GSE GUIDE SHARE EUROPE UK REGION

2023 Inperson Conference
Where Technology and Talent
Meet Tomorrow...

Ansible and z/OS Cloud Broker in action with CICS TS

Drew Hughes & Andrew Twydell
IBM

November 2023
Session EB

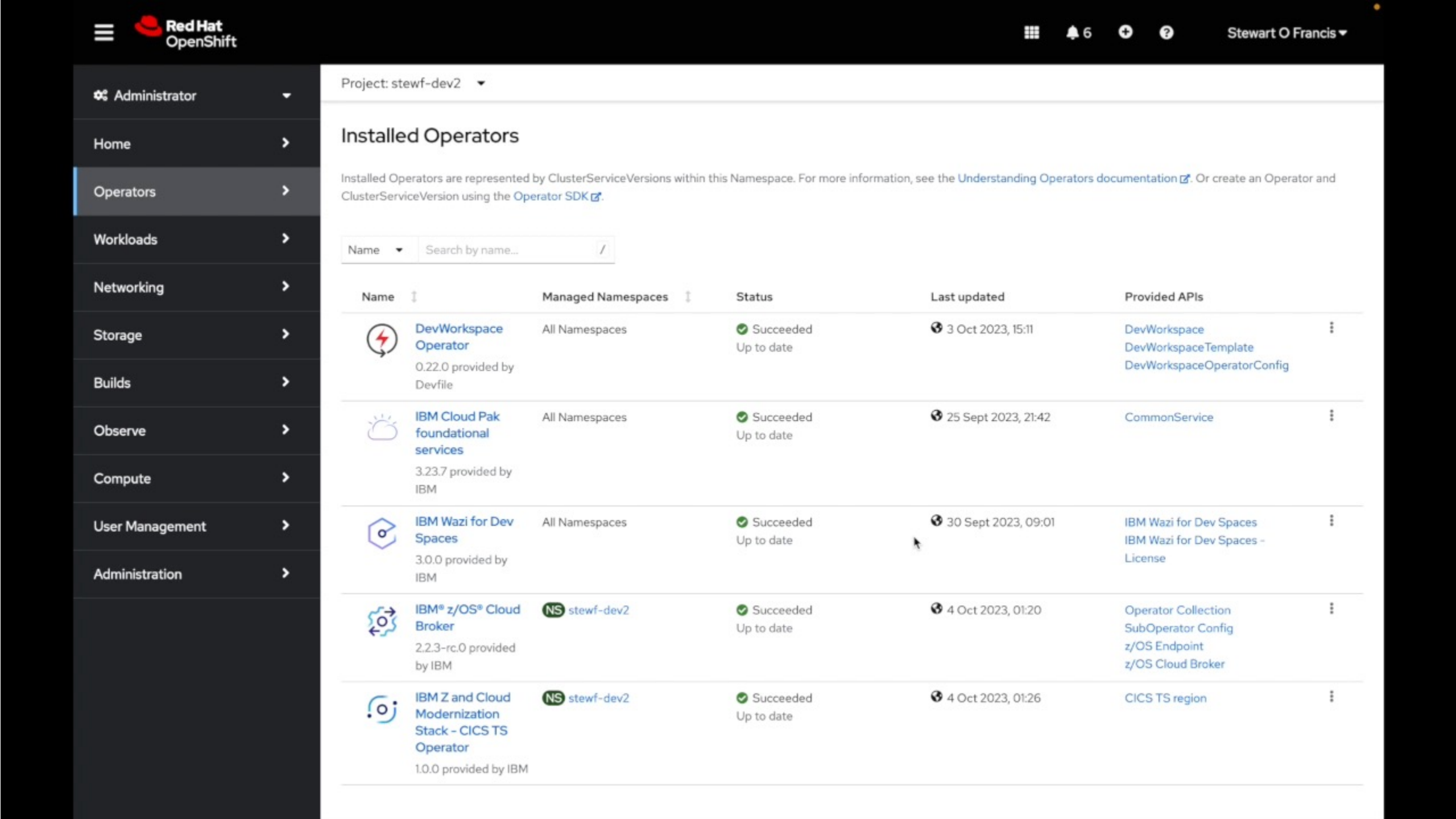
GSE UK Conference 2023 Charities

- The GSE UK Region team hope that you find this presentation and others that follow useful and help to expand your knowledge of z Systems.
- Please consider showing your appreciation by kindly donating a small sum to our charities this year, Blood Bikes and LimbPower.

https://www.justgiving.com/crowdfunding/mark-wilson-343

Agenda

- CICS Region provisioning with Cloud Broker
- Introduction to Ansible
  - What is Ansible?
  - How can it be used for automation on z/OS?
- Ansible Ecosystem
- Demo repository -> https://github.com/andrewhughes101/gseuk_demos


