# z/OS 3.2 IBM Education Assistant

Solution Name:  Software Update REST API

Solution Element(s):  z/OSMF Software Management

July 2025

# Agenda

- Trademarks
- Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Upgrade & Coexistence Considerations
- Installation & Configuration
- Summary
- Appendix

# Trademarks

- See url http://www.ibm.com/legal/copytrade.shtml for a list of trademarks.
- Additional Trademarks:
  - If you need to list any that aren't included on the website above, please do so here.  If not, remove the text in this bullet and just say “None”.

# Objectives

- Enable automation of z/OS system administrator tasks
  - Create new APIs to install software updates (PTFs).
  - Enable automation of common z/OS system administrator tasks.
  - The API drives the software update processes managed by the z/OSMF Software Update application.
  - A step toward hands free update installation.

# Overview

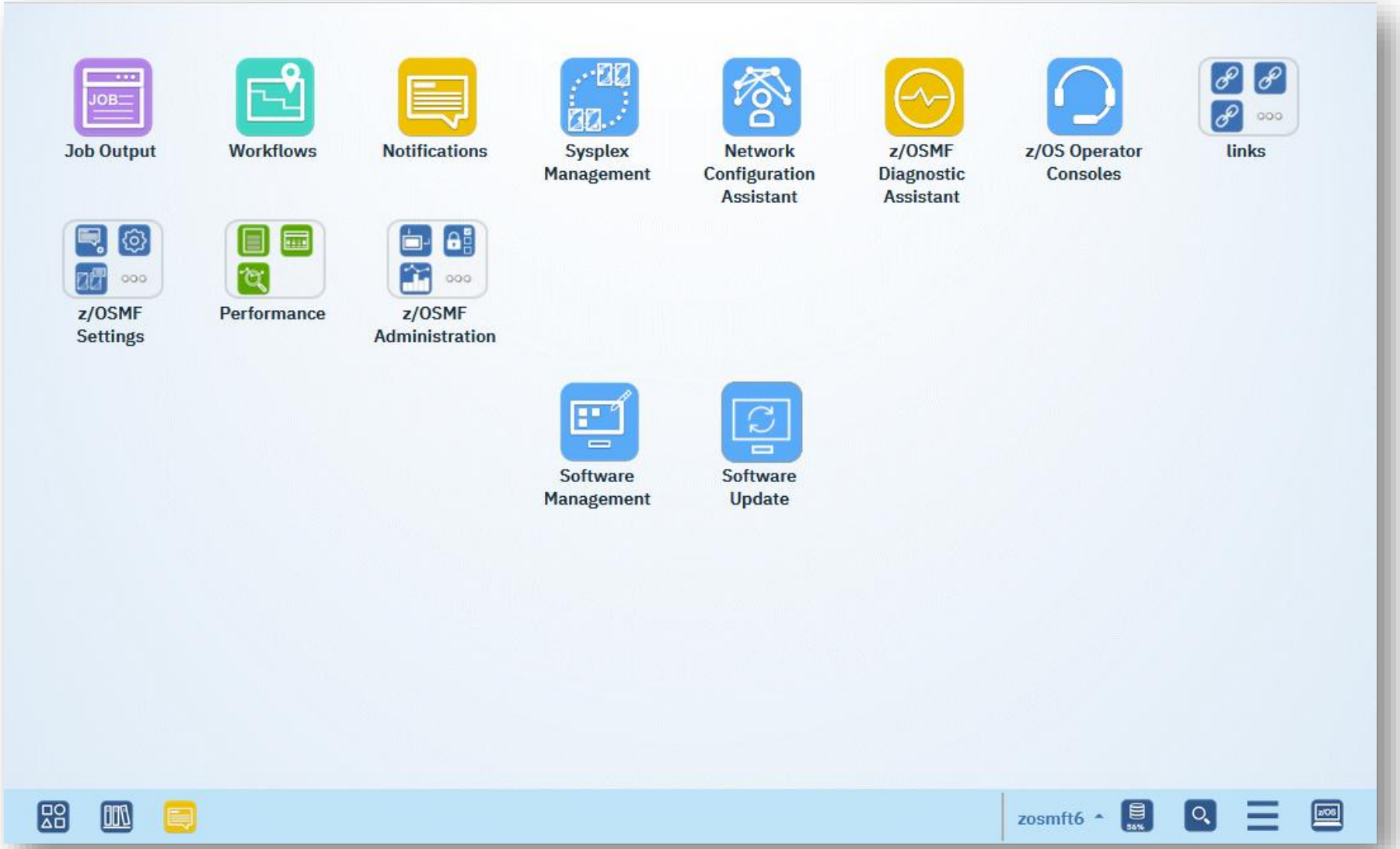
- Who (Audience)
  - z/OS system administrators
- What (Solution)
  - A new set of APIs to perform software update installation via the z/OSMF Software Update application.
    - Start a software update process
    - Retrieve the status of a software update process
    - Resume a suspended software update process
    - Cancel an in-progress software update process
    - Copy the saved output for a software update process
- Wow (Benefit / Value, Need Addressed)
  - Enables automation of common z/OS system administrator tasks.

# Usage and Invocation

- To understand the new Software Update REST API, we must start with a short review of the Software Update application.

# z/OSMF

The z/OSMF desktop.



# z/OSMF Software Management


- Software Management is a z/OSMF application to install and manage z/OS platform software.
- Installed software is known to z/OSMF as a **software instance**.
- The Software Management application allows you to:
  - View data sets that compose a software instance.
  - View Product, Feature, FMID content of software instances.
  - Identify software products that are approaching, or have reached, end of service support.
  - Validate the SMP/E structure and content of a software instance.
  - Identify missing HIPER and PE fixes, and fixes associated with fix categories.
  - Determine if specific fixes are installed.
  - Compare functional and service content of two software instances to aid in migration planning or debugging.
  - Install and Deploy software instances.
  - Launch workflows defined for a software instance to perform setup and configuration tasks.

# z/OSMF Software Update


- Software Update is a z/OSMF application to simplify installing SMP/E managed software updates (aka PTFs).
  - Target users are early tenure z/OS system administrators and system programmers.
  - Codifies best practices for installing software updates.
- Installed software is known to z/OSMF as a **software instance**.
- The Software Update application installs software updates on a software instance.

# Software Update

A **software update** is a generic term for a PTF.

There are 3 actions for installing software updates:

**Install By Name**

- Install individual software updates.
- z/OSMF displays the installable software updates and you select which updates to install.
- If you know the name (ID) for updates you want to install, perhaps to correct a specific problem, then use this action.
- Formerly called the "Install Corrective Updates" action.

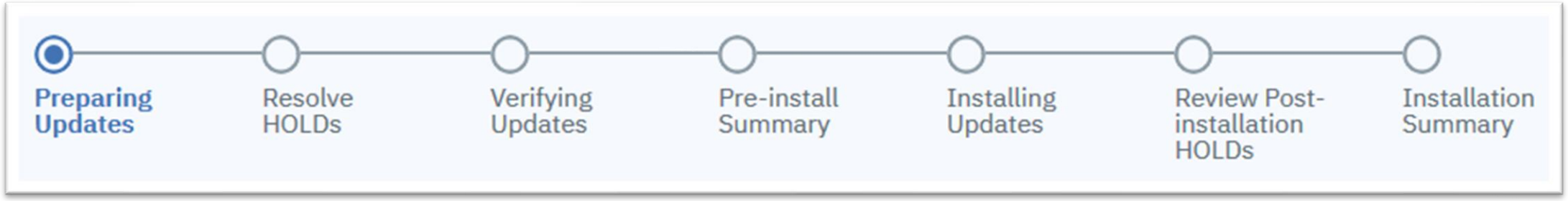
**Install By Source ID**

- Install groups of software updates by selecting source IDs.
- Source IDs identify groups of updates and may indicate whether updates are recommended by the vendor and when, from where or how updates were acquired, or other update categories.
- z/OSMF displays source IDs assigned to installable updates and you select source IDs to install the associated updates.
- Use this action to install vendor-recommended updates.
- Formerly called the "Install Recommended Updates" action.

**Install by Fix Category**

- Install groups of software updates by selecting fix categories.
- Fix categories identify updates which support new hardware, software, or functions.
- z/OSMF displays fix categories for installable updates and you select categories to install the associated updates.
- Use this action to install updates supporting new server devices or software releases.
- Formerly called the "Install Functional Updates" action.

# Software Update Process Steps

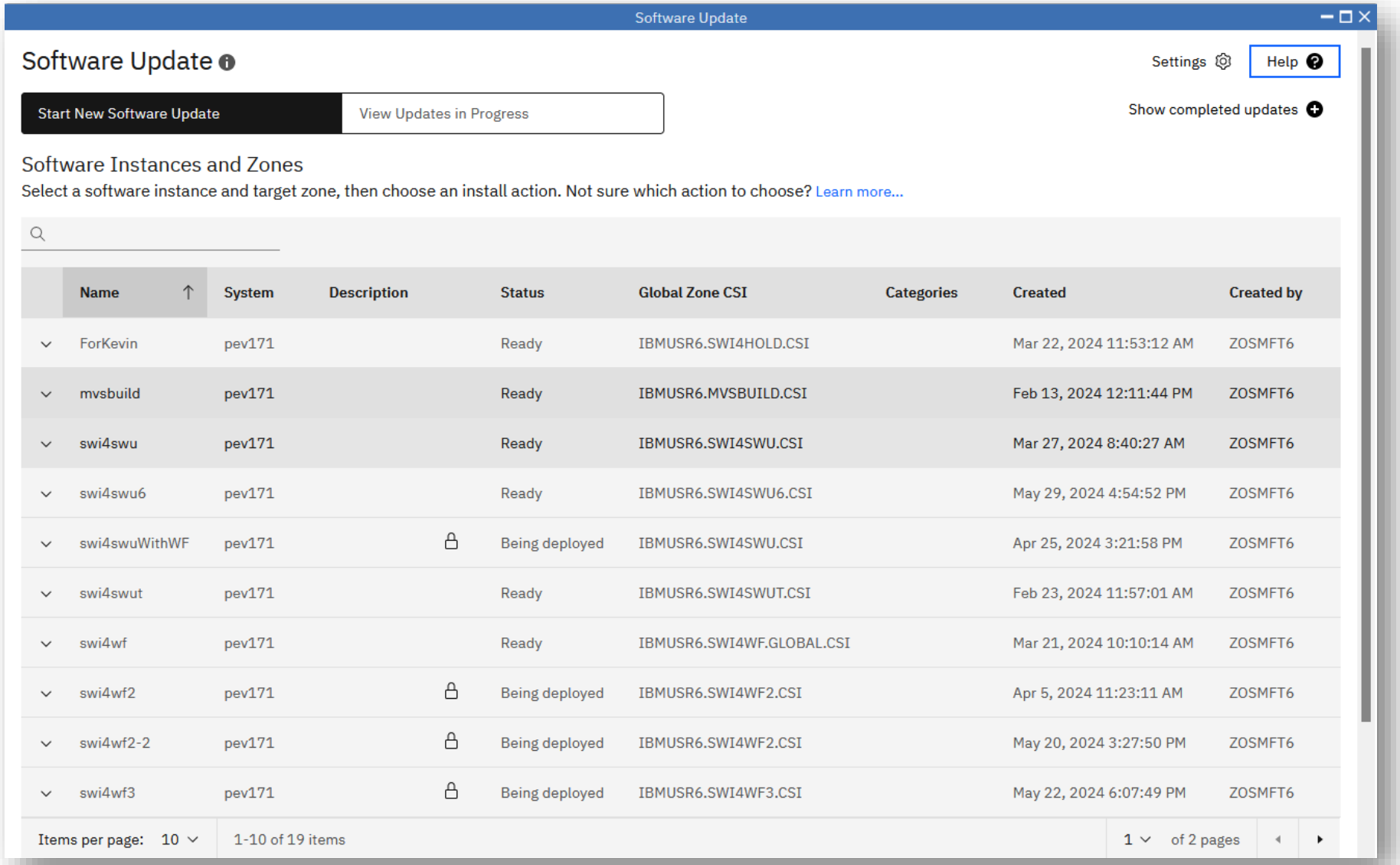



After identifying which updates to install, Software Update guides you through the following steps:

| Step | Action |
|---|---|
| Preparing updates | z/OSMF performs APPLY CHECK to identify HOLDs to review and ensure no missing requisites |
| Resolve HOLDs | User reviews and resolves each HOLD, either bypass the HOLD or exclude the update |
| Verifying updates | z/OSMF performs APPLY CHECK to validate the HOLD resolution choices |
| Pre-installation summary | User reviews the list of updates that will be installed. |
| Installing updates | z/OSMF performs APPLY |
| Review post-installation HOLDs | User reviews any HOLDs that need action after the APPLY |

