

**Consumer documentation file**
Path for the documentation file for consumers. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Administrator documentation file**
Path for the documentation file for administrators. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Template approver (groups or users)**
List of the user IDs or SAF groups of the template approvers. Separate these values with commas or blanks, for example `zosmfad,ibmuser,zmfgrp`. These are approvers for the template (sometimes called general approvers) as opposed to approvers for a specific step or action. Approvers receive a z/OSMF notification.

**Template description**
Description of the template.

Click **Next** to display the window for adding published, standard templates to the composite template.

## *Add Composite Template: Working with published templates in the composite template*

Use **Add Published Template** to add published standard templates to the composite template.

- When you add the first template to the composite template, you select a published, standard template on the **Add Published Template** dialog.
- When you add subsequent templates, you select a standard, published template to add it to the composite template. If the controls are displayed, you can also define connector variables. Connector variables connect the new template to previous templates in the sequence.

For each published template in a clustered composite template, specify the number of clustered instances to create from that published template. The maximum number of clustered instances that you can specify depends on whether the domain in which the composite template resides is in a single sysplex or extends across multiple sysplexes. In a single-sysplex domain, the maximum number of clustered instances is equal to the number of systems in the domain. In a multiple sysplex domain, the maximum number is based on the sysplex that contains the most systems in the domain; the instances will be created in this sysplex. For example, assume that a domain encompasses System 1 on Sysplex A and Systems 2 and 3 on Sysplex B. Here, the maximum number of clustered instances that can be created is two because Sysplex B has two systems in the domain.

The standard templates in the composite template (sometimes referred to as member templates) are displayed in a table. The table shows, for each member template, the sequence in which the template will be provisioned, the name of the template, the number of clustered instances (for clustered composite templates), and the name of the templates that it is connected to through connector variables.

### Actions for the table of member templates in the composite template

*Table 66. Actions for the table of member templates in the composite template*

| Action | Description |
|---|---|
| Add Published Template | Display a page to allow you to specify a published, standard template to add to the composite template. |
| Modify | Display a page to allow you to modify the connector variables. This action is not available for the first template in the list, or if there are no atCreate variables for the templates that follow the first template. For more information, see “Modify Connector Variables” on page 150. |
| Move | Select **Move** and **Up** or **Down** to move the selected template up or down in the sequence. Connector variables connect a template to templates that precede it, so be sure that you understand any possible effects on connector variables when reordering the templates. |
| Remove | Remove a published, standard template from the composite template. Be sure that you understand any possible effects on connector variables. |

### Create New Actions File window

Supply values in the fields.

**Target file path or data set**
The location of the actions file that you want to create. Specify the file path or fully qualified data set name.

**Deprovisioning workflow definition file**
If a workflow definition file exists for deprovisioning, specify the file path or fully qualified data set name. If you do not specify this value, the actions editor opens with a placeholder instruction deprovision action defined. If necessary, you can use the actions editor to delete the instruction deprovision action and replace it with a workflow action for deprovisioning.

## Modify a template

To modify a template, use the **Modify** action provided in the **Templates** table.

### Before you begin

The template must be in one of the draft states, or in the published state.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then, select **Modify**.
5. On the **Modify** window, supply values. Values that are required are indicated by a * preceding the label for the field. See "Values on the Modify window for a standard template " on page 147 or "Values on the Modify Composite window " on page 148.
6. Click **OK**.

## Values on the Modify window for a standard template

**Template name**
Name of the template.

**Domain**
Name of the domain that is associated with the template.

**Workflow file**
Location of the workflow definition file. This file is the primary XML file for the workflow definition.

Specify the fully qualified path name of the file, beginning with the forward slash (/) and including the file name, for example, /usr/lpp/zosmf/V2R2/samples/workflow_sample_automation.xml, or the name of a partitioned or sequential data set.

Click **Edit** to open the workflow definition file in the workflow editor.

A workflow file is required.

**Actions file**
Location of the XML file that contains action definitions. Specify the fully qualified path name of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. An actions file is required.

Click **Edit** to open the actions file in an editor.

**Workflow variables input file**
Location for the variables input file to use with the workflow. Specify the fully qualified path name of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set.

**Consumer documentation file**
Path for the documentation file for consumers. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Administrator documentation file**
Path for the documentation file for administrators. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Template approver (Groups or Users)**
List of the user IDs or SAF groups of the template approvers. You can add or remove approvers. Separate these values with commas or blanks, for example `zosmfad,ibmuser,zmfgrp`. New approvers receive a z/OSMF notification.

**Template description**
Description of the template.

This setting can be modified for a published template.

**Workflows disposition**
Indicates the disposition of the workflow after the software is provisioned. This selection applies to the workflow that is used to provision the software, and its associated action workflows. Choose one of the following options:

**Archive successful workflows on completion**
Workflows are archived in the Workflows task after they complete. This option is the default.

**Delete successful workflows on completion**
Workflows are deleted after they complete.

**Keep successful workflows on completion**
Workflows are retained after they complete. You can manually delete them from the workflows table in the Workflows task.

If you do not specify a workflows disposition, the workflows are archived by default.

For action workflows, this setting can be overridden in the actions definition file.

This setting can be modified for a published template.

**Jobs disposition**
Select **Delete jobs on completion** to cause the jobs that are dynamically submitted to be deleted automatically after they complete. The default is to keep the jobs.

If you do not specify that the jobs should be deleted automatically, you can manually delete the jobs.

This setting can be modified for a published template.

**Instances disposition**
Select **Delete deprovisioned instances on completion** to cause the instance to be deleted automatically when it is deprovisioned. The default is to keep the instance.

The instances disposition is also applicable for composite templates. It applies to the instances for the composite instance and composite member instances.

If you do not specify that deprovisioned instances should be deleted automatically, you can manually delete them. To do so, navigate to the instances table, click **Actions**, then select **Remove**.

This setting can be modified for a published template.

## Values on the Modify Composite window

**Target Domain**
Name of the domain that is associated with the template.

**Template name**
Name of the template.

**Use composite template to cluster instances on systems in a sysplex**
The template is a clustered composite template. It provisions clustered software services instances. Clustered software services instances are collections of instances that use the resources defined in a common resource pool that is associated with the clustered composite template. The instances are provisioned on the systems in the sysplex that are identified in the resource pool.

**Composite variables input file**
Location of the properties file that you can use to specify in advance values for one or more of the atCreate variables that are defined in the member standard template workflow definition files.

Specify the fully qualified z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name. For example, specify /usr/lpp/zosmf/samples/composite.properties

The variable names are in the following format: <standard-template-name>.<atcreate-variable>

For example: `CICS.startup=10`

If the file includes any variables that are associated with standard templates that are not members of the composite, those variables are ignored. All other variable names are validated to ensure they are

atCreate variables that associated with the member standard template. No validation is performed on the provided values.

**Consumer documentation file**
Path for the documentation file for consumers. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Administrator documentation file**
Path for the documentation file for administrators. Specify the absolute z/OS UNIX path of the file, beginning with the forward slash (/) and including the file name, or the name of a partitioned or sequential data set. Select the file type with the **File Type** field.

**Template approver (Groups or Users)**
List of the user IDs or SAF groups of the template approvers. You can add or remove approvers. Separate these values with commas or blanks, for example `zosmfad,ibmuser,zmfgrp`. New approvers receive a z/OSMF notification.

**Template description**
Description of the template.

Click **Next** to display the window for adding published, standard templates to the composite template.

### *Add Composite Template: Working with published templates in the composite template*

Use **Add Published Template** to add published standard templates to the composite template.

- When you add the first template to the composite template, you select a published, standard template on the **Add Published Template** dialog.
- When you add subsequent templates, you select a standard, published template to add it to the composite template. If the controls are displayed, you can also define connector variables. Connector variables connect the new template to previous templates in the sequence.

For each published template in a clustered composite template, specify the number of clustered instances to create from that published template. The maximum number of clustered instances that you can specify depends on whether the domain in which the composite template resides is in a single sysplex or extends across multiple sysplexes. In a single-sysplex domain, the maximum number of clustered instances is equal to the number of systems in the domain. In a multiple sysplex domain, the maximum number is based on the sysplex that contains the most systems in the domain; the instances will be created in this sysplex. For example, assume that a domain encompasses System 1 on Sysplex A and Systems 2 and 3 on Sysplex B. Here, the maximum number of clustered instances that can be created is two because Sysplex B has two systems in the domain.

The standard templates in the composite template (sometimes referred to as member templates) are displayed in a table. The table shows, for each member template, the sequence in which the template will be provisioned, the name of the template, the number of clustered instances (for clustered composite templates), and the name of the templates that it is connected to through connector variables.

## Actions for the table of member templates in the composite template

*Table 67. Actions for the table of member templates in the composite template*

| Action | Description |
|---|---|
| Add Published Template | Display a page to allow you to specify a published, standard template to add to the composite template. |
| Modify | Display a page to allow you to modify the connector variables. This action is not available for the first template in the list, or if there are no atCreate variables for the templates that follow the first template. For more information, see “Modify Connector Variables” on page 150. |

| *Table 67. Actions for the table of member templates in the composite template (continued)* | |
|---|---|
| **Action** | **Description** |
| Move | Select **Move** and **Up** or **Down** to move the selected template up or down in the sequence. Connector variables connect a template to templates that precede it, so be sure that you understand any possible effects on connector variables when reordering the templates. |
| Remove | Remove a published, standard template from the composite template. Be sure that you understand any possible effects on connector variables. |

*Modify Connector Variables*

A list of variables shows atCreate variables for the indicated template. Use **Add** or **Remove** to build the set of connector variables that connect the template to previous templates in the sequence. In the table of variables, you can select a different source template, from the other templates in the composite, to override the original value for the variable. If a template appears multiple times in the list, values for variables always come from the first of those templates.