Red Hat OpenShift
6
Stewart O Francis
Administrator
Home
Operators
Workloads
Networking
Storage
Builds
Observe
Compute
User Management
Administration
Project: stewf-dev2
Installed Operators
Installed Operators are represented by ClusterServiceVersions within this Namespace. For more information, see the Understanding Operators documentation. Or create an Operator and ClusterServiceVersion using the Operator SDK.
Name
Search by name...
Name
Managed Namespaces
Status
Last updated
Provided APIs
DevWorkspace Operator
0.22.0 provided by Devfile
All Namespaces
Succeeded
Up to date
3 Oct 2023, 15:11
DevWorkspace
DevWorkspaceTemplate
DevWorkspaceOperatorConfig
IBM Cloud Pak foundational services
3.23.7 provided by IBM
All Namespaces
Succeeded
Up to date
25 Sept 2023, 21:42
CommonService
IBM Wazi for Dev Spaces
3.0.0 provided by IBM
All Namespaces
Succeeded
Up to date
30 Sept 2023, 09:01
IBM Wazi for Dev Spaces
IBM Wazi for Dev Spaces - License
IBM® z/OS® Cloud Broker
2.2.3-rc.0 provided by IBM
NS stewf-dev2
Succeeded
Up to date
4 Oct 2023, 01:20
Operator Collection
SubOperator Config
z/OS Endpoint
z/OS Cloud Broker
IBM Z and Cloud Modernization Stack - CICS TS Operator
1.0.0 provided by IBM
NS stewf-dev2
Succeeded
Up to date
4 Oct 2023, 01:26
CICS TS region

So what did we just do?

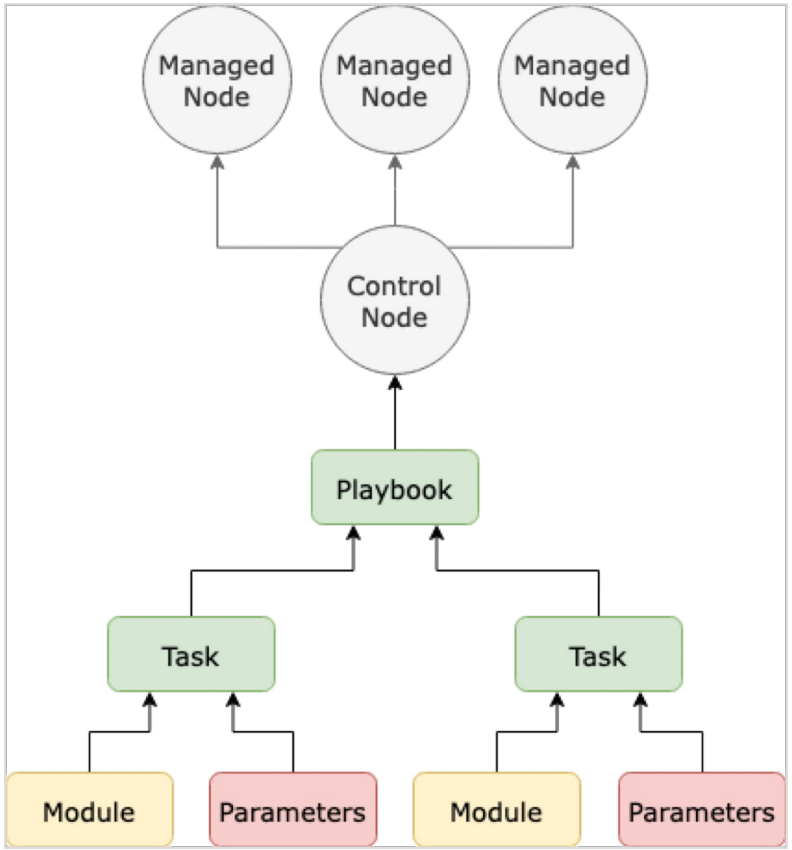
- Used OpenShift's web-based GUI to provision a CICS Region on Wazi Sandbox
- Provided only the SYSID for the new region
- Used Ansible to do this
- Context: Cloud broker is running in Open shift, and an endpoint was pre-configured in Cloud Broker

What is Ansible?