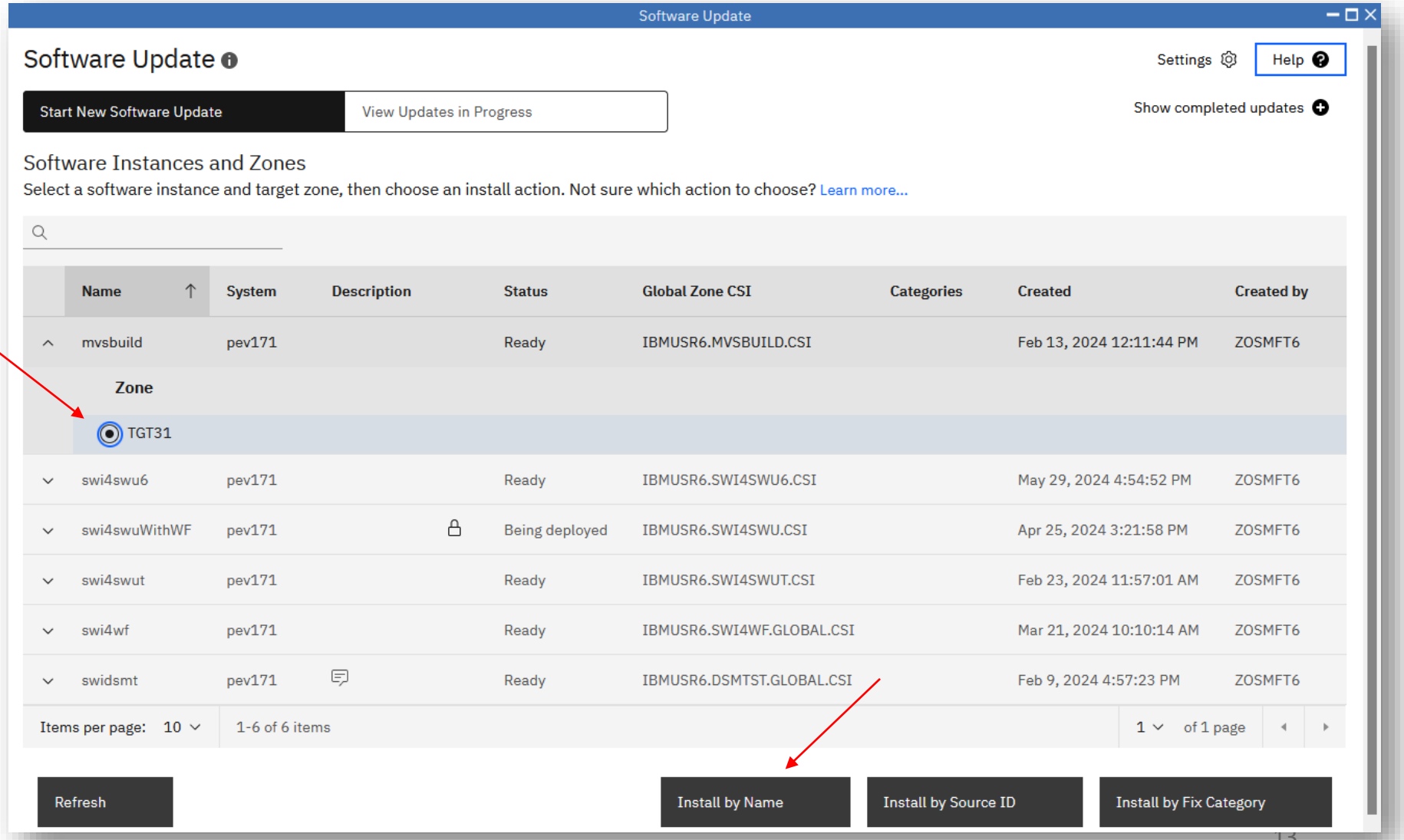
# The Software Update Desktop

The list of Software Instances is displayed.



# Install Updates by Name

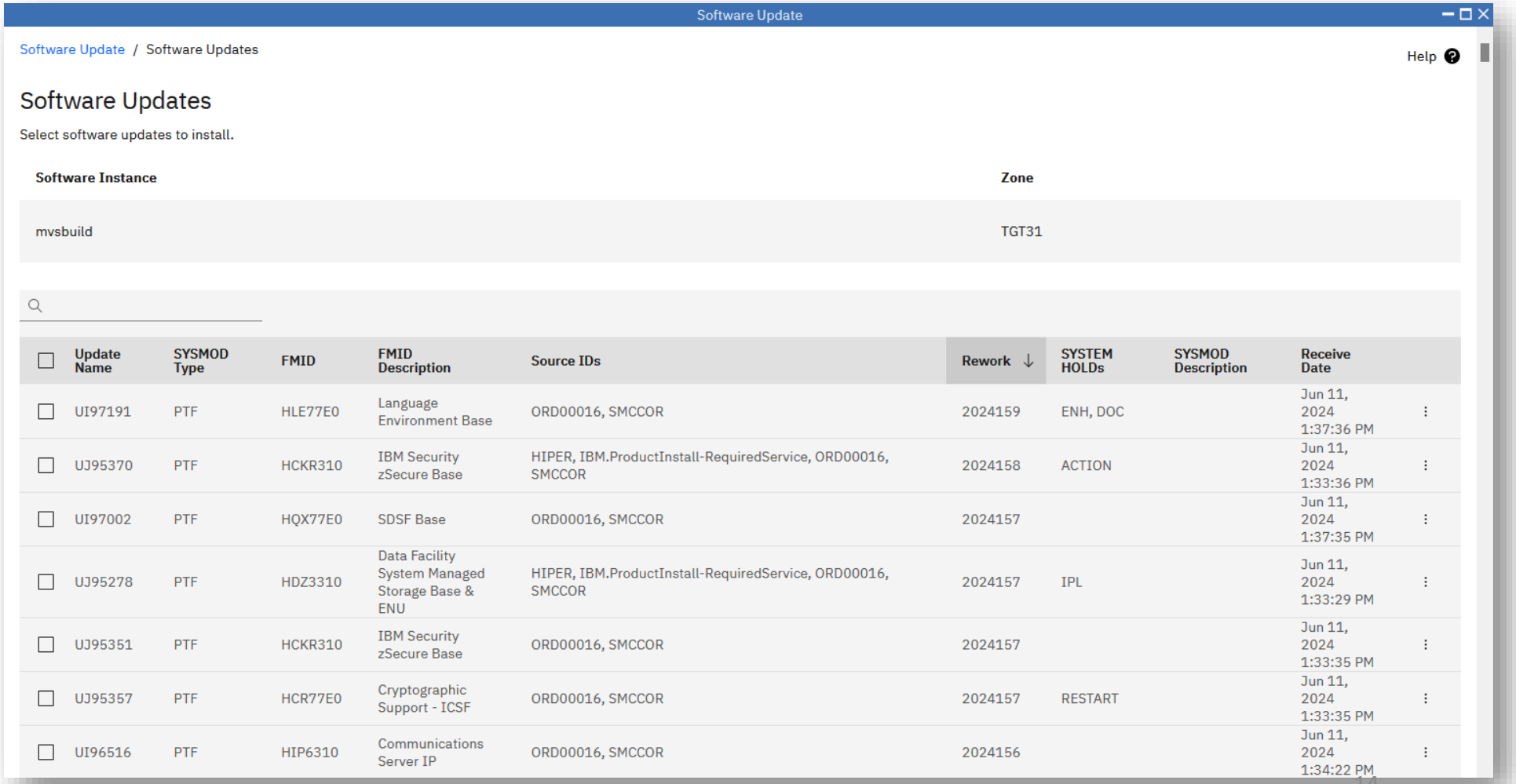
- Select a software instance and the target zone to be updated.
- Click "**Install by Name**"



# Selecting the Software Updates (1)

Updates are displayed if they are:

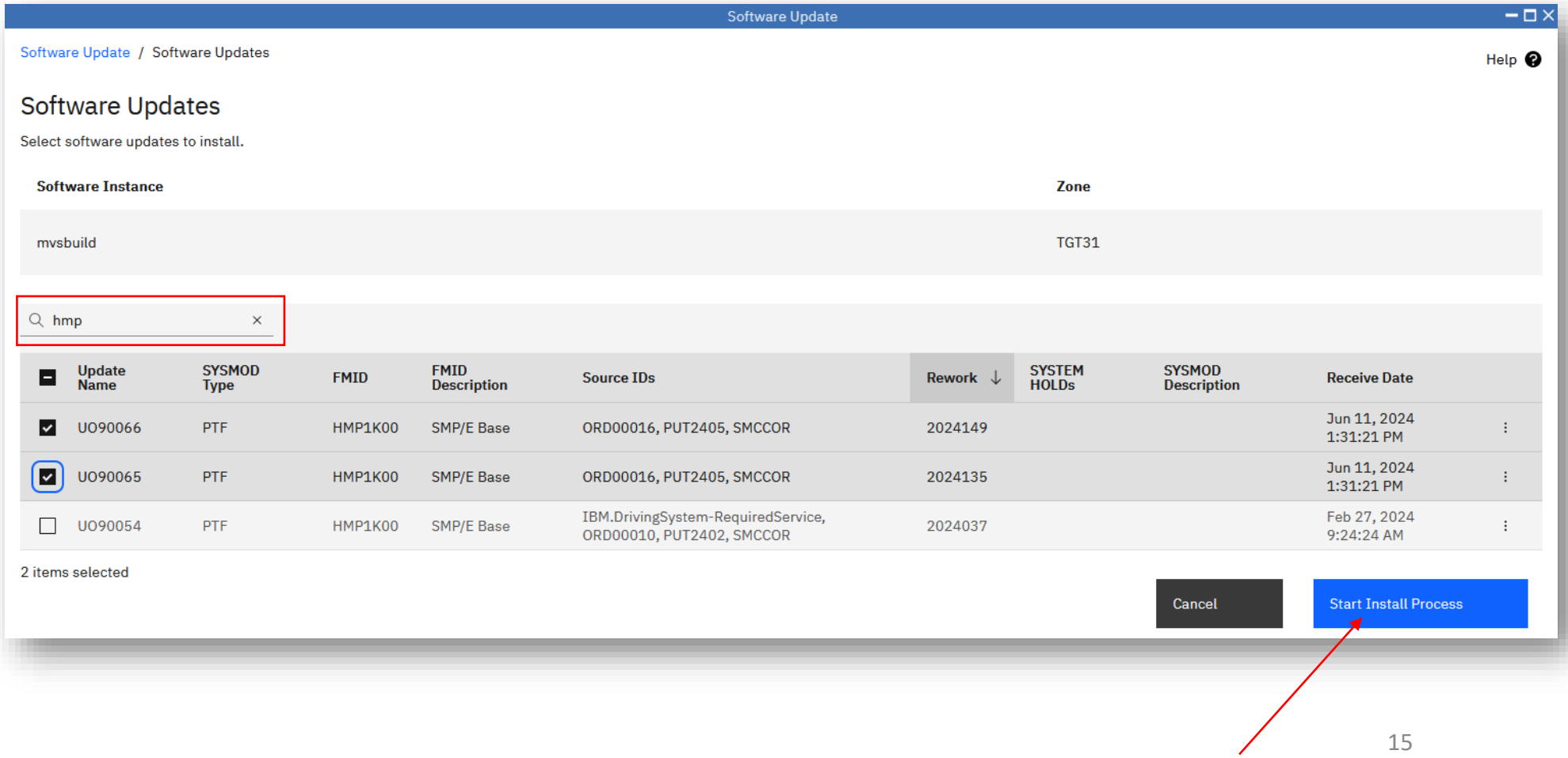
- PTF, APAR, or USERMOD type SYSMODs
- Received in the global zone
- Applicable to the target zone
- Not already applied in the target zone