When you add a variable to the list of connector variables, you can then select the source variable name for it.

The registry-instance-Name constant (the default) evaluates to the instance name that is associated with the instance that was created for the source template. You can code a workflow to perform a GET REST request against the instance name and obtain whatever variables are required.

When you are finished building the set of connector variables for a template, click **OK**. Then, add additional published templates as needed.

## Edit an actions definition file

You can use the actions editor to edit an actions definition file when modifying a template.

### Before you begin

The template must be in one of the draft states.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select Software Services.
2. Select the **Templates** tab.
3. Modify a template.
   a) In the templates table, select a template.
   b) Click **Actions**, then select **Modify**.
   c) On the **Modify** window, click **Edit** for the Actions file field. The **Edit Actions File** window is displayed.

- You can create a new actions file when adding a template.

## Using the Edit Actions File window

In the **Edit Actions File** window, a table displays the actions in the selected action definition file. To view or edit the properties of an action, select the action in the table. You can select one action only.

When you select an action, the editor opens a new area to the right of the table for editing the action properties. The contents of that area varies with the type of action that is selected.

### Actions table

*Table 68. Columns in the actions table.*

| Column | Description |
|---|---|
| **Name** | Name of the action. |
| **Type** | Type of the action. |

The actions are described in the following tables:

- Targeted actions. Actions that apply to the selected item. To use a targeted action, you must select an item.
- Table actions. Actions that apply to the entire table. No selection of table items is required.

*Table 69. Targeted actions for the Actions table.*

| Action | Description |
|---|---|
| **Create New Action** | Create an action and add it to the actions definition file.<br>Choose one of the following types:<br>• Command. This issues a system command.<br>• Instruction. This displays text that describes how to perform a task.<br>• Workflow. This causes a workflow to be run.<br>z/OSMF opens the **Add Action** area, where you can supply information about the new action. |
| **Delete** | Delete the selected action from the actions definition file.<br>You cannot undo a delete. A prompt lets you confirm the deletion before it is performed. |

*Table 70. Table actions for the Actions table.*

| Action | Description |
|---|---|
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |

## Edit Action area for a command action

The **Edit Action** area displays the following fields, where you can type or select values.

## Metadata tab

The fields on the Metadata tab are described below.

**Action name**
Name of the action, which is displayed with the **Perform** action on the Instances table.

For actions that deprovision software services instances, select **This is a deprovision action**. A deprovision action is required.

**Action type**
Type of action.

**Description**
Description of the action.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Command value**
System command.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Solicited key**
Key to search for in the solicited messages of the command response.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Unsolicited key**
Key to search for in the unsolicited messages of the command response.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Detect time**
Time in seconds to search for the Unsolicited key value in the unsolicited messages. Also, the minimum time before a command response is checked for after the command is submitted for execution.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

## Security tab

The fields on the Security tab are described below.

**Run action under user ID**
Specify the user ID under which the action is to be performed.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

You are responsible for ensuring that the value you enter is a valid z/OS user ID. The editor checks the value for syntax, but it does not verify that the user ID is defined to the security management product on your system.

**Approvers**
A table of user and group IDs that can approve the action. At least one approver must approve the action before it is performed on behalf of the user ID that is specified with **Run action under user ID**. Use **Actions** to add or delete approvers.

User IDs must have a security profile with an OMVS segment and a UID assigned. Group IDs must have a security profile with an OMVS segment and a GID assigned.

When you specify the approver name on the **Add approver** window, the field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables that are stored with the provisioned service at the time that the action is performed.

If no approver user ID or no user in an approver group ID matches the user ID specified with **Run action under user ID**, an approval record for `Security Administrator` is generated by z/OSMF. This `Security Administrator` approver record must be approved by a user with z/OSMF security

administrator authority, that is, a user with access to the IZUDFLT.ZOSMF.SECURITY.ADMIN resource in the ZMFCLOUD class.

## Edit Action area for an instructions action

The **Edit Action** area displays the following fields, where you can type or select values.

**Action name**
Name of the action, which is displayed with the **Perform** action on the Instances table.

For actions that deprovision software services instances, select **This is a deprovision action**. A deprovision action is required.

**Action type**
Type of action.

**Description**
Description of the action.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Instructions**
Text that describes how to perform a task, to be displayed in a window when the action is selected.

Select **Allow substitution** to allow variable substitution, with variables resolved from the variables stored with the provisioned service at the time that the action is performed.

## Edit Action area for a workflow action

The **Edit Action** area displays the following fields, where you can type or select values.

**Action name**
Name of the action, which is displayed with the **Perform** action on the Instances table.

For actions that deprovision software services instances, select **This is a deprovision action**. A deprovision action is required.

**Action type**
Type of action.

**Description**
Description of the action.

**Workflow definition file**
Path for the workflow definition file. Specify the absolute path of the file, beginning with the forward slash (/) and including the file name, for example, `/usr/lpp/zosmf/samples/workflow_sample_basic.xml`, or the name of a partitioned or sequential data set.

Click **Edit** to open the workflow with the Workflow Editor task.

**Workflow variable input file**
Path for the variable input file to use with the workflow. Specify the absolute path of the file, beginning with the forward slash (/) and including the file name, for example,`/usr/lpp/zosmf/samples/workflow_sample_variables.xml`, or the name of a partitioned or sequential data set.

**Variables**
Table of input variables, that is, properties that are required at runtime. It shows the name and value for each variable.

Click **Edit Variables** to display a window that lets you add or remove variables from the set of selected variables.

**Workflow disposition**
Select an option.

**Delete successful workflows on completion**
Causes the workflow to be deleted automatically after it completes. This is the default.

**Keep successful workflows on completion**
Causes the workflow to be kept after it completes. You can view it with the Workflows task.

**Inherit from template**
Use the workflow disposition that is defined in the template.

If you do not specify that the workflow should be deleted automatically, you can manually delete the workflow from the workflows table in the Workflows task.

### *Add a command action to the actions definition file*

To add a command-type action to the actions definition file, click **Create New Action** in the Actions table, then select Command.

## Before you begin

The template must be in one of the draft states.

## Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then, select **Modify**.
5. On the **Modify** window, click **Edit** for the Actions file field.
   The **Edit Actions File** window is displayed.
6. In the Actions table, click **Create New Action**, then select **Command**.
   The **Add Action** area is displayed to the right of the Actions table.
7. Specify values, then click **Save** or **Save & Close**.

### *Values for a command action*

For a command-type action, the values are displayed on tabs.

## Metadata tab

The fields on the Metadata tab are described below.

**Action name**
Name of the action, which is displayed with the **Perform** action on the Instances table.

For actions that deprovision software services instances, select **This is a deprovision action**. A deprovision action is required.

**Action type**
Type of action.

**Description**
Description of the action.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Command value**
System command.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Solicited key**
Key to search for in the solicited messages of the command response.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Unsolicited key**
Key to search for in the unsolicited messages of the command response.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Detect time**
Time in seconds to search for the Unsolicited key value in the unsolicited messages. Also, the minimum time before a command response is checked for after the command is submitted for execution.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

## Security tab

The fields on the Security tab are described below.

**Run action under user ID**
Specify the user ID under which the action is to be performed.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

You are responsible for ensuring that the value you enter is a valid z/OS user ID. The editor checks the value for syntax, but it does not verify that the user ID is defined to the security management product on your system.

**Approvers**
A table of user and group IDs that can approve the action. At least one approver must approve the action before it is performed on behalf of the user ID that is specified with **Run action under user ID**. Use **Actions** to add or delete approvers.

User IDs must have a security profile with an OMVS segment and a UID assigned. Group IDs must have a security profile with an OMVS segment and a GID assigned.

When you specify the approver name on the **Add approver** window, the field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables that are stored with the provisioned service at the time that the action is performed.

If no approver user ID or no user in an approver group ID matches the user ID specified with **Run action under user ID**, an approval record for `Security Administrator` is generated by z/OSMF. This `Security Administrator` approver record must be approved by a user with z/OSMF security administrator authority, that is, a user with access to the IZUDFLT.ZOSMF.SECURITY.ADMIN resource in the ZMFCLOUD class.

### *Add an instructions action to the actions definition file*

To add an instructions-type action to the actions definition file, click **Create New Action** in the Actions table, then select Instructions.

## Before you begin

The template must be in one of the draft states.

## Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then, select **Modify**.
5. On the **Modify** window, click **Edit** for the Actions file field.
   The **Edit Actions File** window is displayed.
6. In the Actions table, click **Create New Action**, then select **Instructions**.
   The **Add Action** area is displayed to the right of the Actions table.
7. Specify values, then click **Save** or **Save & Close**.

### *Values for an instruction action*

The **Add Action** area displays the following fields, where you can type or select values.

**Action name**
Name of the action, which is displayed with the **Perform** action on the Instances table.

For actions that deprovision software services instances, select **This is a deprovision action**. A deprovision action is required.

**Action type**
Type of action.

**Description**
Description of the action.

This field can contain substituted values (variables). If you include variables in this field, select **Allow substitution**. Variables are resolved from the variables stored with the provisioned service at the time that the action is performed.