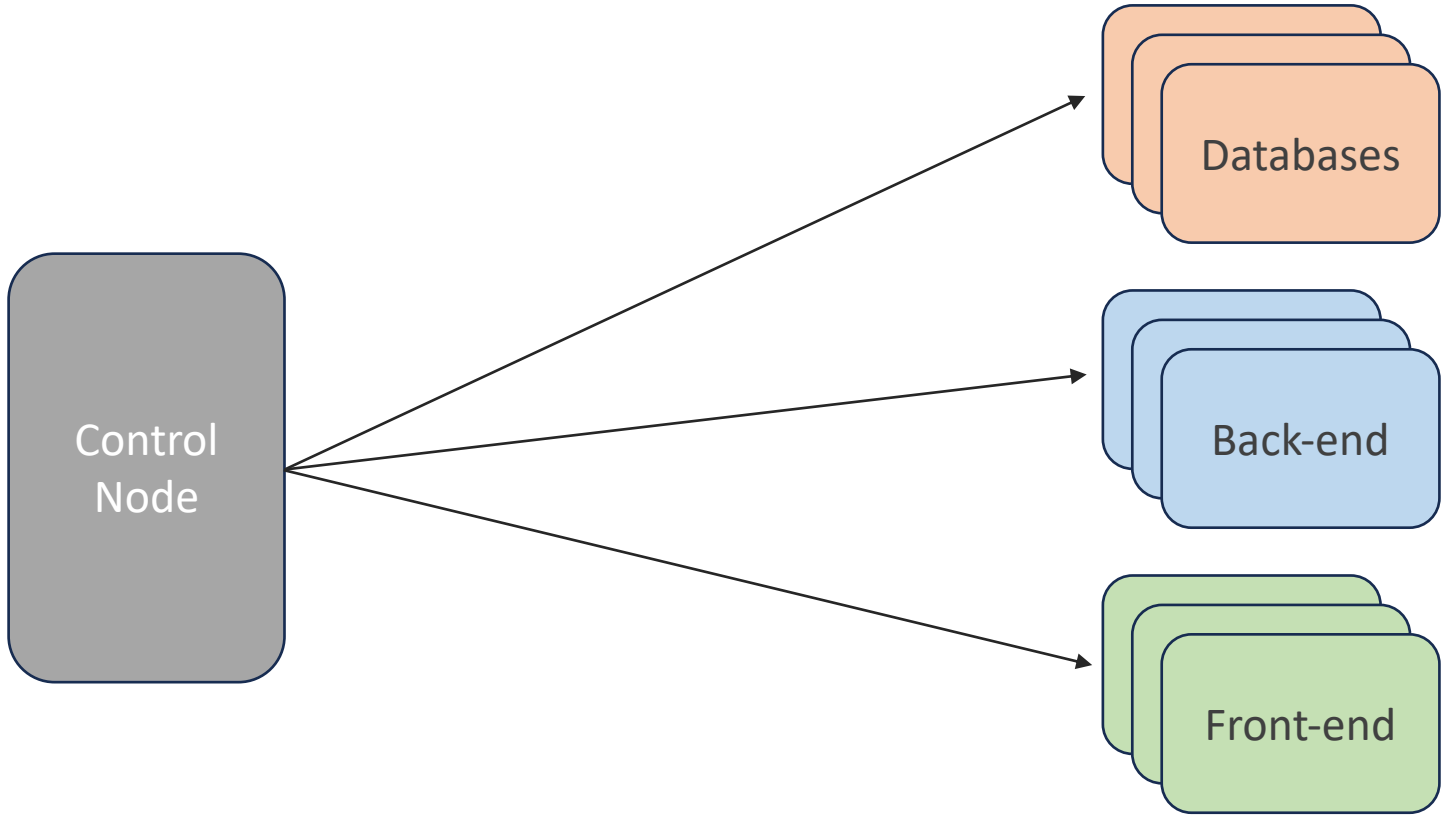
- Industry Standard Automation Tool
- Configuration as code
- "Turns tough tasks into repeatable playbooks"
- Normalises tooling across platforms

Key terms | What is Ansible?

- **Managed node:** the remote system you're targeting
- **Control node:** the machine where Ansible playbooks are run
- **Playbook:** YAML that defines the steps needed to perform an action and where to perform it
- **Task:** individual step of a **playbook**, containing which **module** to run and the parameters required
- **Module:** code to execute, and data about when and where it runs
- **Collection:** installable extensions to Ansible, that add functionality to **playbooks**



Structure | What is Ansible?



- SSH powered
- 1 Control Node
- Multiple Managed Nodes

Inventories | What is Ansible?

- Identify managed nodes
- Categorise target nodes into groups
- Assign variables at node or group level
- Defined as a file or dynamically
- Nodes can belong to multiple groups

```
---
all:
  hosts:
    wazi:
      ansible_host: z-stack.wazi.ibm.com
      ansible_user: ibmuser
      ansible_port: 22
```

Playbooks | What is Ansible?