| Update Name | SYSMOD Type | FMID | FMID Description | Source IDs | Rework | SYSTEM HOLDs | SYSMOD Description | Receive Date |
|---|---|---|---|---|---|---|---|---|
| UI97191 | PTF | HLE77E0 | Language Environment Base | ORD00016, SMCCOR | 2024159 | ENH, DOC | | Jun 11, 2024 1:37:36 PM |
| UJ95370 | PTF | HCKR310 | IBM Security zSecure Base | HIPER, IBM.ProductInstall-RequiredService, ORD00016, SMCCOR | 2024158 | ACTION | | Jun 11, 2024 1:33:36 PM |
| UI97002 | PTF | HQX77E0 | SDSF Base | ORD00016, SMCCOR | 2024157 | | | Jun 11, 2024 1:37:35 PM |
| UJ95278 | PTF | HDZ3310 | Data Facility System Managed Storage Base & ENU | HIPER, IBM.ProductInstall-RequiredService, ORD00016, SMCCOR | 2024157 | IPL | | Jun 11, 2024 1:33:29 PM |
| UJ95351 | PTF | HCKR310 | IBM Security zSecure Base | ORD00016, SMCCOR | 2024157 | | | Jun 11, 2024 1:33:35 PM |
| UJ95357 | PTF | HCR77E0 | Cryptographic Support - ICSF | ORD00016, SMCCOR | 2024157 | RESTART | | Jun 11, 2024 1:33:35 PM |
| UI96516 | PTF | HIP6310 | Communications Server IP | ORD00016, SMCCOR | 2024156 | | | Jun 11, 2024 1:34:22 PM |

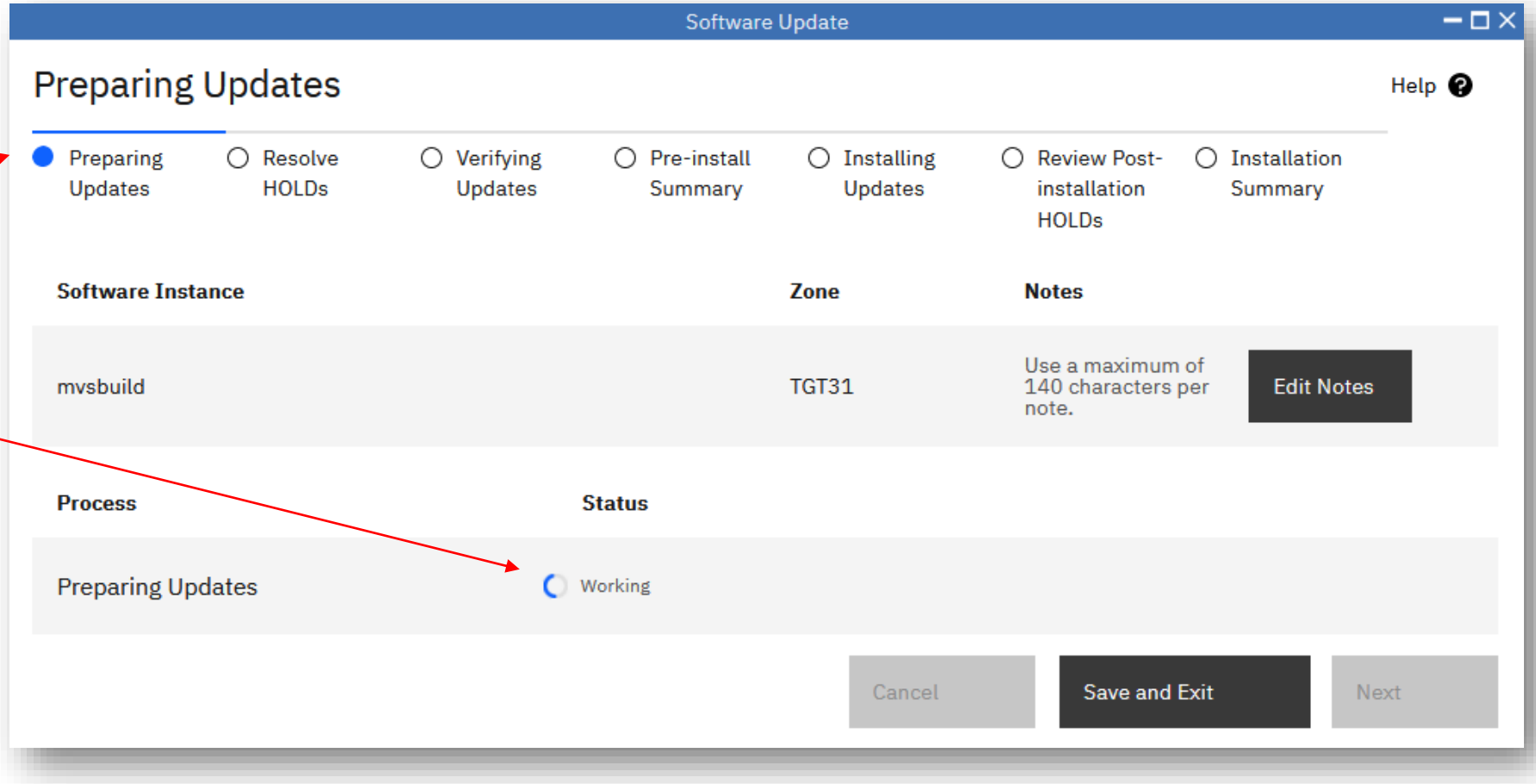
# Selecting the Software Updates (2)

- Enter a search string to filter the list of updates.
- Select the updates (PTFs) you want to install.
- Click “**Start Install Process**”



# Preparing Updates

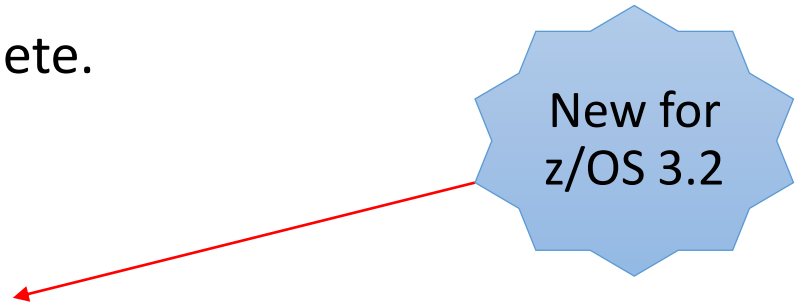
- The overview on top indicates the current step in the wizard.
- A first pass APPLY CHECK identifies all relevant HOLDs and ensures requisites are found.



# z/OSMF Programming Interfaces (REST APIs)

# z/OSMF Programming Interfaces

- Many z/OSMF applications provide program interfaces to work with their resources and actions.
- Implemented as **Representational State Transfer (REST) APIs**.
- Invoked by an **HTTP** client program running on the local z/OS, a remote z/OS, or on another platform.
- Software Management provides the following REST APIs:
  - Software Instance List, Add, Read, Modify, Delete, List data sets, Export, Load products/features/FMIDs, Report Missing Critical Updates, Report Missing FIXCAT Updates, Update Search.
  - Portable Software Instance List, Add, Read, Delete.
  - Deployment Add, Delete.
  - Get z/OS System UUID
  - Query an SMP/E CSI
  - **Software Update Start, Read, Resume, Cancel**
- See the z/OSMF Programming Guide for more information https://www.ibm.com/docs/en/zos/3.1.0?topic=services-software-management