**Instructions**
Text that describes how to perform a task, to be displayed in a window when the action is selected.

Select **Allow substitution** to allow variable substitution, with variables resolved from the variables stored with the provisioned service at the time that the action is performed.

### *Add a workflow action to the actions definition file*

To add a workflow-type action to the actions definition file, click **Create New Action** in the Actions table, then select Workflow.

## Before you begin

The template must be in one of the draft states.

## Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then, select **Modify**.
5. On the **Modify** window, click **Edit** for the Actions file field.
   The **Edit Actions File** window is displayed.
6. In the Actions table, click **Create New Action**, then select **Workflow**.
   The **Add Action** area is displayed to the right of the Actions table.
7. Specify values, then click **Save** or **Save & Close**.

### *Values for a workflow action*

The **Add Action** area displays the following fields, where you can type or select values.

**Action name**
Name of the action, which is displayed with the **Perform** action on the Instances table.

For actions that deprovision software services instances, select **This is a deprovision action**. A deprovision action is required.

**Action type**
Type of action.

**Description**
Description of the action.

**Workflow definition file**
Path for the workflow definition file. Specify the absolute path of the file, beginning with the forward slash (/) and including the file name, for example, `/usr/lpp/zosmf/samples/workflow_sample_basic.xml`, or the name of a partitioned or sequential data set.

Click **Edit** to open the workflow with the Workflow Editor task.

**Workflow variable input file**
Path for the variable input file to use with the workflow. Specify the absolute path of the file, beginning with the forward slash (/) and including the file name, for example,`/usr/lpp/zosmf/samples/workflow_sample_variables.xml`, or the name of a partitioned or sequential data set.

**Variables**
Table of input variables, that is, properties that are required at runtime. It shows the name and value for each variable.

Click **Edit Variables** to display a window that lets you add or remove variables from the set of selected variables.

**Workflow disposition**
Select an option.

**Delete successful workflows on completion**
Causes the workflow to be deleted automatically after it completes. This is the default.

**Keep successful workflows on completion**
Causes the workflow to be kept after it completes. You can view it with the Workflows task.

**Inherit from template**
Use the workflow disposition that is defined in the template.

If you do not specify that the workflow should be deleted automatically, you can manually delete the workflow from the workflows table in the Workflows task.

### *Edit Variables*

You can edit the variables for an action workflow.

## Before you begin

The template must be in one of the draft states, or in the published state.

## Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then select **Modify**.
5. On the **Modify** window, click **Edit** for the Actions file field.
   The **Edit Actions File** window is displayed.

6. In the table, select an action that is type workflow.

   The Edit Action area is displayed.
7. Click **Edit Variables**.

   The **Edit Variables** window displayed.

### *Values on the Edit Variables window*

**Variables**
**Selected Variables**
Define the variables to include. The Variables table shows the variables that are available to be included.

Use **Add** or **Remove** to build the set of variables.

In the Selected Variables table, you can supply new values for variables. Select **Save Value Updates** to specify that the new value is saved and is available to the instance after the action workflow completes.

### *Variable substitution*

You can use variable substitution with command actions.

Use variable substitution for fields on the Metadata tab, and for user IDs that you specify for approvers or the Run action under user ID field on the **Security** tab. Specify the substitution string in the input field and select the option to allow substitution. When the action is performed, the system performs the variable substitution to derive the value.

The syntax for specifying a substitution variable is $!{*variable*}. For example, to use variable substitution for a user ID, you might specify the following variable:

```
$!{CONSOLE_USER}
```

## Associate a tenant with a template

To associate a tenant with a template, use the **Associate Tenant** action in the Templates table.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then, select **Associate Tenant**.
5. On the **Associate Tenant** window, supply values. Click **OK** to display the **Add Template and Resource Pool** window of the Resource Management task.
6. On the **Add Template and Resource Pool** window, supply values. Then click **OK**.
7. Having used the Resource Management task to add a template to the tenant, return now to the Software task. Click the **Software Services** tab.

## Values on the Associate Tenant window

**Template Name**
Name of the template.

**Template Description**
Description of the template.

**Domain**
Name of the domain that is associated with the template.

**Tenant**
Select a tenant. Tenants are defined for a domain with the Resource Management task.

**Resource pool selection**
Select an option:

**Create a dedicated resource pool**
Select this option to create a new resource pool that is dedicated to the template.

**Use an existing tenant shared resource pool**
Select this option to use a tenant shared resource pool, which can be shared between the templates in a tenant. This option is available only when the tenant contains a shared resource pool.

**Use an existing domain shared resource pool**
Select this option to use a domain shared resource pool, which can be shared between the templates in all of the tenant in the domain. This option is available only when the domain contains a shared resource pool.

If the tenant- or domain-shared resource pool does not exist, these selections are not selectable.

When a resource pool is selected for a template or tenant during provisioning, the following selection order is used by default:

1. Dedicated resource pool.
2. Tenant shared resource pool.
3. Domain shared resource pool.

## Approve a template

To approve a template, use the **Approve** action that is provided in the Templates table.

### About this task

This task describes how to approve the approval records for a template. There can be multiple approvers for a template, each of whom must complete this task. If there are no approvers for a template, this task does not apply.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then, select **Approvals**.
5. On the **Approvals** window, find items in the Approvers table that you can approve, then use the **Approve** action to approve them.

   If the **Approve** action is not available, you cannot approve the selected item. To view an item before you approve it, click the value in the Item to Approve column to open it in the appropriate editor.

   If changes must be made to the definition files, use the **Reject** action to reject the item.

   **Note:** Modifying definition files causes all approvals to be reset.

   When all of the required approvals are entered for the template, z/OSMF sends a notification of the template approval status to each of the domain administrators. If one or more rejections are specified, z/OSMF sends a separate notification for each rejection to the domain administrators.

### What to do next

When you return to the templates table, if the state of the template is now Pending Security Update, click **Refresh** to see an updated state that reflects the approvals.

## Values on the Approvals window

**Template name**
The name of the template.

**Template description**
Description of the template.

**Approvers**
Table of approval records for the templates. You can approve or reject each approval record.

When there are multiple user IDs for a row in the table, at least one of those user IDs must approve. When there are multiple rows in the table, each represents a required approval. For example, when the table shows the following, three approvers are required: usera, userb, and either userc or userd.

| User ID |
|---|
| usera |
| userb |
| userc or userd |

If no approver user ID or no user in an approver group ID matches the user ID specified with the runAsUser user ID, an approval record for `Security Administrator` is generated by z/OSMF. This `Security Administrator` approver record must be approved by a user with z/OSMF security administrator authority, that is, a user with access to the IZUDFLT.ZOSMF.SECURITY.ADMIN resource in the ZMFCLOUD class. The Security Administrator approver should review the contents of the templates, focusing on the use of runAsUser in the workflow definition and actions definition files.

### Columns in the Approvers table

*Table 71. Columns in the Approvers table*

| Column | Description |
|---|---|
| **Approvers (Groups and Users)** | User IDs and SAF groups of the approvers. Any one of the users can approve or reject the item.<br><br>If no approver user ID or no user in an approver group ID matches the user ID specified with the runAsUser user ID, an approval record for `Security Administrator` is generated by z/OSMF. This `Security Administrator` approver record must be approved by a user with z/OSMF security administrator authority, that is, a user with access to the IZUDFLT.ZOSMF.SECURITY.ADMIN resource in the ZMFCLOUD class. The Security Administrator approver should review the contents of the templates, focusing on the use of runAsUser in the workflow definition and actions definition files. |
| **Status** | Status of the approval. |
| **Run As User** | User ID under which the current workflow step or command is to be performed. indicates that the value for the ID is dynamic, meaning that it was assigned by a workflow. |
| **Description** | Description of the item. |
| **Item to Approve** | Item (workflow step, action, or both) that requires approval, or an indication that the approval is for the template as a whole or for the template based on the domain that it is associated with. Click a link to open the item in read-only mode in the appropriate editor. For domain and general approvals, the link is a text string, for example, Workflow definition file. |
| **Modified By** | User ID of the user who last acted on the item. |

*Table 71. Columns in the Approvers table (continued)*

| Column | Description |
|---|---|
| **Comment** | Text of a comment that was added for the approval. |
| **Modified** | Time that the item was last modified. |

For a workflow step or action, you can click the link in the Item column to open it in the Workflow Editor.

### Actions for Approvers

The actions are described in the following tables:

- Targeted actions. Actions that apply to the selected items. To use a targeted action, you must select one or more items.
- Table actions. Actions that apply to the entire table. No selection of table items is required.

*Table 72. Targeted actions for the Approvers table*

| Action | Description |
|---|---|
| **Approve** | Approve the selected item. If the **Approve** action is not available, then you are not permitted to approve that item. |
| **Reject** | Reject the selected item. Adding a comment with the rejection might help in getting any necessary changes made to the definition files. Modifying definition files causes all approvals to be reset. You might need to remove and add the template, or refresh the template files, using the **Refresh Template** action in the templates table. |

*Table 73. Table actions for the Approvers table*

| Action | Description |
|---|---|
| **Select All** | Select all of the items in the table. |
| **Deselect All** | Clear all of the items in the table. |
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Approvals

Approval records for a software services template must be approved before the template can be published. The State column of the templates table indicates if approvals are required.

Approval records can be:

- Specific to a workflow step or action. These are generated when a workflow or action definition file for a software services template contains a runAsUser element with approver elements. A runAsUser element identifies a user ID under which the current workflow step or command is to be performed.