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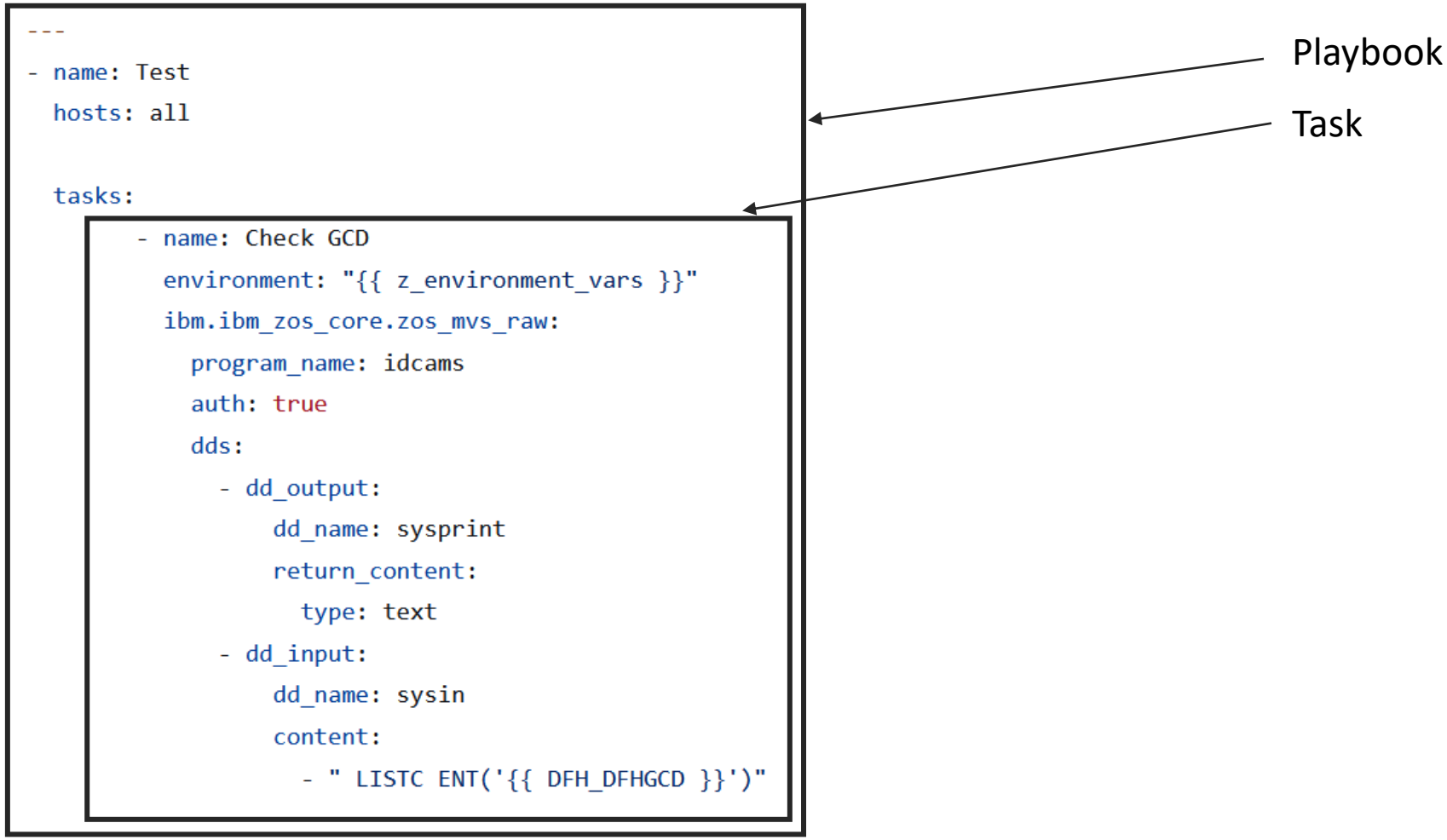
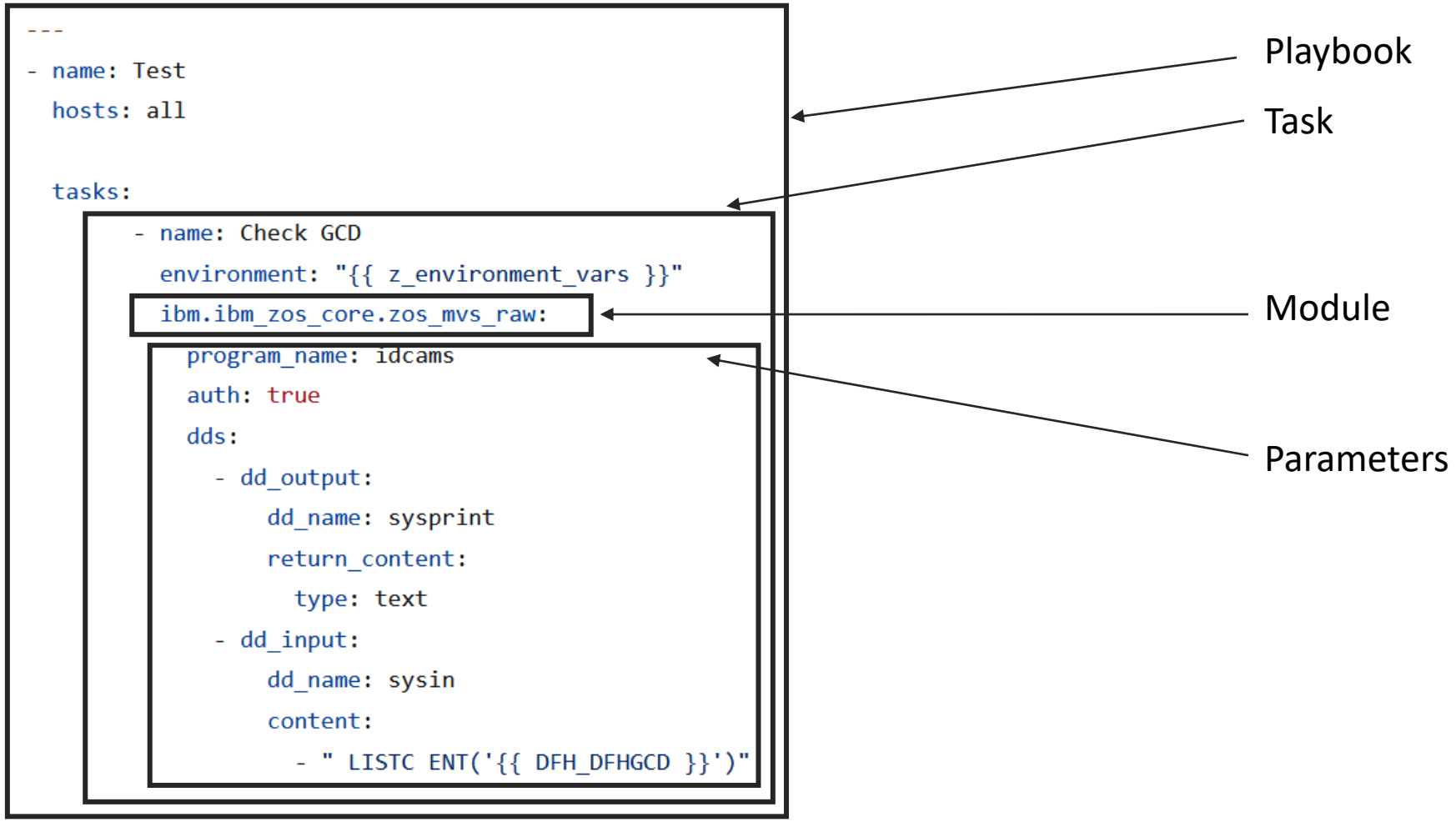
```yaml
---
- name: Test
  hosts: all

  tasks:
        - name: Check GCD
          environment: "{{ z_environment_vars }}"
          ibm.ibm_zos_core.zos_mvs_raw:
            program_name: idcams
            auth: true
            dds:
              - dd_output:
                  dd_name: sysprint
                  return_content:
                    type: text
              - dd_input:
                  dd_name: sysin
                  content:
                    - " LISTC ENT('{{ DFH_DFHGCD }}')"
```