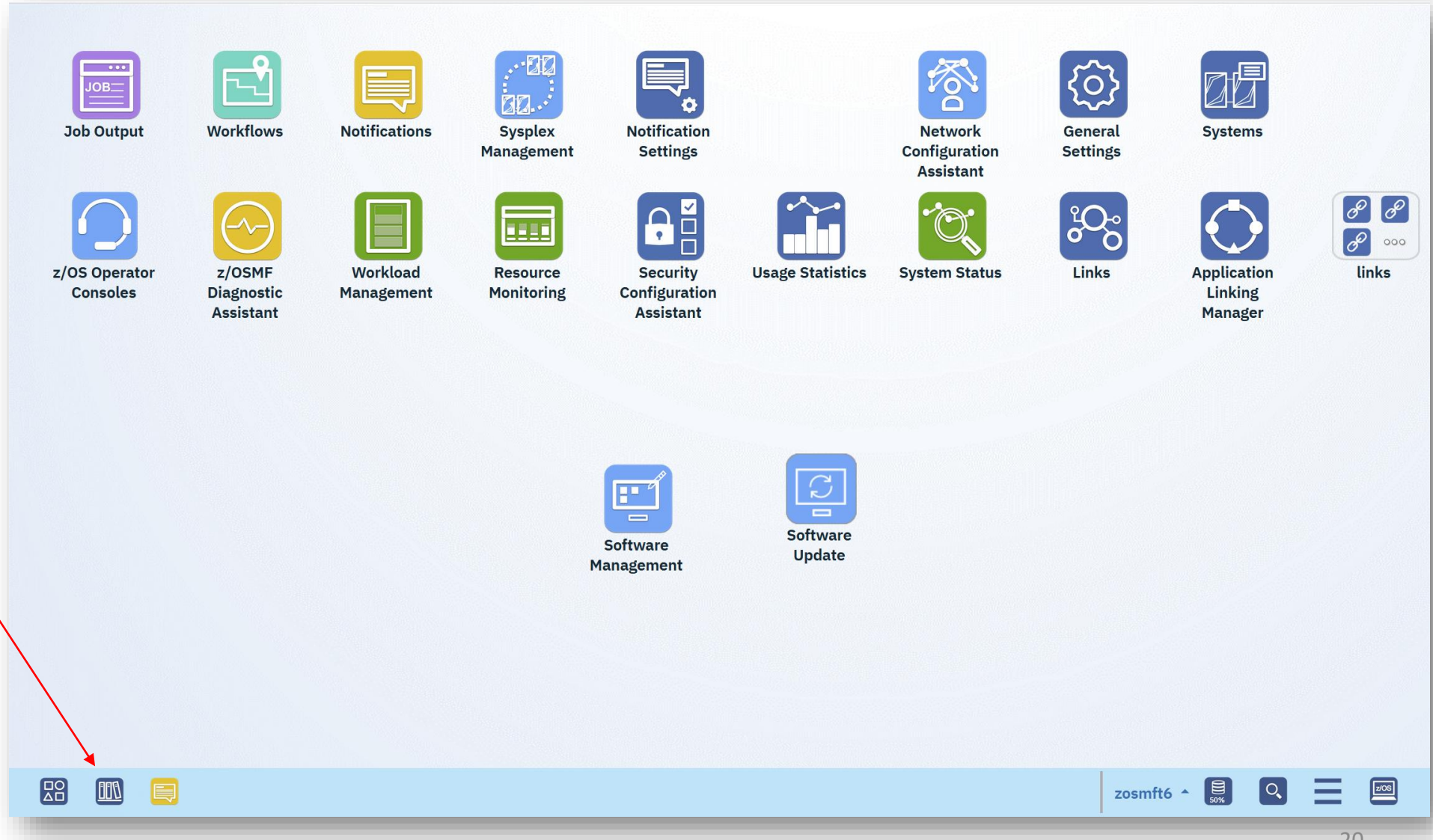
# Software Update APIs

1. **Start** a software update process.  Identify the following:
   - Software instance and target zone to update
   - Software updates to install
   - HOLDs to automatically resolve
   - Process steps on which to suspend
2. **Retrieve** the status of a software update process
3. **Resume** a suspended software update process.  Identify the following:
   - HOLDs to resolve
   - Process steps on which to suspend
4. **Cancel** a software update process
5. **Copy** the output for a completed software update process

A process started by the API is accessible by the application (UI), and vice versa

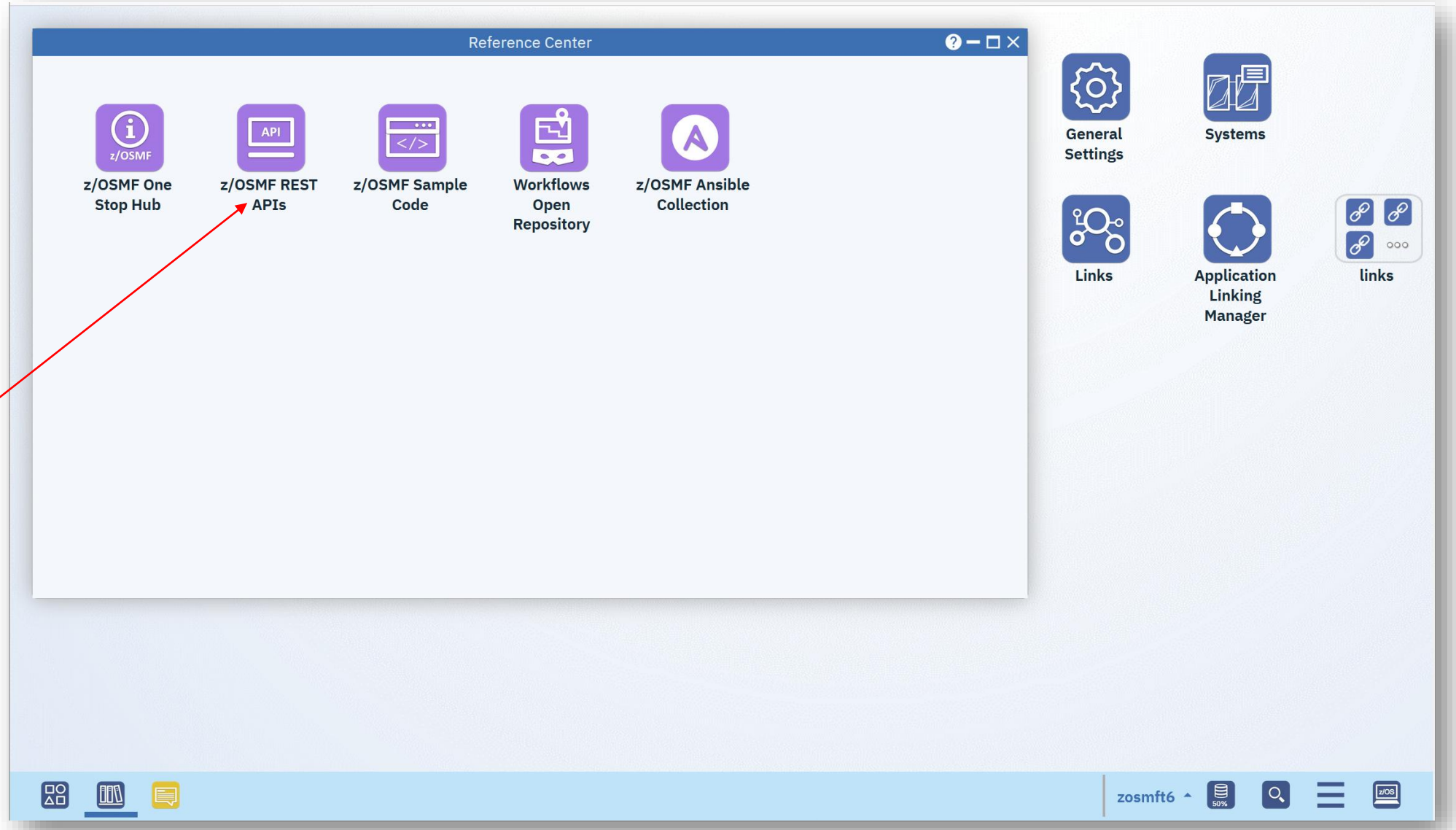
# z/OSMF APIs (1)

Open the “**Reference Center**” folder.



# z/OSMF APIs (2)

Click the "**z/OSMF REST APIs**" icon.

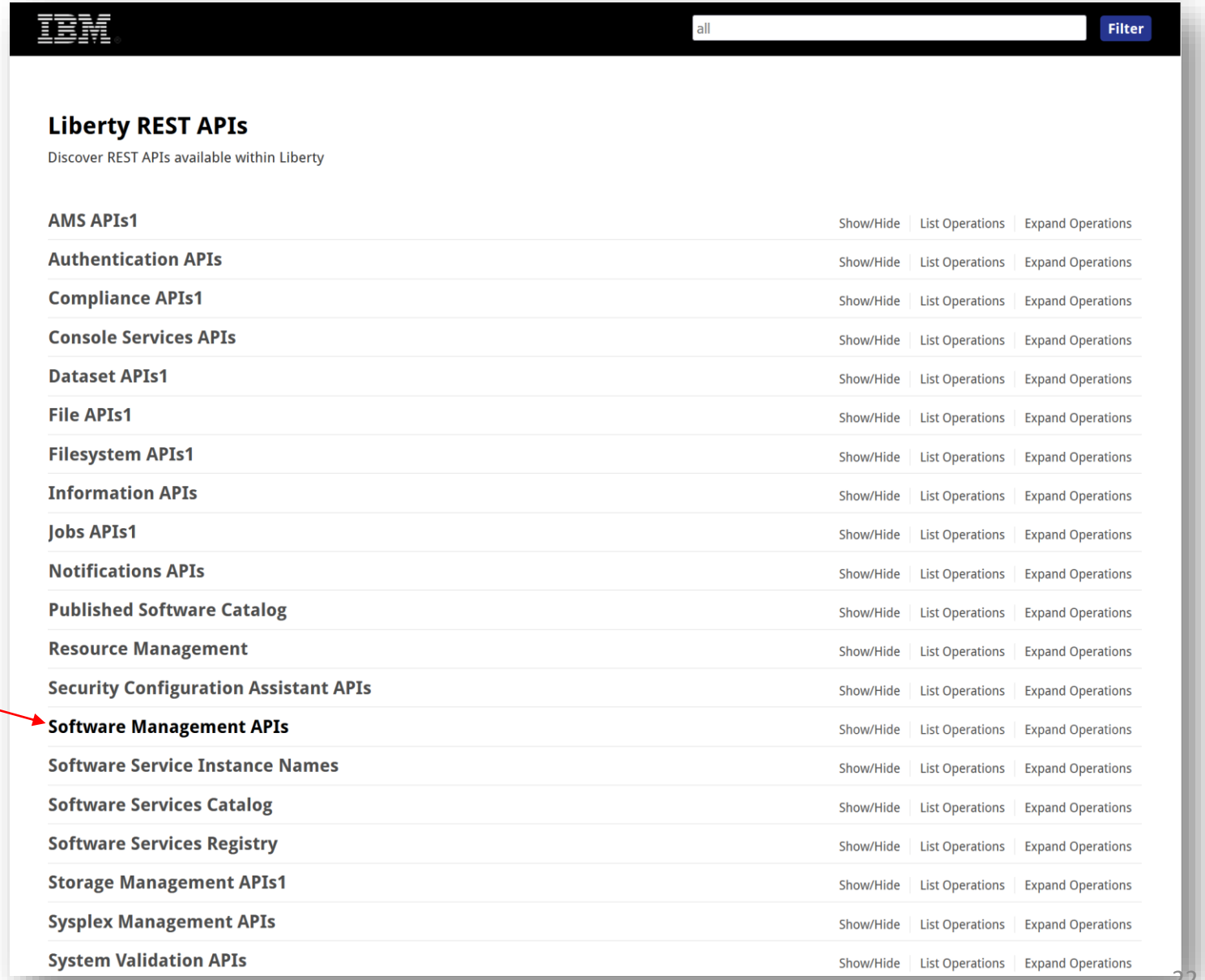


# z/OSMF APIs (3)

The API Explorer uses supplied OpenAPI definitions to display the z/OSMF application REST APIs.