  Approving an approval record for a workflow step or action allows the owner of the software services template to use the "run as" user ID in the software services template.
- For the template. To create a template approval, modify a template using the **Modify** action. Then, on the **Modify Template** window, use the Template Approvers field.

- For the domain. Domain approvals apply to the template while it is in one of the draft states. Domains are defined with the Resource Management task. You can define an approver for a domain when creating or modifying the domain.

Each approver record can contain multiple user and group IDs, separated by commas or blanks, for example, `zosmfad ibmuser`. When there are multiple user or group IDs for an approver record, any one of those user IDs or any user in any of the group IDs can approve. When there are multiple approver records, each represents a required approver. For example, when the approval records are as follows, three approvers are required: usera, userb, and either groupc or userd.

| **User ID** |
| --- |
| usera |
| userb |
| groupc userd |

If no approver user ID or no user in an approver group ID matches the user ID specified with the runAsUser user ID, an approval record for `Security Administrator` is generated by z/OSMF. This `Security Administrator` approver record must be approved by a user with z/OSMF security administrator authority, that is, a user with access to the IZUDFLT.ZOSMF.SECURITY.ADMIN resource in the ZMFCLOUD class. The Security Administrator approver should review the contents of the templates, focusing on the use of runAsUser in the workflow definition and actions definition files.

### Missing required approvers

A Draft missing required approver state indicates that a runAsUser element in a definition file has no approval elements. This state, in the templates table, is a link. To identify the missing approver, click the state to view the details. When the details are displayed, click a link in the Item to Approve column to display the element in read-only mode using the Workflow Editor or actions editor, as appropriate. To resolve the missing required approver state, either:

- Edit the definition using the appropriate editor and add an approver.
- Add a domain approver, with the Resource Management task.
- Add a template approver. Modify the template using the **Modify** action, then, on the Modify Template window, use the Template Approvers field.

To approve the approval record, use the **Approvals** action in the templates table. Then, on the **Approvals** window, select items in the table and use the **Approve** action.

## Test Run a template

To test run a template before publishing it, use the **Test Run** action provided in the Templates table.

### Before you begin

All approvals for the template must be approved.

The template must be in a draft or draft approved state.

If you would like to complete these steps using a video see How to test and publish a template in IBM Cloud Provisioning and Management for z/OS (mediacenter.ibm.com/media/How+to+test+and+publish+a+template+in+IBM+Cloud+Provisioning+and+Management+for+z+OS/0_dxypa7uq/101043781).

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select Software Services.
2. Select the **Templates** tab.
3. In the table, select a template.

4. Click **Actions**, then select **Test Run**.
5. On the **Test Run Template** window, supply values, then click **OK**. See “Values on the Test Run window for a standard template ” on page 163 and “Values on the Test Run window for a composite template ” on page 164.

   If there are additional input fields for prompt variables (based on the workflow definition and variable input files for this template), supply the required information. To display the tip for a field, click the tips icon ( ).

   Test Run creates a workflow, starts the workflow, and creates a corresponding instance. The Instances tab is displayed.

## What to do next

On the **Instances** tab, check the table for the software services instance that you created with **Test Run**.

The name of the instance is :

- For a standard template: *software-type_prefix-for-resource-poolnumber*, for example, Standard_M03.
- For a composite template: *prefix-for-resource-pool_prefix-for-resource-poolnumber*, for example, C_C03. For a clustered composite, a suffix of *_software-service-instance-name* is added.

In the name, *prefix-for-resource-pool* is the value that is specified for software service instance name prefix field on the **Add Template and Resource Pool** page or the **Create Shared Resource Pool** page, and *number* is assigned by z/OSMF.

The status of the instance should be either Being-Provisioned or Provisioned. Provisioned indicates success. You might need to click **Refresh** to see the status change to Provisioned.

You might want to try one or more actions against the instance to ensure that they work as expected. Click **Actions**, then select **Perform**, then select an action.

If the instance was created successfully, with a status of Provisioned, and the actions perform as expected, you are now ready to publish the template. You may want to first clean up the results of your test, that is, deprovision and remove the instance that you created with **Test Run**.

# Values on the Test Run window for a standard template

**Template name**
Name of the template.

**Template description**
Description of the template.

**Associated tenant**
Select the tenant whose resource pool is used to obtain resources during instance provisioning.

A tenant is a class of users, which is defined with the Resource Management task.

**System selection for provisioning**
If the value is Select system, you must select a system from the list. Otherwise, the field indicates how the system is selected for you:

- **Assign a system automatically from the table below:** z/OSMF assigns a system from thesystems that are shown in the table.
- **System name:** The value indicates the system on which the template will be provisioned.

**Maximum days until a provisioned instance expires automatically**
Enter the number of days until the provisioned instance expires. When a provisioned instance expires, it is marked as expired, and the instance remains in provisioned state. The **Instances** tab of the Software Services task shows when an instance is expired in the "State" column as *"Provisioned - Expired"*. When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance.

This field is preset to the maximum time limit that is set in the resource pool for the template. You cannot exceed this value. If this field is left blank, the maximum value for the resource pool is used by default. If no limit is set for the resource pool, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Account information**
Specify account information to use in the JCL JOB statement. By default, it is the account information that is associated with the tenant resource pool.

This field might not be shown as a result of an option set with the Resource Management task. (The option is Allow account information to be modified when the template is provisioned, for adding or modifying a template and resource pool.)

There might additional input fields for prompt variables, based on the workflow definition and variable input files for the template. To display the tip for a field, click the tips icon ( ).

## Values on the Test Run window for a composite template

**Template name**
Name of the template.

**Template description**
Description of the template.

**Associated tenant**
Select the tenant whose resource pool is used to obtain resources during instance provisioning.

A tenant is a class of users, which is defined with the Resource Management task.

**System selection for provisioning**
If the value is Select system, you must select a system from the list. Otherwise, the field indicates how the system is selected for you:

- **Assign a system automatically from the table below:** z/OSMF assigns a system from thesystems that are shown in the table.
- **System name:** The value indicates the system on which the template will be provisioned.

**Maximum days until a provisioned instance expires automatically**
Enter the number of days until the provisioned instance expires. When a provisioned instance expires, it is marked as expired, and the instance remains in provisioned state. The **Instances** tab of the Software Services task shows when an instance is expired in the "State" column as *"Provisioned - Expired"*. When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance.

This field is preset to the maximum time limit that is set in the resource pool for the template. You cannot exceed this value. If this field is left blank, the maximum value for the resource pool is used by default. If no limit is set for the resource pool, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Account information**
Specify account information to use in the JCL JOB statement. The account information is supplied for any member templates for which the Allow account information to be modified when the template is provisioned option was selected when adding or modifying a template and resource pool to the tenant. This is performed with the Resource Management task.

This field is not shown if Allow account information to be modified when the template is provisioned was not selected for any templates.

There might additional input fields for prompt variables, based on the workflow definition and variable input files for the member templates. To display the tip for a field, click the tips icon ( ).

# Publish a template

Publish makes a template available to consumers and prepares it for the **Run** action. It locks the template, allowing only limited modification, and puts it in the published state.

Publishing a new version of a standard template automatically archives any published composite templates that include the standard as a member. You can then either publish one or more of the affected composite templates again, or create a new version. The composite template can be published only if all connector information is accurate.

Before you use Publish, all approval records must be approved.

The template must be in the draft, draft approved, or archived state.

**Note:** For templates in a draft or draft approved state, if the workflow definition, action definition, composite variable input, or workflow variable input files were modified since the template was created, you must use the **Refresh Template** action before the **Publish** action to use the modified files.

## Confirm publish a template

This topic describes the conditions and actions related to confirming the **Publish** action.

You have attempted to publish a template, and one of the following conditions exists.

- The template that you are attempting to publish has not been tested with the **Test Run** action. **Test Run** allows you to verify that a template successfully creates a software service instance, while leaving the template open for further changes. IBM recommends that you use **Test Run** before publishing a template.
  - To continue without first performing the **Test Run**, click **OK**.
  - To use **Test Run** before publishing the template, click **Cancel**.
- One or more source files for the template has been modified, but the modifications will not be used.
  - To continue without the changes to the source files, click **OK**.
  - To use the modified source files, click **Cancel**, then use the **Refresh** action for the template.
- There is already a published template with the same name. If you continue, that template will be archived.
  - To continue, click **OK**.
  - To cancel the Publish action, click **Cancel**.

  You can return an archived template to the published state with the **Publish** action.

# Run a template

To run a template, use the **Run** action provided in the templates table. This creates an instance.

### Before you begin

The template must be published.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Templates** tab.
3. In the table, select a template.
4. Click **Actions**, then select **Run**.
5. On the **Run Template** window, supply values, then click **OK**. See “Values on the Run window for a standard template” on page 166 and “Values on the Run window for a composite template ” on page 167.

If there are additional input fields for prompt variables (based on the workflow definition and variable input files for this template), supply the required information. To display the tip for a field, click the tips icon ().

Run creates a workflow, starts the workflow, and creates a corresponding instance. The Instances tab is displayed. When the instance is in the provisioned state, the workflow is automatically deleted.

### What to do next

On the **Instances** tab, check the table for the software services instance that you created with **Run**.

The name of the instance is :

- For a standard template: *software-type_prefix-for-resource-poolnumber*, for example, Standard_M03.
- For a composite template: *prefix-for-resource-pool_prefix-for-resource-poolnumber*, for example, C_C03. For a clustered composite, a suffix of *_software-service-instance-name* is added.