Playbook

Playbooks | What is Ansible?



Playbooks | What is Ansible?



Tasks | What is Ansible?

- Single step in a playbook

- Consists of:
  - Task name
  - Module to run
  - Parameters specific to that module

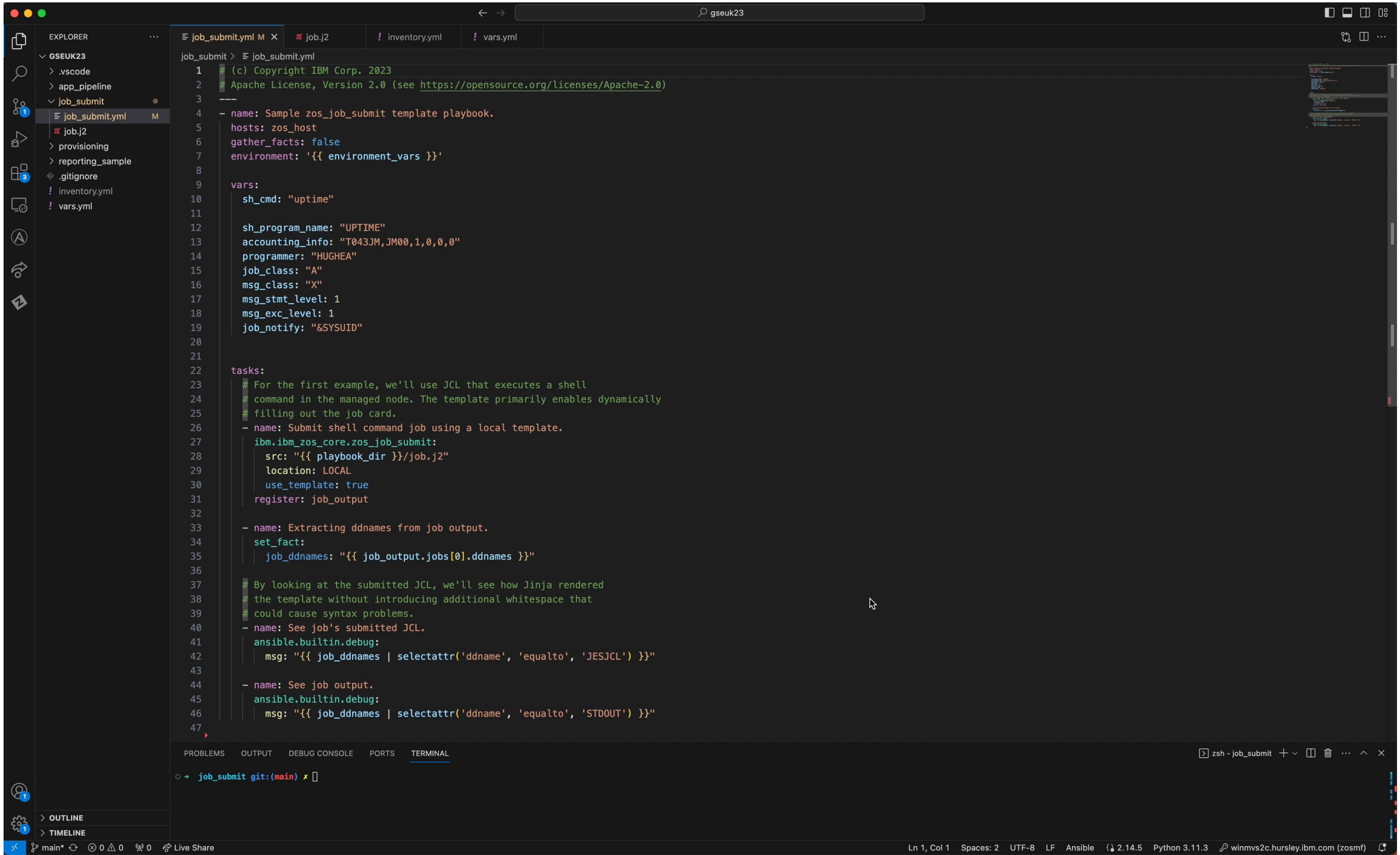
```yaml
- name: "Submit JCL for the job {{ zos_job_submit_template_src }}"
  environment: "{{ z_environment_vars }}"
  ibm.ibm_zos_core.zos_job_submit:
    src: "{{ templated_job.path }}"
    location: LOCAL
    wait: true
    max_rc: "{{ zos_job_submit_template_max_rc }}"
    wait_time_s: "{{ zos_job_submit_template_wait_time_s }}"
  register: job_submit_response
```

CLI | What is Ansible?