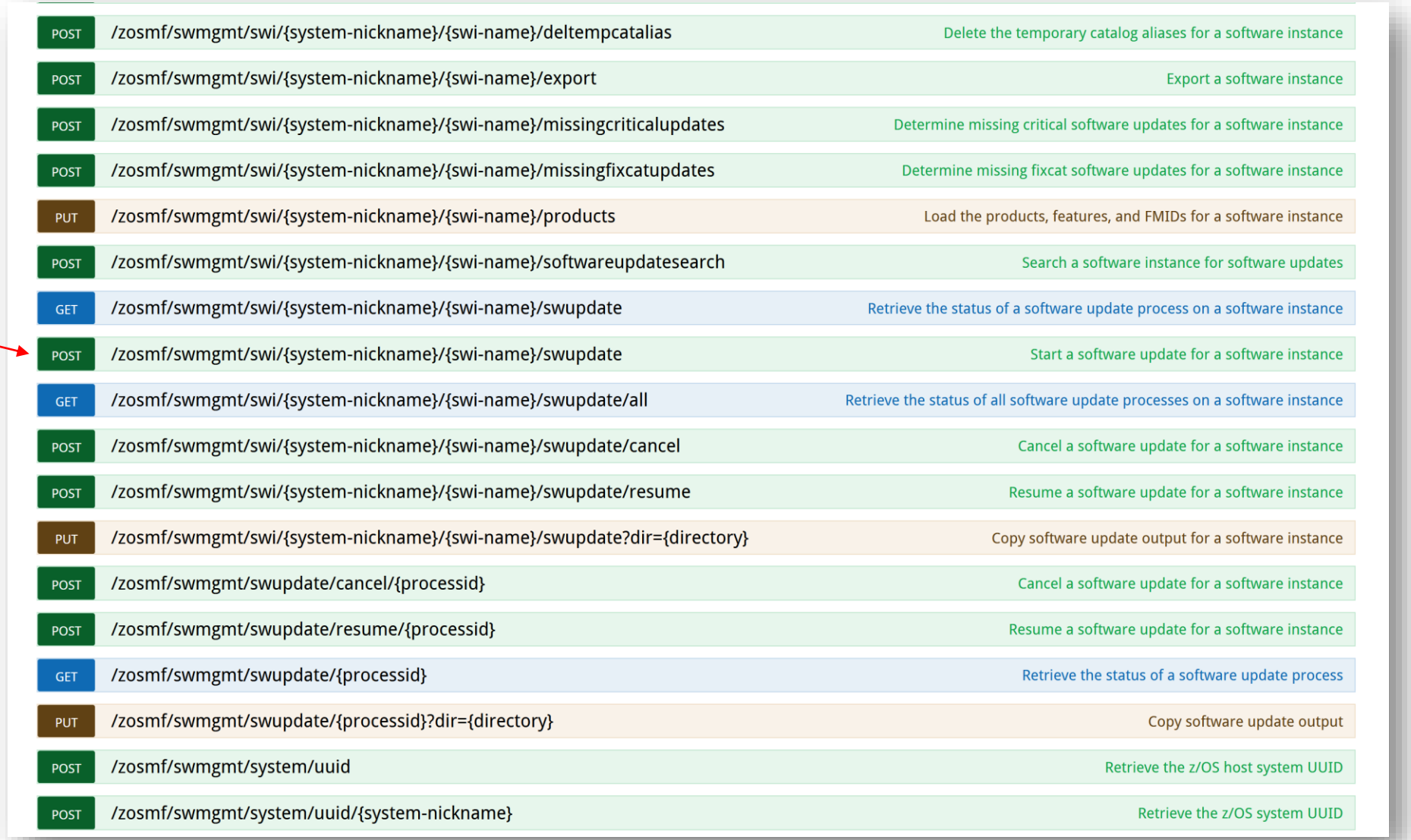
Provides both documentation and an interface to experiment with REST APIs.

Click "**Software Management APIs**"



# z/OSMF APIs (4)

Click “**Start a software update for a software instance**”



# Start a Software Update Process (1)

- The z/OSMF server starts a new update process.

- The URL identifies the software instance to update.
- In the request content specify the following:
  - Target zone to update
  - Software update selection criteria, one of:
    - Update names
    - Source IDs
    - Fix Categories
  - Optional, HOLDs to *automatically* resolve
    - HOLD type (SYSTEM, ERROR, USER)
    - HOLD reason (IPL, RESTART, DOC, ACTION, ENH, …)
    - Held SYSMOD
    - For example, automatically resolve all SYSTEM HOLDs for IPL and RESTART
  - Optional, suspend step:
    - Resolve-Holds
    - Pre-Installation-Summary
  - Optional, SMP/E user ID

# Start a Software Update Process (2)

## HTTP **POST** method

| **URLs:** |
| --- |
| /zosmf/swmgmt/swi/<system-nickname>/<swi-name>/swupdate |
| /zosmf/swmgmt/swi/<swi-uuid>/swupdate |

Request content:

```
{
  "targetzone": "TGT",
  "sourceids": ["RSU2412"],
  "resolve-holds": [
    {"type":"SYSTEM", "reason":"IPL"},
    {"type":"SYSTEM", "reason":"RESTART"}
  ],
  "notes": "Install RSU updates"
}
```

- Install updates in zone “TGT”
- Install all updates assigned to source ID “RSU2412”
- Automatically resolve all SYSTEM HOLDs for IPL and RESTART

# Software Update Process Steps…

- Like the Software Update application UI, a process started by the API has several steps.
- A process may run from start to completion without interruption, or it may suspend and can be resumed or cancelled.
- A started software update process progresses through the following steps:

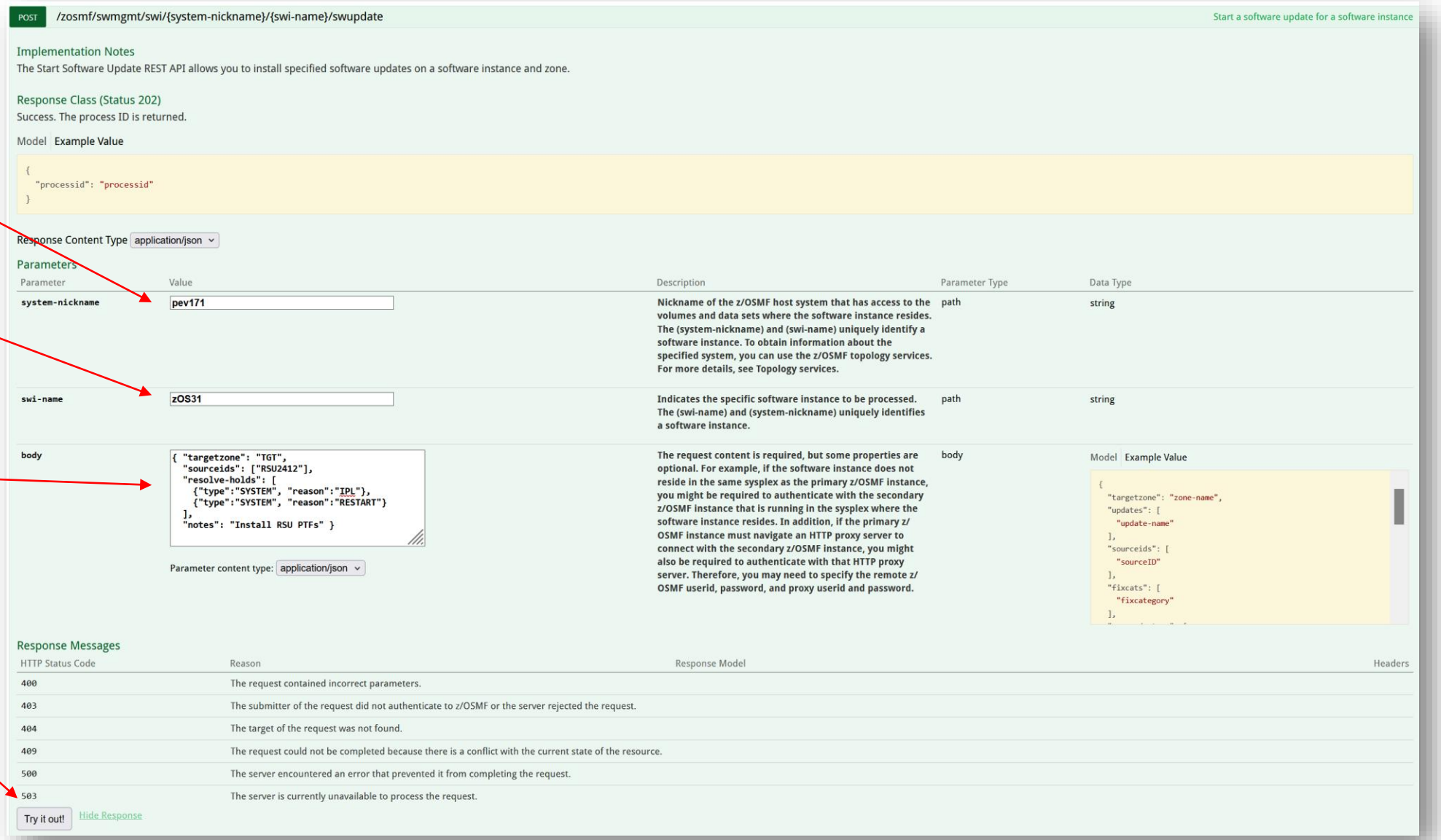
| Step | Action |
|---|---|
| Preparing updates | Perform APPLY CHECK based on the Start input (selected updates, source IDs, or fix categories) to identify updates to be installed and HOLDs that must be resolved. |
| Resolve HOLDs | • Are there any HOLDs to resolve? If yes, **automatically resolve HOLDs** based on the input to Start. If any HOLDs remain unresolved then **Suspend** the process.<br>• If the input to Start requested suspend, then **Suspend** the process to allow the HOLDs to be reviewed. |
| Verifying updates | Perform APPLY CHECK to validate the HOLD resolutions (BYPASS or EXCLUDE). |
| Pre-installation summary | If the input to Start or Resume requested suspend, then **Suspend** the process to allow the list of updates that will be installed to be reviewed. |
| Installing updates | Perform APPLY. |
| Complete | The update process is complete. |

# Start a Software Update (1)

Enter:

- z/OSMF host system name
- Software instance name
- Software update request
  - Target zone
  - Source IDs
  - Resolve Holds
  - SMP/E userid

Click "**Try it out**!"



# Start a Software Update (2)

The HTTP request is sent to the server.

The update process is started and runs asynchronously, so the response returns the **process ID** for the update process, to get the results later.

# Retrieve the Status for a Software Update Process (1)

HTTP **GET** method

| URLs |
| --- |
| /zosmf/swmgmt/swupdate/<process-id> |
| /zosmf/swmgmt/swi/<system-nickname>/<swi-name>/swupdate |
| /zosmf/swmgmt/swi/<swi-uuid>/swupdate |

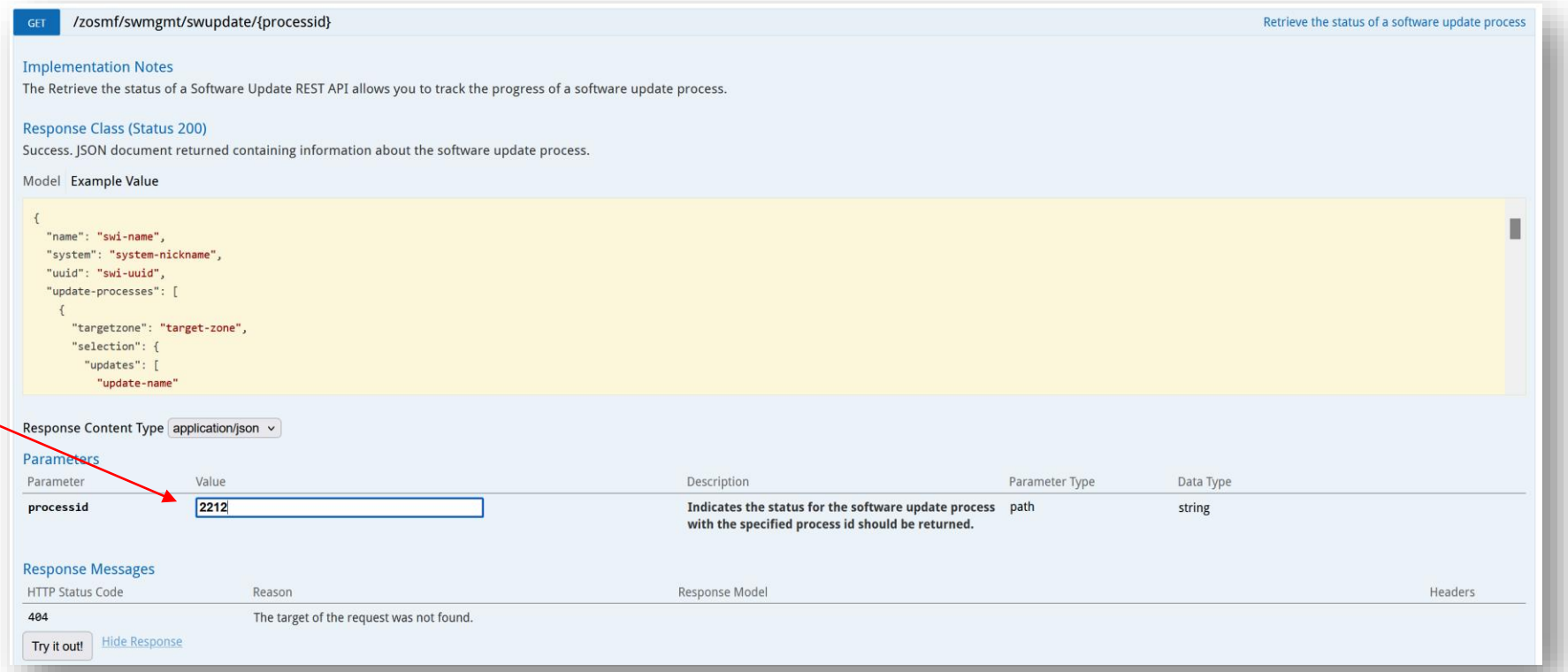
Response content:

```
{
...
"processid": "processid",
"started":"start-date",
"lastmodified":"last-modified",
"completed":"date-completed",
"status": "status",
"step": "current-step",
"holds": [{
  "name": "update-name",
  "holdStatus": "hold-status",
  "fmid": "fmid-name",
  "holdType": "hold-type",
  "holdClass": "hold-class",
  "holdReason": "hold-reason"
  }],
"updates": [{
  "name": "update-name",
  "fmid": "fmid-name",
  "selectStatus": "selection-status"
  }]
...
}
```