In the name, *prefix-for-resource-pool* is the value that is specified for software service instance name prefix field on the **Add Template and Resource Pool** page or the **Create Shared Resource Pool** page, and *number* is assigned by z/OSMF.

The status of the instance should be either Being-Provisioned or Provisioned. Provisioned indicates success. You might need to click **Refresh** to see the status change to Provisioned.

## Values on the Run window for a standard template

**Template name**
Name of the template.

**Template description**
Description of the template.

**Associated tenant**
Select the tenant whose resource pool is used to obtain resources during instance provisioning.

A tenant is a class of users, which is defined with the Resource Management task.

**System selection for provisioning**
If the value is Select system, you must select a system from the list. Otherwise, the field indicates how the system is selected for you:

- **Assign a system automatically from the table below:** z/OSMF assigns a system from thesystems that are shown in the table.
- **System name:** The value indicates the system on which the template will be provisioned.

**Maximum days until a provisioned instance expires automatically**
Enter the number of days until the provisioned instance expires. When a provisioned instance expires, it is marked as expired, and the instance remains in provisioned state. The **Instances** tab of the Software Services task shows when an instance is expired in the "State" column as *"Provisioned - Expired"*. When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance.

This field is preset to the maximum time limit that is set in the resource pool for the template. You cannot exceed this value. If this field is left blank, the maximum value for the resource pool is used by default. If no limit is set for the resource pool, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Account information**
Specify account information to use in the JCL JOB statement. By default, it is the account information that is associated with the tenant resource pool.

This field might not be shown as a result of an option set with the Resource Management task. (The option is Allow account information to be modified when the template is provisioned, for adding or modifying a template and resource pool.)

There may additional input fields for prompt variables, based on the workflow definition and variable input files for the template. To display the tip for a field, click the tips icon ( ).

### Values on the Run window for a composite template

**Template name**
Name of the template.

**Template description**
Description of the template.

**Associated tenant**
Select the tenant whose resource pool is used to obtain resources during instance provisioning.

A tenant is a class of users, which is defined with the Resource Management task.

**System selection for provisioning**
If the value is Select system, you must select a system from the list. Otherwise, the field indicates how the system is selected for you:

- **Assign a system automatically from the table below:** z/OSMF assigns a system from thesystems that are shown in the table.
- **System name:** The value indicates the system on which the template will be provisioned.

**Maximum days until a provisioned instance expires automatically**
Enter the number of days until the provisioned instance expires. When a provisioned instance expires, it is marked as expired, and the instance remains in provisioned state. The **Instances** tab of the Software Services task shows when an instance is expired in the "State" column as *"Provisioned - Expired"*. When an instance for which a time limit is set nears its time limit, z/OSMF notifies the consumer, who can then deprovision the instance.

This field is preset to the maximum time limit that is set in the resource pool for the template. You cannot exceed this value. If this field is left blank, the maximum value for the resource pool is used by default. If no limit is set for the resource pool, the provisioned instance does not expire automatically unless a time limit is set for the template that creates the instance.

**Account information**
Specify account information to use in the JCL JOB statement. The account information is supplied for any member templates for which the Allow account information to be modified when the template is provisioned option was selected when adding or modifying a template and resource pool to the tenant. This is performed with the Resource Management task.

This field is not shown if Allow account information to be modified when the template is provisioned was not selected for any templates.

There may additional input fields for prompt variables, based on the workflow definition and variable input files for the templates. To display the tip for a field, click the tips icon ( ).

## Fixing problems with provisioning

When the status of a software services instance is Provisioning-Failed, you may need to make changes in the workflow definition.

To determine the cause of the error in the workflow, you can examine the failed step using the **Workflows** task of z/OSMF.

1. In the Instances table, click the instance name.
2. On the View page, click the value in the Workflow field. This opens the Workflows task.

In addition to correcting the workflow, you need to clean up the work that has been performed.

1. To remove the instance, select the instance in the instances table, click **Perform**, then select **deprovision**.

2. When the instance is in a Deprovisioned state, click **Actions**, then select **Remove**.
3. Select the Templates tab to display the table of templates. Depending on the changes that you made, either:
   - Remove the template with the **Remove** action, then add the template with the **Add** action.
   - If the only changes were to workflow or action definitions, you can refresh those files with the **Refresh Template** action.
4. Resume the process for provisioning with the **Approvals** action, if the template has approval records, or with the **Test Run** action.

## Composite templates

If a composite template fails to provision, review the member templates to identify the member that failed to provision and the problems with that member's provisioning workflow. You can view the details of the failed composite instance, by clicking the name of the composite instance in the instances table, to see all of the child instances and their workflows (if available).

If you manually move the failed member template into a provisioning complete state, this initiates an attempt to provision the remaining members that are still in a being-initialized state.

You cannot deprovision the members. Instead, deprovision the composite instance.

## Troubleshooting problems in z/OSMF

For information on troubleshooting problems in z/OSMF, see *IBM z/OS Management Facility Configuration Guide*.

# Chapter 7. Managing software instances

z/OS software that you provisioned from templates is displayed on the Instances tab of the Software Services task.

From the table of instances, you can view details for an instance, or take an action against an instance, such as perform deprovision. The actions that are available depend on the actions definition file that was provided with the template.

## View instance

The **View Instance** window shows properties for an instance beyond what is shown in the instances table, including instance variables and actions. It also includes a link to the workflow for the instance.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Instances** tab.
3. In the table, select an instance.
4. Click **Actions**, then select **View**.
   The **Software Properties** window shows additional information.

## Values on the View window for a standard instance

This page shows the values for a standard instance, including an instance that is a child in a composite instance.

The values are grouped on tabs.

### Instance Details

**Composite clustered instance**
Name of the clustered instance. Shown for clustered instances only.

**Type**
Type of software.

**Current System**
Current system for the instance. This reflects any system selection on the most recent action. The value is in this format: *sysplex*.*system*(*nickname*).

**Provisioned System**
System on which the software was provisioned, in this format: *sysplex*.*system*(*nickname*).

**State**
Current state of the software:

- Being-Provisioned
- Provisioned
- Being-Deprovisioned
- Deprovisioned
- Provisioning-Suspended
- Provisioning-Expired
- Provisioning-Failed. For more information, see “Fixing problems with provisioning” on page 167.
- Deprovisioning-Suspended
- Deprovisioning-Failed.

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**Domain**
Domain for the instance, defined with the Resource Management task.

**Tenant**
Tenant for the instance, defined with the Resource Management task.

**Template name**
The name of the software services template that the instance was created from.

**Template owner**
The user who created the template that the instance was created from.

**Template version**
The version of the software services template that the instance was created from.

**Resource Pool**
Links to the Resource Management task to **View Tenant and Resource Pool** for the instance.

**Composite parent instance**
The parent instance of the composite.

**Composite parent template**
The template that the composite parent instance was created from.

**Workflow**
Workflow that provisioned the instance. Click the link to open the Workflows task.

**Workflow duration**
Total elapsed time that the provision workflow took to run. It is displayed in the format *a* hours *b* minutes *c* seconds, with units of time shown as appropriate.

The value includes any time that elapsed while the workflow was suspended.

**Current step**
The number of the step that is being processed automatically in the provisioning workflow, followed by the total number of steps. Shown if the instance is being provisioned or if provisioning failed.

**Current step name**
The name of the step that is being processed automatically in the provisioning workflow. Shown if the instance is being provisioned or if provisioning failed.

**Workflow message**
The message returned from the provisioning workflow, if provisioning failed.

## Metadata

**Owner**
User ID that identifies the owner of the software.

**Provider**
User ID that identifies the provider of the software.

**Vendor**
Vendor of the software.

**Version**
Version of the software.

**Date created**
Date and time the instance was created.

**Last modified**
Date and time the instance was last modified.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

### Public Variables

**Public Variables**
Contains a table of information about the public variables that belong to the instance.

### Private Variables

**Private Variables**
Contains a table of information about the private variables that belong to the instance.

### Actions

**Actions**
Contains a table of the actions that are available with the **Perform** action. They are defined in an actions definition file.

To perform an action, select the action in the table, click **Actions**, then select an action from the list.

### History

**Actions History**
Contains a table of information about **Perform** actions that have been performed.

You can use these actions:

**View**
Show details about the action. Alternatively, you can click the name of the action in the table.

**Resume**
Resume a suspended action.

**Retry**
Retry a failed provision or deprovision action. This restarts the failed provisioning or action workflow.

## Values on the View window for a composite instance

This page shows the values for a composite instance. For properties of the standard instances that are the children in a composite instance, see "Values on the View window for a standard instance" on page 169.

The values are grouped on tabs. Composite instances are identified by preceding the name.

### Instance Details

**Composite clustered instance**
Name of the clustered instance. Shown for clustered instances only.

**State**
Current state of the software:

- Being-Provisioned
- Provisioned
- Being-Deprovisioned
- Deprovisioned
- Provisioning-Suspended
- Provisioning-Expired

- Provisioning-Failed. For more information, see "Fixing problems with provisioning" on page 167.
- Deprovisioning-Suspended
- Deprovisioning-Failed.

**Composite cluster**
Indicates if the instance is a clustered composite. Not shown for child instances in a clustered composite.