- Ansible is a Python package – install with Pip

- Multiple CLI tools:
  - *Ansible-galaxy* – installing extensions, publishing content
  - *Ansible-inventory* – display your inventories Ansible sees
  - *Ansible-playbook* – running playbooks

```
root@31d149416a83:/#
root@31d149416a83:/# ansible-playbook -i inventory.yml -e echotext=World playbook.yml

PLAY [Echo text] ***************************************************************

TASK [Say hello] ***************************************************************
ok: [localhost] => {
    "msg": "Hello, World"
}

PLAY RECAP *********************************************************************
localhost                  : ok=1    changed=0    unreachable=0    failed=0    skipped=0
   rescued=0    ignored=0

root@31d149416a83:/#
```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inventory.yml
vars.yml
job_submit > job_submit.yml
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- name: Sample zos_job_submit template playbook.
hosts: zos_host
gather_facts: false
environment: '{{ environment_vars }}'
vars:
sh_cmd: "uptime"
sh_program_name: "UPTIME"
accounting_info: "T043JM,JM00,1,0,0,0"
programmer: "HUGHEA"
job_class: "A"
msg_class: "X"
msg_stmt_level: 1
msg_exc_level: 1
job_notify: "&SYSUID"
tasks:
For the first example, we'll use JCL that executes a shell
command in the managed node. The template primarily enables dynamically
filling out the job card.
- name: Submit shell command job using a local template.
ibm.ibm_zos_core.zos_job_submit:
src: "{{ playbook_dir }}/job.j2"
location: LOCAL
use_template: true
register: job_output
- name: Extracting ddnames from job output.
set_fact:
job_ddnames: "{{ job_output.jobs[0].ddnames }}"
By looking at the submitted JCL, we'll see how Jinja rendered
the template without introducing additional whitespace that
could cause syntax problems.
- name: See job's submitted JCL.
ansible.builtin.debug:
msg: "{{ job_ddnames | selectattr('ddname', 'equalto', 'JESJCL') }}"
- name: See job output.
ansible.builtin.debug:
msg: "{{ job_ddnames | selectattr('ddname', 'equalto', 'STDOUT') }}"
PROBLEMS
OUTPUT
DEBUG CONSOLE
PORTS
TERMINAL
zsh - job_submit
job_submit git:(main) ✗
OUTLINE
TIMELINE
main*
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Spaces: 2
UTF-8
LF
Ansible
2.14.5
Python 3.11.3
winmvs2c.hursley.ibm.com (zosmf)

Collections

- Distributed format of Ansible playbooks, modules, plugins, and roles
- Universal method of packaging and sharing automation functionality
- Variety of z/OS based collections available
- Installed through distribution servers like Ansible Galaxy or Ansible Automation Hub using the ansible-galaxy CLI

Automation Hub and Galaxy

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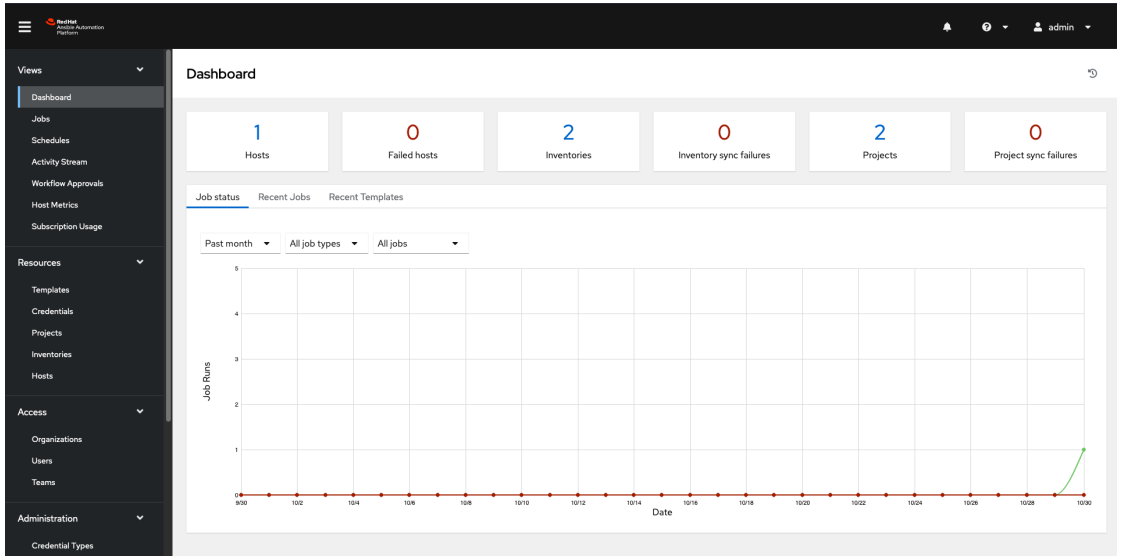
- Ansible Galaxy
  - Public repository of pre-built roles, collections, and playbooks
  - Anyone can upload