# Retrieve the Status for a Software Update Process (2)

Retrieve the status of the software update process.

Enter the process ID returned from the Start.



# Retrieve the Status for a Software Update Process (3)

The Response Body contains the status for the update process, in json format.

- This process is suspended at the RESOLVE_HOLDS step.
- A DOC HOLD is an unresolved.
- An IPL HOLD is automatically resolved, based on the input for the Start.

Try it out! Hide Response

Curl

```
curl -X GET --header 'Accept: application/json' 'https://pev171.pok.ibm.com:443/zosmf/swmgmt/swupdate/2212'
```

Request URL

```
https://pev171.pok.ibm.com:443/zosmf/swmgmt/swupdate/2212
```

Response Body


```
"started": "2025-02-21T21:04:33Z",
"lastmodified": "2025-02-21T21:05:03Z",
"status": "SUSPENDED",
"step": "RESOLVE_HOLDS",
"holds": [
  {
    "fmid": "HSWUPD1",
    "holdStatus": "Unresolved",
    "name": "UA00009",
    "holdReason": "DOC",
    "holdType": "SYSTEM",
    "holdClass": null
  },
  {
    "fmid": "HSWUPD1",
    "holdStatus": "Resolved",
    "name": "UA00011",
    "holdReason": "IPL",
    "holdType": "SYSTEM",
    "holdClass": null
```


Response Code

```
200
```

# Resolved and Unresolved HOLDs

- The Retrieve API response indicates the resolved and unresolved HOLDs for the updates being installed.
- The response does not contain the HOLDDATA (the text).
- To programmatically get the HOLDDATA for review, use the **Query CSI REST API** to get the desired HOLDDATA from the global zone.

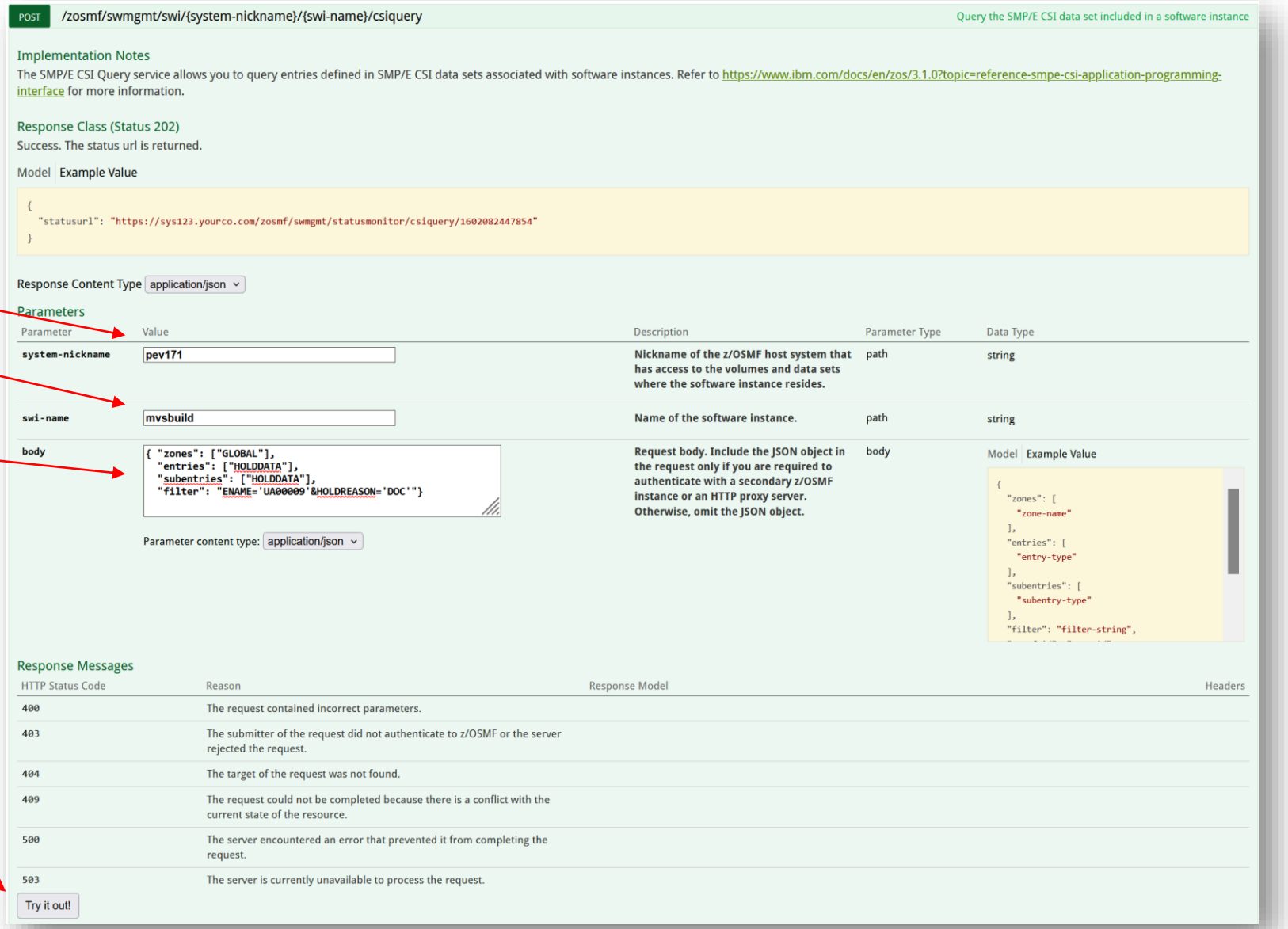
# Get the DOC HOLD (Query the CSI)

Use the Query CSI REST API to get the HOLD entry.

Enter:

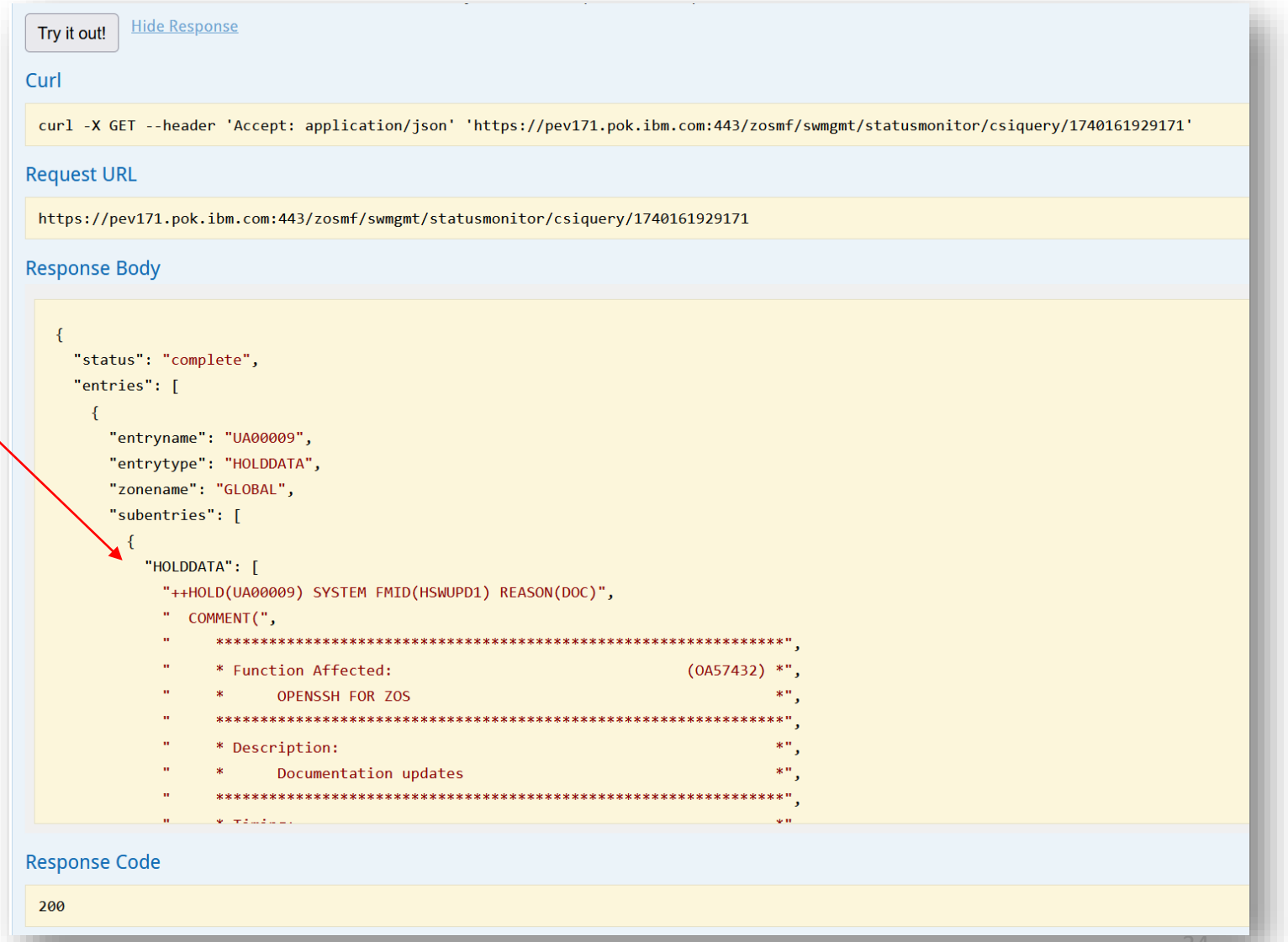
- z/OSMF host system
- Software instance name
- Query:
  - Global zone
  - HOLDDATA entry
  - Return the HOLDDATA subentry
  - Filter to get only the HOLD DOC

Click "**Try it out**!"



# Get the DOC HOLD (Query the CSI)…

The response contains the requested HOLDDATA entry.