**Domain**
Domain for the instance, defined with the Resource Management task.

**Tenant**
Tenant for the instance, defined with the Resource Management task.

**Template name**
The name of the software services template that the instance was created from.

**Template owner**
The user who created the template that the instance was created from.

**Template version**
The version of the software services template that the instance was created from.

**Child instances**
A table showing the instances that make up this composite. Click the link for the name to show the properties of the instance, or click the link for the workflow to open the Workflows task.

## Metadata

**Owner**
User ID that identifies the owner of the software.

**Provider**
User ID that identifies the provider of the software.

**Date created**
Date and time the instance was created.

**Last modified**
Date and time the instance was last modified.

**Managed by**
Primary or *managing* system for this domain, in the format *sysplex-name.system-name*. If the domain is not managed from another sysplex, this field is blank.

**Managed by domain ID**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the domain ID. If the domain is not managed from another sysplex, this field is blank.

**Managed by z/OSMF URL**
For a domain that is managed by a primary z/OSMF instance on another sysplex, this field indicates the URL of the primary z/OSMF system. If the domain is not managed from another sysplex, this field is blank.

## Public Variables

**Public Variables for *instance***
Contains a table for the child instance that shows information about the public variables for that instance. There is a table for each instance. You can expand or collapse the section for each instance.

## Private Variables

**Private Variables for *instance***
Contains a table for the child instance that shows information about the private variables for that instance. There is a table for each instance. You can expand or collapse the section for each instance.

### Actions

**Actions for *instance***
Contains a table of the actions for the child instance that are available with the **Perform** action. The actions are defined in an actions definition file. The table shows the name and type of the action (command, instruction, workflow, or composite), description, and the command, if appropriate. There is a table for each instance. You can expand or collapse the section for each instance.

To perform an action, select the action in the table, click **Actions**, then select an action from the list.

### History

**Action History for *instance***
Contains a table of information about **Perform** actions that have been performed.

You can use these actions:

**View**
Show details about the action. Alternatively, you can click the name of the action in the table.

**Resume**
Resume a suspended action.

**Retry**
Retry a failed provision or deprovision action. This restarts the failed provisioning or action workflow.

## View action

The **View action** window shows details for the last action that was performed for an instance.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Instances** tab.
3. In the table, click the value in the Last Action Status column for an instance.

   You can also display the **View action** window by using the **View** action for an instance, then clicking an action name in the table on the Action History tab.

## Values on the View action window

**Name**
Name of the action.

**Type**
Type of the action, for a standard instance, or Composite, for a composite instance (created from a composite template).

**Description**
Description of the action. This value is optional. If not provided, the Description field is empty.

**System**
System that the software is provisioned on.

**Ran at time**
Date and time the action was performed.

**Ran by user**
User ID that performed the action.

**Workflow duration**
Duration of the workflow that performed the action, if applicable.

**State**
Current state of the action.

**Workflow**
Workflow name, if applicable. Click the workflow name to open it in the Workflows task.

# Perform an action for an instance

To peform an action for an instance, use the **Perform** action provided in the **Instances** table.

## Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select **Software Configuration**.
2. Select the **Instances** tab.
3. In the table, select an instance.
4. Click **Actions**, select **Perform**, then select the action that you want to perform.
5. On the **Perform** window, supply values as needed for the fields that can be modified.

   Tips are available for some fields. To display the tip for a field, click the tips icon ( ).
6. Click **OK**.

# Values on the Perform window

Fields on the **Perform** window indicate the name and type of the action (workflow, command, or instructions).

When it is displayed, the System field lets you specify the system on which the action is to be performed. The System field is displayed if both of these are true:

- **Allow resources to be relocated to other systems** was selected for the resource pool that is associated with the instance. This is not supported for composite instances (instances created from composite templates).
- More than one system is available in the resource pool.

The selected system is then reflected on the Instances table and on the View page for the instance. Local in the system value indicates the system on which z/OSMF is running.

The action is not performed until you click **OK**. A state field, displayed after you click **OK**, indicates whether or not the action has been performed.

For a standard instance (created from a standard template), a workflow field shows the workflow for the action. Click the workflow name to open the workflow with the Workflow task.

For a composite instance (created from a composite template), a Child instances table shows the instances that make up the composite.

*Table 74. Columns in the Child instances table*

| Column | Description |
|---|---|
| **Name** | Name of the instance. Click the name to view the properties of the instance. |
| **Action State** | Current state of the action. Click the value to view details. |
| **Workflow** | Name of the workflow that performs the action, if applicable. Click the value to open the workflow with the Workflows task. |
| **System** | The system on which the action is to be performed. For child instances in a clustered composite instance, the values may differ. |

## Actions for the Child instances table

The actions are described in the following tables:

- Targeted actions. Actions that apply to the selected item. To use a targeted action, you must select an item.
- Table actions. Actions that apply to the entire table. No selection of a table item is required.

*Table 75. Targeted actions for the Child instances table*

| Action | Description |
|---|---|
| **View** | View the properties of the instance. |
| **View Action** | View the properties of the action. Not available if the action has not been issued. |
| **View Workflow** | Display the workflow using the Workflows task. |
| **Resume** | Resume a suspended action. If the action is not suspended, **Resume** is not available. |
| **Retry** | Retry a failed provision or deprovision action. This restarts the failed provisioning or action workflow. |

*Table 76. Table actions for the Child instances table*

| Action | Description |
|---|---|
| **Configure Columns** | Select the columns to display in the table, specify the order of those columns, and designate which columns are fixed in position when the table is scrolled horizontally. |
| **Hide Filter Row** | Remove the filter row from view.<br>If the filter row is displayed in the table, the **Hide Filter Row** action is listed. Otherwise, the **Show Filter Row** action is listed. |
| **Clear Sorts** | Clear the sort from all of the columns in the table. When you use this action, the column defaults to a descending sort. |
| **Clear Search** | Clear the search. |

## Working with actions

In addition to the actions that are provided with the table of instances, instance-specific actions can be defined for instances, using an action definition file that is part of a template. These actions might either start a workflow, issue a command, or provide instructions. They include a **deprovision** action.

## View actions in a software services template

### About this task

From the templates table, you can view the actions that are defined in the actions definition file.

### Procedure

1. Select the **Templates** tab.
2. In the templates table, click a template name.
3. Scroll the window to view a table of the actions.

# Change the actions definition file for a software services template

### About this task

If the action definitions file for a template is changed, you must refresh the files for a template prior to publishing the template.

### Procedure

1. Select the **Templates** tab.
2. Select a template in the table.
3. Select **Actions**, then **Refresh Template**.

# Create the actions definition file for a software services template

### About this task

You can create an actions definition file with the actions editor when you add a template.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select Software Services.
2. Select the **Templates** tab.
3. In the table, click **Add Template**.
4. On the **Add Template** window, click **Create New** for the Actions file field.
   The **Create New Actions File** window is displayed.
5. Specify values and click **OK**.

   **Target file path or data set**
   The location of the actions file that you want to create. Specify the file path or fully qualified data set name.

   **Deprovisioning workflow definition file**
   If a workflow definition file exists for deprovisioning, specify the file path or fully qualified data set name. If you do not specify this value, the actions editor opens with a placeholder instruction deprovision action defined. If necessary, you can use the actions editor to delete the instruction deprovision action and replace it with a workflow action for deprovisioning.

   The **Edit Actions File** window is displayed.

# Edit actions for a software services template

### About this task

You can use the actions editor to edit an actions definition file when modifying or adding a template.

### Procedure

1. Expand the Cloud Provisioning category in the navigation area, then select Software Services.
2. Select the **Templates** tab.
3. Modify a template.
   a) In the templates table, select a template.
   b) Click **Actions**, then select **Modify**.
   c) On the **Modify** window, click **Edit** for the Actions file field. The **Edit Actions File** window is displayed.

- You can create a new actions file when adding a template.

# Perform actions for a software services instance

## About this task

From the Instances table, you can perform the actions that are defined in the actions definition file.

## Procedure

1. Select the **Instances** tab.
2. In the instances table, select an instance.
3. Click **Perform**, then select an action.
4. On the resulting window, review the information, and provide input as required.

   Tips are available for some fields.

   Tips provide task-oriented information so that you can quickly complete your task. Task information can include, for example, syntax rules or instructions for how to modify the data in a table cell. To display the tips for a field, click the tips icon ( ).
5. Click **OK**.

# Chapter 8. Using the cloud provisioning marketplace

A sample marketplace shows how to make software services available to consumers.

You might use the sample in developing your own software services marketplace.

## Cloud provisioning marketplace

Cloud Provisioning includes a sample marketplace, which makes software services available to marketplace consumers, and also includes functions for marketplace administrators. The sample marketplace is created when you import the Cloud Portal application into z/OSMF. Doing so adds the Marketplace and Marketplace Administration tasks to the z/OSMF desktop interface.

The marketplace is provided as-is, and is intended as a sample for learning purposes only.

If you plan to configure the marketplace, you have system customization to perform, as described in the following topics:


- "Creating SAF authorizations for the marketplace tasks" on page 179
- "Creating role-based authorizations for the marketplace tasks" on page 179
- "Adding or removing the marketplace tasks" on page 180
- "Configuring the marketplace tasks" on page 180
- "Creating and managing subscriptions" on page 180
- "Modifying the Cloud Portal application" on page 181


### Creating SAF authorizations for the marketplace tasks

To enable the marketplace on your system, ask your security administrator to create the authorizations that are shown in Table 77 on page 179.