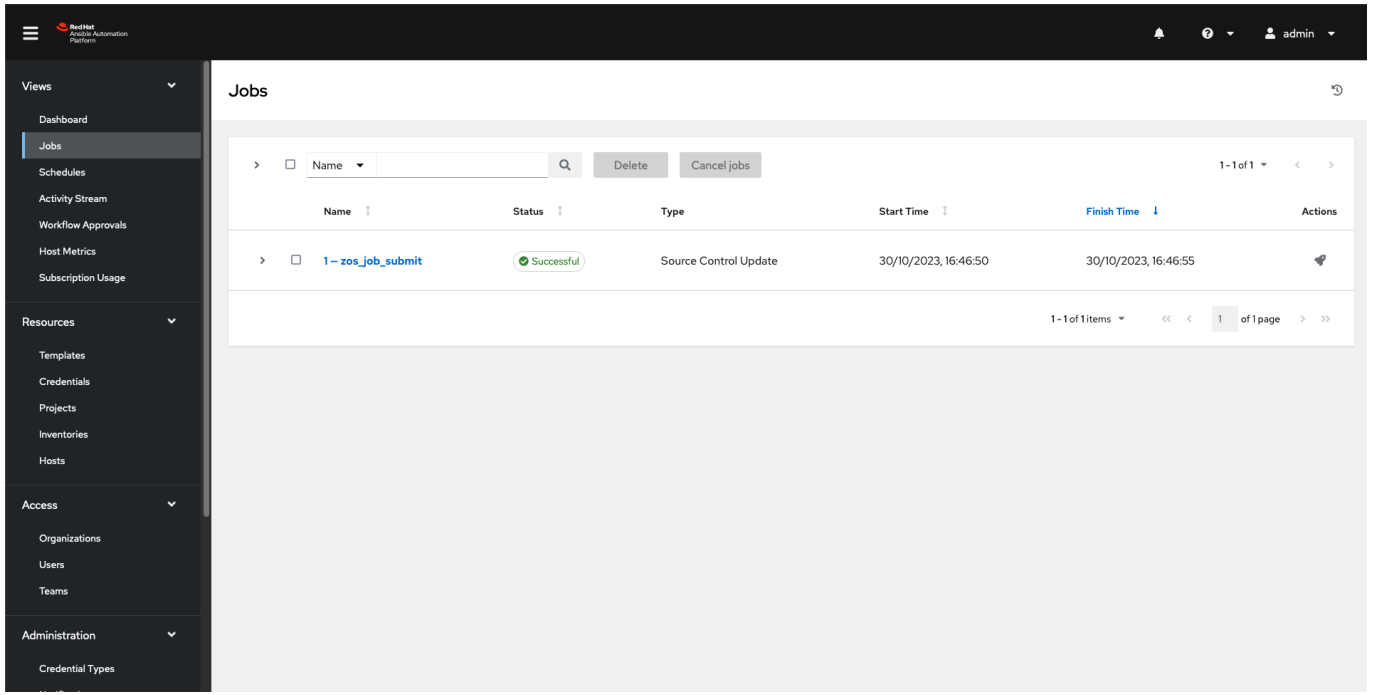
- Ansible Automation Hub
  - Included with AAP subscription
  - Public repository of Ansible certified content
  - Private, on-premise repository to share enterprise content

Ansible Automation Platform

- Centralise and control your infrastructure from one place
- "End-to-end automation platform to configure systems, deploy software, and orchestrate advanced workflow"
- GUI, role-based access, job scheduling, graphical inventory management
- No need to have ansible or collections installed locally