# Resume a Suspended Software Update Process (1)

- The z/OSMF server resumes a suspended update process, allowing it to progress to the next steps.

- The URL identifies the software update process to resume.
- In the request content specify the following:
  - Optional, HOLDs to resolve
    - HOLD type (SYSTEM, ERROR, USER)
    - HOLD reason (IPL, RESTART, DOC, ACTION, ENH, …)
    - Held SYSMOD
    - For example, resolve all SYSTEM HOLDs for IPL, RESTART, and DOC
  - Optional, updates to exclude
  - Optional, suspend step:
    - Resolve-Holds
    - Pre-Installation-Summary

# Resume a Suspended Software Update Process (2)

## HTTP **POST** method

| URLs |
| --- |
| /zosmf/swmgmt/swupdate/resume/<process-id> |
| /zosmf/swmgmt/swi/<system-nickname>/<swi-name>/swupdate/resume |
| /zosmf/swmgmt/swi/<swi-uuid>/swupdate/resume |

Request content:

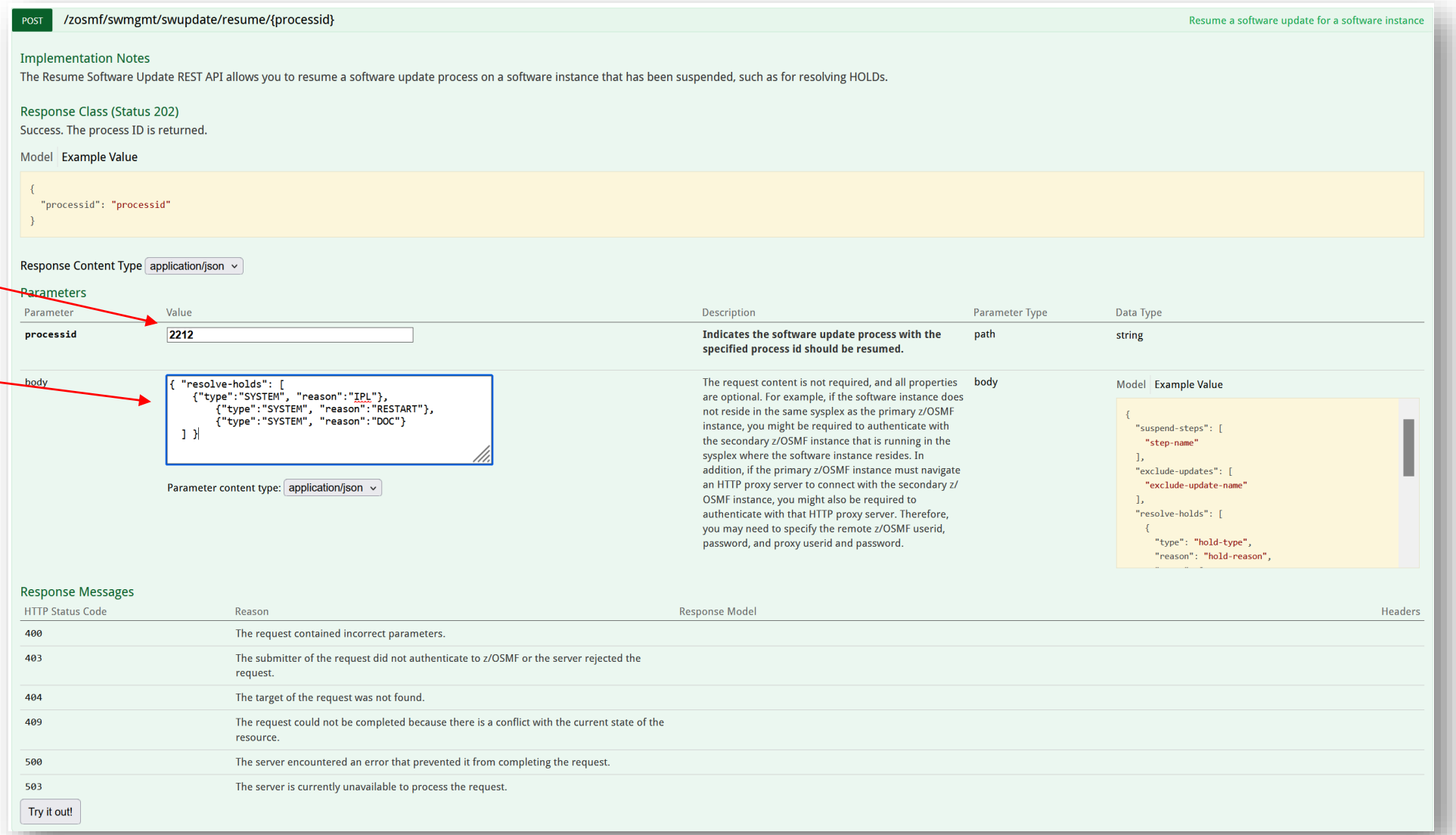
```
{
  "resolve-holds": [
    {"type":"SYSTEM", "reason":"IPL"},
    {"type":"SYSTEM", "reason":"RESTART"},
    {"type":"SYSTEM", "reason":"DOC"}
  ]
}
```

- Resume the update process
- Resolve all SYSTEM HOLDs for IPL, RESTART, and DOC

# Resume a Suspended Software Update Process (3)

Enter:

- Process ID
- Resolve HOLDs, including DOC to resolve all of the HOLDs



# Retrieve the Status for a Software Update Process

The Response Body contains the status for the update process, in json format.

- This process is Completed.
- A DOC and IPL HOLDs are resolved.
- Three updates were installed.

Try it out! Hide Response

Curl

```
curl -X GET --header 'Accept: application/json' 'https://pev171.pok.ibm.com:443/zosmf/swmgmt/swupdate/2212'
```

Request URL

```
https://pev171.pok.ibm.com:443/zosmf/swmgmt/swupdate/2212
```

Response Body


```
"started": "2025-02-21T21:04:33Z",
"completed": "2025-02-21T21:26:51Z",
"status": "COMPLETED",
"step": "COMPLETE",
"holds": [
  {
    "fmid": "HSWUPD1",
    "holdStatus": "Resolved",
    "name": "UA00009",
    "holdReason": "DOC",
    "holdType": "SYSTEM",
    "holdClass": null
  },
  {
    "fmid": "HSWUPD1",
    "holdStatus": "Resolved",
    "name": "UA00011",
    "holdReason": "IPL",
    "holdType": "SYSTEM",
    "holdClass": null
```


Response Code

```
200
```


```
"updates": [
  {
    "fmid": "HSWUPD1",
    "selectStatus": "APPLIED",
    "name": "UA00009"
  },
  {
    "fmid": "HSWUPD1",
    "selectStatus": "APPLIED",
    "name": "UA00010"
  },
  {
    "fmid": "HSWUPD1",
    "selectStatus": "APPLIED",
    "name": "UA00011"
  }
]
```

# Cancel a Software Update Process

- The z/OSMF server cancels a software update process.

- The URL identifies the software update process to cancel.
  - The process must not already be in the Installation step or completed.

HTTP **POST** method

| URLs |
| --- |
| /zosmf/swmgmt/swupdate/cancel/<process-id> |
| /zosmf/swmgmt/swi/<system-nickname>/<swi-name>/swupdate/cancel |
| /zosmf/swmgmt/swi/<swi-uuid>/swupdate/cancel |

# Copy Output for a Software Update Process

- The z/OSMF server copies the saved output for a software update process.
- The saved output includes:
  - All SMP/E output generated for all process steps, in a zip file.
  - File containing relevant SYSTEM ++HOLD statements for the installed updates.

- The URL identifies:
  - The software update process whose output file will be copied.
  - The UNIX directory into which the output files will be copied. The directory is on the primary z/OSMF server.

HTTP **PUT** method

| URLs |
| --- |
| /zosmf/swmgmt/swupdate/<process-id>?dir=<unix-directory> |
| /zosmf/swmgmt/swi/<system-nickname>/<swi-name>/swupdate?dir=<unix-directory> |
| /zosmf/swmgmt/swi/<swi-uuid>/swupdate?dir=<unix-directory> |

# z/OSMF Software Management Ansible Content

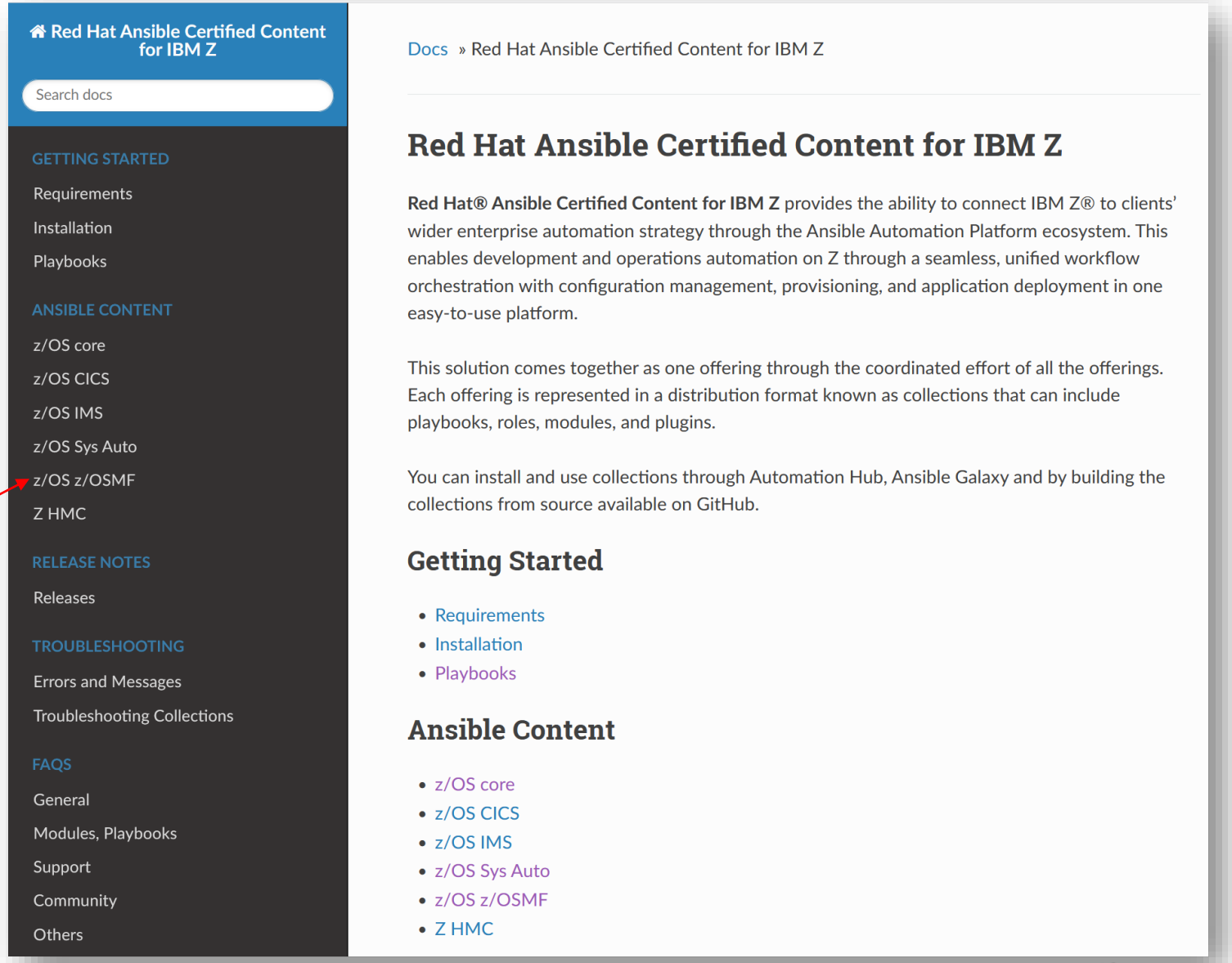
# Red Hat Ansible Certified Content for IBM Z

Ansible is an open source automation engine.

z/OSMF provides a collection of artifacts that enable Ansible to automate z/OSMF actions.