*Table 77. User authorization requirements for the marketplace tasks*

| Resource class | Resource name | Who needs access? | Type of access required | Why |
|---|---|---|---|---|
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.IBM_CLOUDPORTAL .MARKETPLACE. CONSUMER | Consumers and domain administrators | READ | Allows the user to use the marketplace to provision and manage software services. |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.IBM_CLOUDPORTAL .MARKETPLACE. ADMIN | Domain administrators | READ | Allows the user to control which services are published to the marketplace, and manage the services to which marketplace consumers have subscribed. |
| **ZMFAPLA** | *<SAF-prefix>*.ZOSMF.PROVISIONING .SOFTWARE_SERVICES | Consumers and domain administrators | READ | Allows the user to access the Software Services task. |

### Creating role-based authorizations for the marketplace tasks

To perform tasks in the marketplace, users require the following authorizations:

- To associate a domain with the marketplace, the user must be defined to the domain as a domain administrator.
- To publish services to the marketplace, the user must be defined as either a domain administrator or a consumer in the domain that is associated with the marketplace.
- To subscribe to a published service, the user must be permitted to the template that is associated with the service.

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## Adding or removing the marketplace tasks

The Cloud Portal application is included with z/OSMF in the following location:

```
/usr/lpp/zosmf/samples/cloudportal
```

To add the marketplace tasks to z/OSMF, follow these steps:

1. Open the Import Manager task in z/OSMF.
2. Specify the following properties file as input:

   ```
   /usr/lpp/zosmf/samples/cloudportal/cloudportal.properties
   ```

3. Click **Import**.

Later, if you want to remove the marketplace tasks from z/OSMF, you can do so by using a property file to remove the tasks.

Follow these steps:

1. Open the Import Manager task in z/OSMF.
2. Specify the following properties file as input:

   ```
   /usr/lpp/zosmf/samples/cloudportal/cloudportaldelete.properties
   ```

3. Click **Import**.

If the removal is successful, the tasks are removed from z/OSMF. If an error occurs, resolve the error and import the property file again.

For more information, see the online help for the Import Manager task.

## Configuring the marketplace tasks

When you access the marketplace for the first time, you are prompted as a marketplace administrator to supply information about the marketplace domain and its published services.

Specifically, you must provide the following information:

- On the **Settings** tab, specify the domain name for the marketplace. Specify one domain name only. Changing the domain name causes the deletion of any services that are published to the marketplace.

  Also, on the **Settings** tab, you can indicate whether instances that are provisioned outside of the marketplace can be displayed in the **My Subscriptions** tab and **Manage Subscriptions** tab for marketplace consumers. By default, only entries that are provisioned in the marketplace can be displayed to marketplace consumers.
- On the **All Services** tab, select which services are to be published to the marketplace. You can add any of the templates that are listed in the Published Service Catalog to which you are permitted in the domain for the marketplace.

## Creating and managing subscriptions

When a service is published, marketplace consumers can subscribe to it, which causes the service to be provisioned. In the Marketplace task, consumers can use the **All Services** tab to subscribe to any services to which they are permitted.

The marketplace provides the following functions for viewing and managing subscriptions:

- On the **My Subscriptions** tab, marketplace consumers can view their subscriptions. The tab shows which services are provisioned both within and outside of the marketplace, and allows consumers to take actions on the services.

- On the **Manage Subscriptions** tab, marketplace administrators can view all subscriptions in the marketplace domain to which they are permitted. The tab allows the administrator to manage the services to which marketplace consumers have subscribed.

The **All Services** tab has different functions, depending on whether you access the tab as a consumer (from the Marketplace task) or an administrator (from the Marketplace Administration task). In the Marketplace Administration task, the **All Services** tab allows the user (an administrator) to select which services are to be published to the marketplace.

### Modifying the Cloud Portal application

The Cloud Portal application is provided as-is; you can modify it according to your needs. To modify the application, copy it to a local directory, and make changes to the copy.

To copy the application to another directory, you can use a command like the following, where `/myuserdir` is a local directory of your choice:

```
cp -R /usr/lpp/zosmf/samples/cloudportal /myuserdir/
```

To add or remove the modified Cloud Portal application from z/OSMF, you can use the Import Manager task, as described in "Adding or removing the marketplace tasks" on page 180. As input, specify the following properties file:

```
/myuserdir/cloudportal/cloudportal.properties
```

## Marketplace Administration task

The Marketplace Administration task is a sample that offers administrative function for a software services marketplace. You can use it, along with the Marketplace task, as a model for developing your own consumer marketplace for software services.

The Marketplace Administration task is available to service providers.

To get started with the Marketplace Administration task, expand the Cloud Provisioning category in the navigation area, then select Marketplace Administration.

Use links to view aspects of marketplace administration.

**All Services**
Add services that you want to offer to consumers through the Marketplace task. You can add services for software services templates that have been published using the z/OSMF Software Services task. To access published services, you must be the domain administrator of the cloud domain. (Specify the cloud domain with Settings.) Once you have added a service, you might use the Marketplace task to check that the service is available to consumers.

In the Marketplace task, services are visible to consumers only if the consumers have access to the software services templates that the services use.

**Manage Subscriptions**
View and manage the subscriptions. Expand the row for a subscription to see its properties.

**Settings**
Specify settings, including the domain. Domains are defined with the Resource Management task. To access published services, you must be the domain administrator of the cloud domain that you select.

**Note:** Changing the domain permanently removes any services that you previously added with All Services.

# Marketplace task

The Marketplace task is a sample of a software services marketplace for consumers. You can use it, along with the Marketplace Administration task, as a model for developing your own consumer marketplace for software services.

The Marketplace task is available to consumers as well as to service providers.

To get started with the Marketplace task, expand the Cloud Provisioning category in the navigation area, then select Marketplace.

Use links to view aspects of the marketplace.

**All Services**
View the software services that are available and subscribe to services.

**My Subscriptions**
View and manage your subscriptions. These are all of the services that you are either trying to subscribe to or have subscribed to in the past. Select actions for a subscription from a menu. Expand the row for a subscription to see its properties.

A subscription begins in the being-provisioned state. You may need to refresh the subscription properties to see the state change to provisioned, which indicates that the subscription is available. To refresh properties, click .

Once a service is no longer needed, disable it with the **deprovision** action. Then, remove it with the **Remove** action.

# Chapter 9. Cloud provisioning REST APIs

The cloud provisioning services are a set of application programming interfaces (APIs), which are implemented through industry standard Representational State Transfer (REST) services. These services allow the caller to perform software provisioning for IBM Cloud Provisioning and Management for z/OS. This includes creating instances of z/OS and IBM middleware, such as IBM Customer Information Control System (CICS), IBM Db2, IBM Information Management System (IMS), IBM MQ, and IBM WebSphere Application Server (WAS), and creating middleware resources, such as MQ queues, CICS regions, and Db2 databases. This makes it possible for consumers to quickly provision and deprovision an environment as needed.

For details about the APIs, including using the Swagger interface to display information about them, see Cloud Provisioning APIs in *IBM z/OS Management Facility Programming Guide*.

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# Chapter 10. Preparing software to exploit cloud provisioning

This topic describes how software providers can prepare software to exploit IBM Cloud Provisioning and Management for z/OS.

Software is provisioned from a software services template. A software services template requires the following files.

### Workflow definition file

A workflow definition file is the primary XML file that defines the workflow that performs the provisioning. The workflow definition file includes information about the workflow, such as name and version, as well as step and variable definitions.

The provisioning workflow definition file must be located in a z/OS UNIX file. File templates (specified with the fileTemplate element) that are referenced by a provisioning workflow, and any corresponding callable workflows, can be located in a z/OS UNIX file system or a data set.

### Variable input file

A workflow variable input file is a properties file that is used to specify values for one or more of the input variables that are defined in the workflow definition.

### Action definition file

An action definition file describes the actions that can be performed against the provisioned software, which is known as a software services instance.

The actions definition file can be located in a z/OS UNIX file or a z/OS data set. File templates (specified with the fileTemplate element) that are referenced by a workflow action, and any corresponding callable workflows, can be located in a z/OS UNIX file system or a data set.

For more information, see “Actions definition file” on page 187.

### Documentation files

A documentation file is an optional text or PDF file that provides information that is important to provisioning the software. For example, it might describe the workflow and other files, and describe requirements for using them to provision software. There can be one documentation file for administrators, who create the software services template and prepare the software for provisioning, and one for consumers, who use the published software services template to provision the software. The document for administrators might indicate, for example, whether a network resource pool or WLM resource pool is required.

### Manifest, or template source file

A manifest file is optional. It provides a shortcut when a user creates the software services template by using the z/OSMF Software Services task. Rather than specifying each of the files (workflow definition, input variable file, action, and documentation) individually, the user can specify just the manifest file, then click **Load** to supply values for the other files.

The file must be in Java property file format:

- Each entry is a single line, in *property*=*value* or *property*:*value* format.
- The \ character is a continuation character so that a value can span lines.
- For newline, carriage return, and tab, use \n, \r, and \t.

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- Comment characters are ! and #. Lines that start with those characters are ignored.

The fields in the manifest file are:

**workflow-definition-file**
Name of the workflow definition file

**workflow-variable-input-file**
Name of the workflow variable input file

**action-definition-file**
Name of the action definition file

**description**
Brief description of the workflow. This is optional.

**admin-documentation-file**
Name of the file that describes the workflow and other files. This file is intended for an administrator who prepares a software services template that consumers can use to provision the software. This is optional.