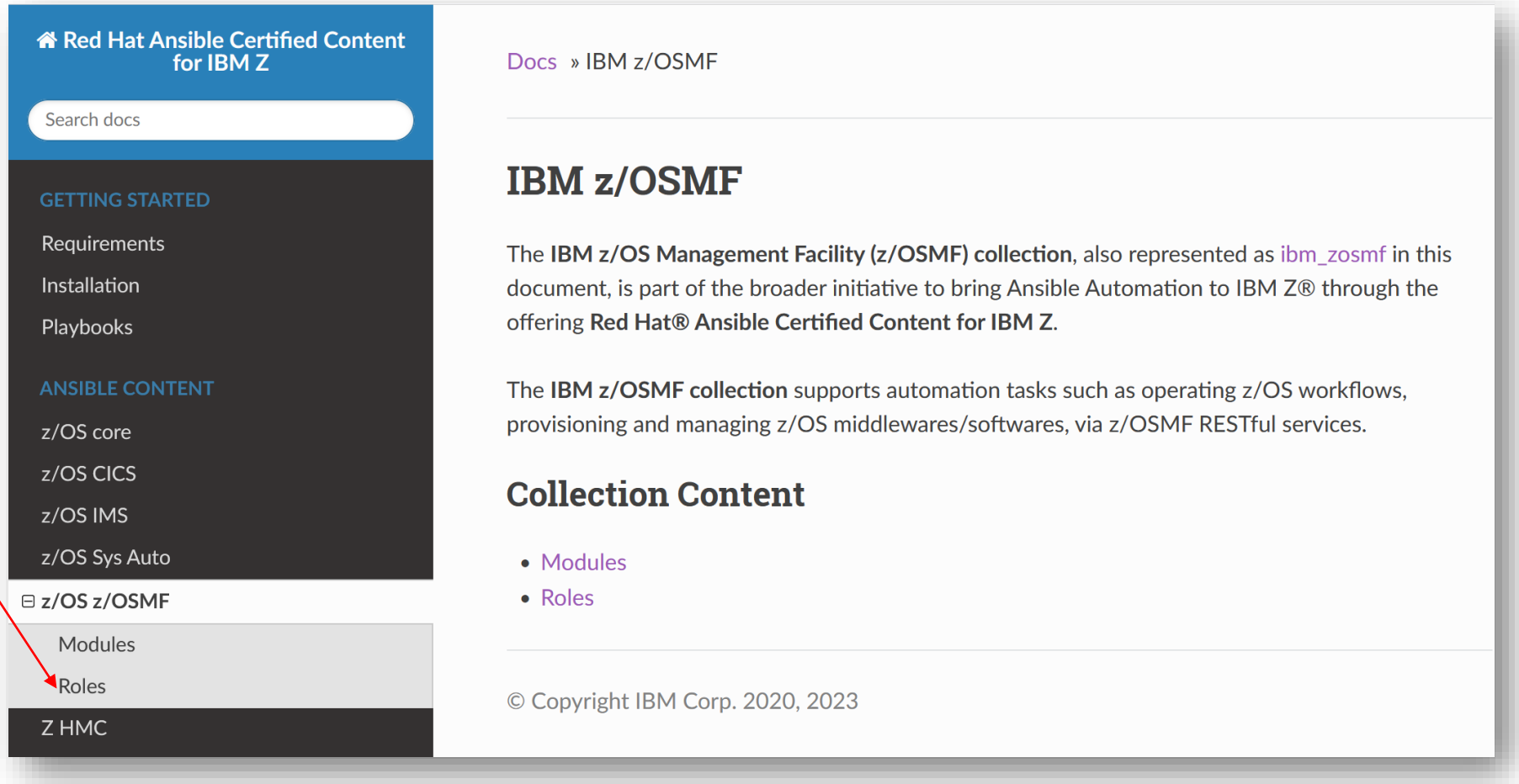
Click “**z/OS z/OSMF**”

https://ibm.github.io/z_ansible_collections_doc/



# z/OSMF Ansible Collection

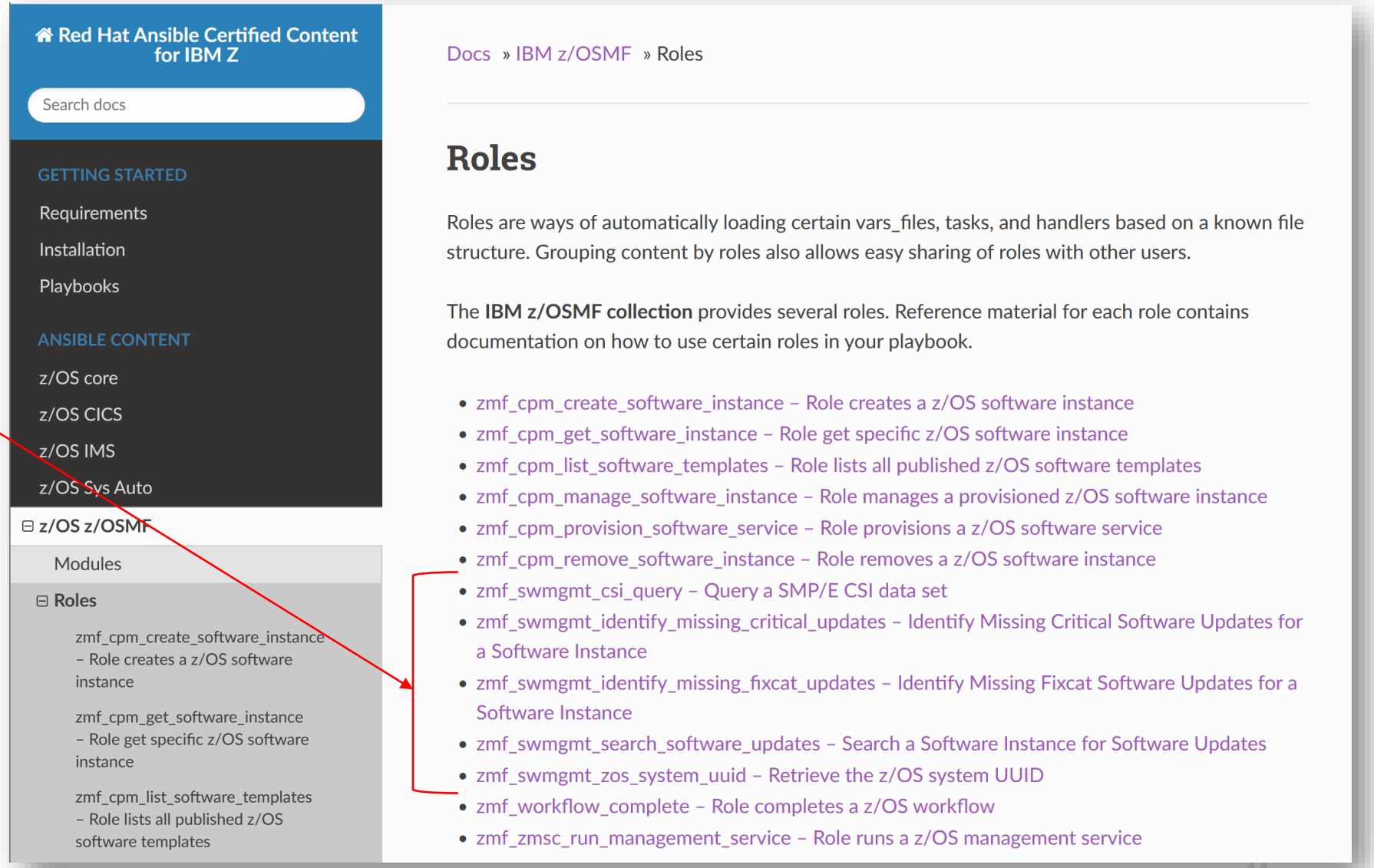
Click “**Roles**”



# z/OSMF Ansible Collection…

Existing Software Management Roles

New for z/OS 3.2, roles to perform Software Update processes.



# Software Management Ansible Roles

1. Query a CSI data set
   - Drives the Query a CSI data set REST API
2. Identify Missing Critical Updates
   - Drives the Missing Critical Updates REST API
   - Identifies missing HIPER, PE fixing, and SECINT fixes, like SMP/E REPORT ERRSYSMODS
3. Identify Missing Fixcat Updates
   - Drives the Missing Fixcat Updates REST API
   - Identifies missing fixes associated with fix categories, like SMP/E REPORT MISSINGFIX
4. Software Update Search
   - Drives the Software Update Search REST API
   - Queries the CSI for a software instance for specified SYSMODs
5. Retrieve z/OS System UUID
   - Drives the Get System UUID REST API
   - Queries z/OS for the UUID of software instance that represents the installed software for the IPL'd z/OS.
6. **Software Update Start, Read, Resume, Cancel, Copy**

# Software Update Ansible Content

- Roles for each API:  Start, Retrieve, Resume, Cancel, Copy
- Sample play books:

1. Install software updates, resolve all HOLDs automatically, no suspend.
   - Input:
     - Software instance and target zone to update
     - Software updates to install
   - Response:
     - List of installed updates
     - File containing ++HOLDs (text) for installed updates
2. Install software updates, identify HOLDs and suspend.
   - Input:
     - Software instance and target zone to update
     - Software updates to install
     - HOLDs to resolve automatically, optional
   - Response:
     - List of updates to be installed
     - List of resolved and unresolved HOLDs
     - File containing ++HOLDs (text) for updates to be installed
3. Resume suspended software update process.
   - Input:
     - Software instance process to resume
     - HOLDs to resolve
   - Response:
     - List of installed updates
     - File containing ++HOLDs (text) for installed updates

# Interactions & Dependencies

- Software Dependencies
  - None
- Hardware Dependencies
  - None
- Exploiters
  - None

# Upgrade & Coexistence Considerations

- To exploit this solution, all systems in the Plex are **NOT** required to be at the new z/OS level.
- Coexistence/toleration PTFs, were available in October 2023:
  - z/OS 3.1, UI93918
  - z/OS 2.5, UI93919
  - z/OS 2.4, UI93920
- No upgrade actions are required.
- This function is available on z/OS 3.1 and higher.

# Installation & Configuration

- There are no new installation or configuration considerations for the z/OSMF Software Management application to use the new Software Update REST API.

# Summary

- A new set of APIs are created to perform software update installation via the z/OSMF Software Update application
  - Start a software update process
  - Retrieve the status of a software update process
  - Resume a suspended software update process
  - Cancel an in-progress software update process
  - Copy the saved output for a software update process
- Ansible roles and sample playbooks are created to exploit the new Software Update APIs
- Helps to enable automation of common z/OS system administrator tasks

# Appendix

- Current published content:
  - Red Hat Ansible Certified Content for IBM Z
    https://ibm.github.io/z_ansible_collections_doc/
  - z/OSMF Programmers Guide, Software Management REST APIs, z/OS 3.1
    https://www.ibm.com/docs/en/zos/3.1.0?topic=services-software-management