**admin-documentation-type**
File type of the administrator documentation file: text or pdf. This is optional, and valid only if admin-documentation-file is specified.

**cconsumer-documentation-file**
Name of the file that describes the workflow and other files, intended for a consumer who uses the software services template to provision the software. This is optional.

**cconsumer-documentation-type**
File type of the consumer documentation file: text or pdf. This is optional, and valid only if consumer-documentation-file is specified.

You can specify relative or absolute paths for the files that you identify in the manifest file, as follows.

- If the manifest file is a z/OS UNIX file, specify:
  - z/OS UNIX files with a full path, for example, `/a/b/c/d.xml`, or a relative path, for example, `../b/c/d.xml`.
  - Data sets with // followed by a fully qualified name. Data sets can be either partitioned or sequential. For example, you might specify `//IBMUSER.DS.PDS(XML)` or `//IBMUSER.DS.SEQ`.
- If the manifest file is in a data set, specify:
  - z/OS UNIX files with a full path, for example, `/a/b/c/d.xml`.
  - Data sets with fully qualified or relative names, as follows.
    - Fully qualified names follow // and can be either partitioned or sequential. For example, you might specify `//IBMUSER.DS.PDS(XML)` or `//IBMUSER.DS.SEQ`.
    - Relative names vary with the type of the manifest file data set, as follows:
      - Partitioned: Specify just the member, which identifies a member in the manifest file data set. For example, if the manifest file is IBMUSER.DS.PDS(MF), specifying a file path of XML in the manifest file requests IBMUSER.DS.PDS(XML).
      - Sequential: Specify one or more qualifiers that are added to the manifest file data set name. For example, if the manifest file is IBMUSER.DS.SEQ, specifying a file path of XML in the manifest file requests IBMUSER.DS.SEQ.XML.

The following is an example of a manifest file.

```
# provision.mf
#
# Manifest file to be used when adding a template for provisioning an MQ for z/OS Queue Manager.
#
#  <copyright
#      notice="lm-source"
#      pids="@PID###@"
#      years="2015,2016"
#      crc="3073404564">
#      Licensed Materials - Property of IBM
#
#      @PID###@
#
#      (C) Copyright IBM Corp. 2015, 2016 All Rights Reserved.
#  </copyright>
#
# Provision Queue Manager workflow file (steps to provision a Queue Manager)
workflow-definition-file:provision.xml
# Provision Queue Manager workflow variables properties file (properties to be used when provisioning
a Queue Manager)
workflow-variable-input-file:workflow_variables.properties
# Queue Manager actions file (defines the actions that can be performed against a Queue Manager)
action-definition-file:qmgrActions.xml
# Provision Queue Manager workflow description
description:This workflow provisions an MQ for z/OS Queue Manager
# Provision Queue Manager readme file
admin-documentation-file:mqaas_readme.pdf
# Provision Queue Manager readme file type
admin-documentation-type:pdf
```

## Actions definition file

An actions definition file has XML syntax and conforms to the rules of the actions schema. The schema defines the required and optional properties (XML elements and attributes). It imposes constraints on the order in which the elements are specified, and on the values that can be specified for each element and attribute.

The schema file is UTF-8 encoded.

If you are developing an actions definition file, you require access to the schema, and therefore access to the z/OS system on which z/OSMF is installed.

The primary XML file must start with a processing instruction (in column 1 of line 1) for the XML processor. This instruction defines the version of XML used and the encoding of the file. For example:

```
<?xml version="1.0" encoding="UTF-8"?>
```

The remaining elements are as follows.

**<actionList>**
Is the root element. It contains the actions definitions.

**<action>**
Contains an action definition. There must be 1 - 50 actions in an actions definition file. The action contains either a command, workflow, or instruction element. The attributes are:

- name, which specifies the name of the action
- deprovision, which accepts true or false, to indicate whether the action is for deprovisioning. There must be at least one deprovision action.

**<command>**
Contains a command definition. It contains the following elements.

**<commandValue>**
Command to be issued. This is required.

**<runAsUser>**
User ID under which the action is to be performed. This is optional. The attribute is substitution, which accepts true or false.

**<approver>**
A user ID, or a list of user IDs separated by blanks. At least one user ID must approve the action before it is performed on behalf of the user ID that is specified with the runAsUser element. To specify multiple required approvers, use multiple approver elements (up to 12). The approver element is optional. If it is specified, then the runAsUser element is required. The action definition supports the same forms as the workflow definition.

**<unsolkey>**
Key to search for in the unsolicited messages, for a command-type action.

**<solkey>**
Key to search for in the solicited messages command response, for a command-type action.

**<detectTime>**
Time in seconds to search for the unsolkey in the unsolicited messages. Also, the minimum time before a command response is checked for after the command is submitted for execution.

**<workflow>**
Contains a workflow definition, consisting of the elements that follow.

**<cleanAfterComplete>**
Indicates whether the workflow is removed if it completes successfully. Accepts true, false, and inherit, which specifies that the value is inherited from the value of the workflow-clean-after-provisioned field for the instance. The default is inherit.

**<wfDefFile>**
Workflow definition file path. This element is required. The maximum length of the file path is 1024 characters.

**<wfVarInFile>**
Workflow variable input file path. This element is optional. The maximum length of the file path is 1024 characters.

**<wfVar>**
Assigns a value to a workflow instance variable defined in the action workflow. During processing of an action workflow, values for variables are obtained from the property file that is specified with element wfVarInFile. Use wfVar to assign a different value for an action workflow variable. You can:

- Specify an explicit value for the variable.
- Request that the variable value is obtained from the registry for the software services instance. Because all the variables and their values are captured in the software instance registry when the template is provisioned, using the wfVar element lets you share the selected variables between provisioning and other action workflows such as the deprovisioning action workflow.

This wfVar element is optional. Up to 1500 variables are allowed. It includes these attributes:

**name**
Is the name of the variable in the action workflow definition. The name must be unique.

**updateRegistry**
Indicates whether to update the variables in the software services instance registry from the action workflow. This is allowed only if the value for the action workflow variable is obtained from the registry. The value for updateRegistry must be true or false. The default is false. When the value is true, after the action is completed:

- If the variable already exists in the software services instance, the value for the variable is updated from the action workflow.

- If the variable does not already exist in the instance, the variable is created in the instance with the value from the workflow.

**Examples:** In the following example, the value for action workflow variable DFS_PORTID is obtained from the registry variable that is identified by $!{DFS_PORTID}. The registry is updated with the new value for the DFS_PORTID variable set during action processing.

```
<wfVar name="DFS_PORTID" updateRegistry="true">$!{DFS_PORTID}</wfVar>
```

In the following example, the value for action workflow variable DFS_REGION_TCPIPPORT is explicitly set to 8080. You cannot specify updateRegistry="true" when the variable value is explicitly specified.

```
<wfVar name="DFS_REGION_TCPIPPORT" updateRegistry="false">"8080"</wfVar>
```

**<instructions>**
Defines an instruction.

**<description>**
Contains a brief description of the action and the function it performs. This element is optional.

## Examples

The following illustrates the elements of an action definition.

```
<?xml version="1.0" encoding="utf-8"?>
<actionList>
        <action name="workflow1">
              <workflow>
                   <wfDefFile>workflow1.xml</wfDefFile>
                   <wfVar name="var1" updateRegistry="false">var1val</wfVar>
                   <wfVar name="var2" updateRegistry="true">var2val</wfVar>
                   <wfVar name="var3">var3val</wfVar>
              </workflow>
              <description>Description of Workflow 1</description>
        </action>
        <action name="workflow2">
              <workflow>
                   <wfDefFile>workflow2.xml</wfDefFile>
              </workflow>
              <description>Description of Workflow 2</description>
        </action>
        <action name="instructions1">
              <instructions>The instructions</instructions>
              <description>For best results, read every word!</description>
        </action>
        <action name="command1">
              <command>
                   <commandValue>d iplinfo</commandValue>
              </command>
              <description>What this command does</description>
        </action>
        <action name="deprovision" deprovision="true">
              <workflow>
                   <wfDefFile>deprovision.xml</wfDefFile>
              </workflow>
              <description>This workflow can be deprovisioned</description>
        </action>
</actionList>
```

The following example shows definitions for deprovision, start, and stop actions.

```
<?xml version="1.0" encoding="utf-8"?>
<actionList xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:noNamespaceSchemaLocation="./actions_v1.xsd">
    <action name="deprovision">
          <workflow>
            <wfDefFile>./deprovision.xml</wfDefFile>
            <wfVarInFile>./workflow_variables.properties</wfVarInFile>
            <wfVar name="DFS_PORTID" updateRegistry="false">$!{DFS_PORTID}</wfVar>
            <wfVar name="DFS_SSLPORTID" updateRegistry="false">$!{DFS_SSLPORTID}</wfVar>
        </workflow>
        <description>This workflow can be deprovisioned</description>
```

```
    </action>
    <action name="start">
          <workflow>
            <wfDefFile>./Start.xml</wfDefFile>
            <wfVarInFile>./workflow_variables.properties</wfVarInFile>
            <wfVar name="url" updateRegistry="true">$!{ipadd}:$!{port}</wfVar>
          </workflow>
    </action>
    <action name="stop">
          <workflow>
            <wfDefFile>./Stop.xml</wfDefFile>
            <wfVarInFile>./workflow_variables.properties</wfVarInFile>
            <wfVar name="processID" updateRegistry="false">$!{pid}</wfVar>
          </workflow>
    </action>
</actionList>
```

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