Ansible Automation Platform



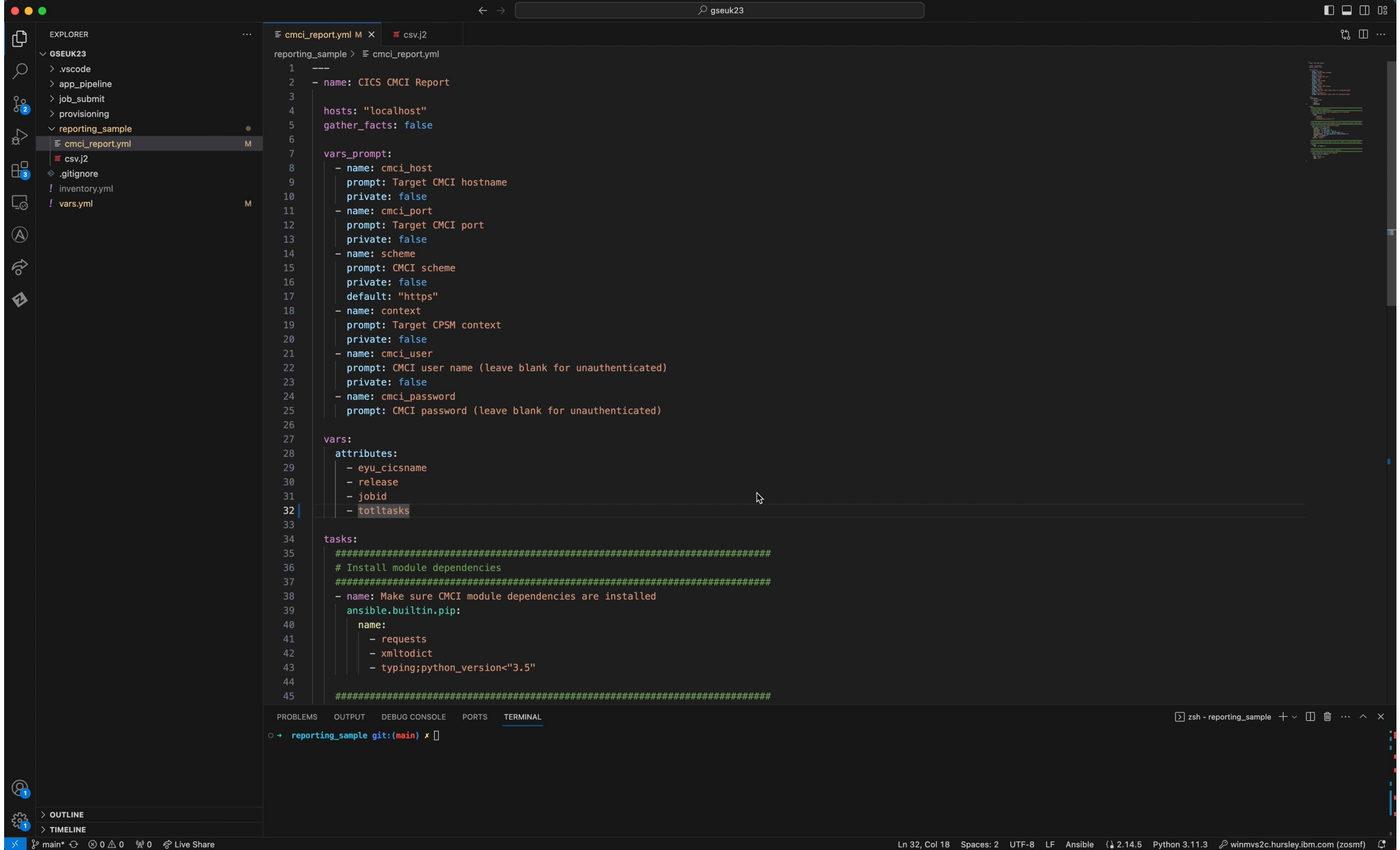


Ansible for z/OS

Ibm_zos_core

- General purpose functionality for common z/OS tasks
- Orchestrate existing automation like running JCL or REXX, or executing TSO commands
- Built in capability to:
  - Manipulate data sets and USS files
  - Manage jobs
  - Execute TSO commands
  - APF authorize libraries
  - Mount file systems
  - Much more…
- https://github.com/ansible-collections/ibm_zos_core

Name	Type	Description
zos_data_set	module	Manage data sets
zos_ping	module	Ping z/OS and check dependencies.
zos_encode	module	Perform encoding operations.
zos_mount	module	Mount a z/OS file system.
zos_job_output	module	Display job output
zos_operator_action_query	module	Display messages requiring action
zos_find	module	Find matching data sets
zos_mvs_raw	module	Run a z/OS program.
zos_backup_restore	module	Backup and restore data sets and volumes
zos_unarchive	module	Unarchive files and data sets in z/OS.
zos_lineinfile	module	Manage textual data on z/OS
zos_copy	module	Copy data to z/OS
zos_volume_init	module	Initialize volumes or minidisks.
zos_apf	module	Add or remove libraries to Authorized Program Facility (APF)
zos_tso_command	module	Execute TSO commands
zos_job_query	module	Query job status
zos_job_submit	module	Submit JCL
zos_operator	module	Execute operator command
zos_gather_facts	module	Gather z/OS system facts.
zos_fetch	module	Fetch data from z/OS
zos_archive	module	Archive files and data sets on z/OS.
zos_blockinfile	module	Manage block of multi-line textual data on z/OS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provisioning
reporting_sample
cmci_report.yml M
csv.j2
.gitignore
inventory.yml
vars.yml M
cmci_report.yml M
csv.j2
reporting_sample > cmci_report.yml

- name: CICS CMCI Report
hosts: "localhost"
gather_facts: false
vars_prompt:
- name: cmci_host
prompt: Target CMCI hostname
private: false
- name: cmci_port
prompt: Target CMCI port
private: false
- name: scheme
prompt: CMCI scheme
private: false
default: "https"
- name: context
prompt: Target CPSM context
private: false
- name: cmci_user
prompt: CMCI user name (leave blank for unauthenticated)
private: false
- name: cmci_password
prompt: CMCI password (leave blank for unauthenticated)
vars:
attributes:
- eyu_cicsname
- release
- jobid
- totltasks
tasks:
Install module dependencies
- name: Make sure CMCI module dependencies are installed
ansible.builtin.pip:
name:
- requests
- xmltodict
- typing;python_version<"3.5"
PROBLEMS
OUTPUT
DEBUG CONSOLE
PORTS
TERMINAL
zsh - reporting_sample
reporting_sample git:(main) ✗
OUTLINE
TIMELINE
main*
0 0 0
Live Share
Ln 32, Col 18
Spaces: 2
UTF-8
LF
Ansible
2.14.5
Python 3.11.3
winmvs2c.hursley.ibm.com (zosmf)

Ansible for z/OS

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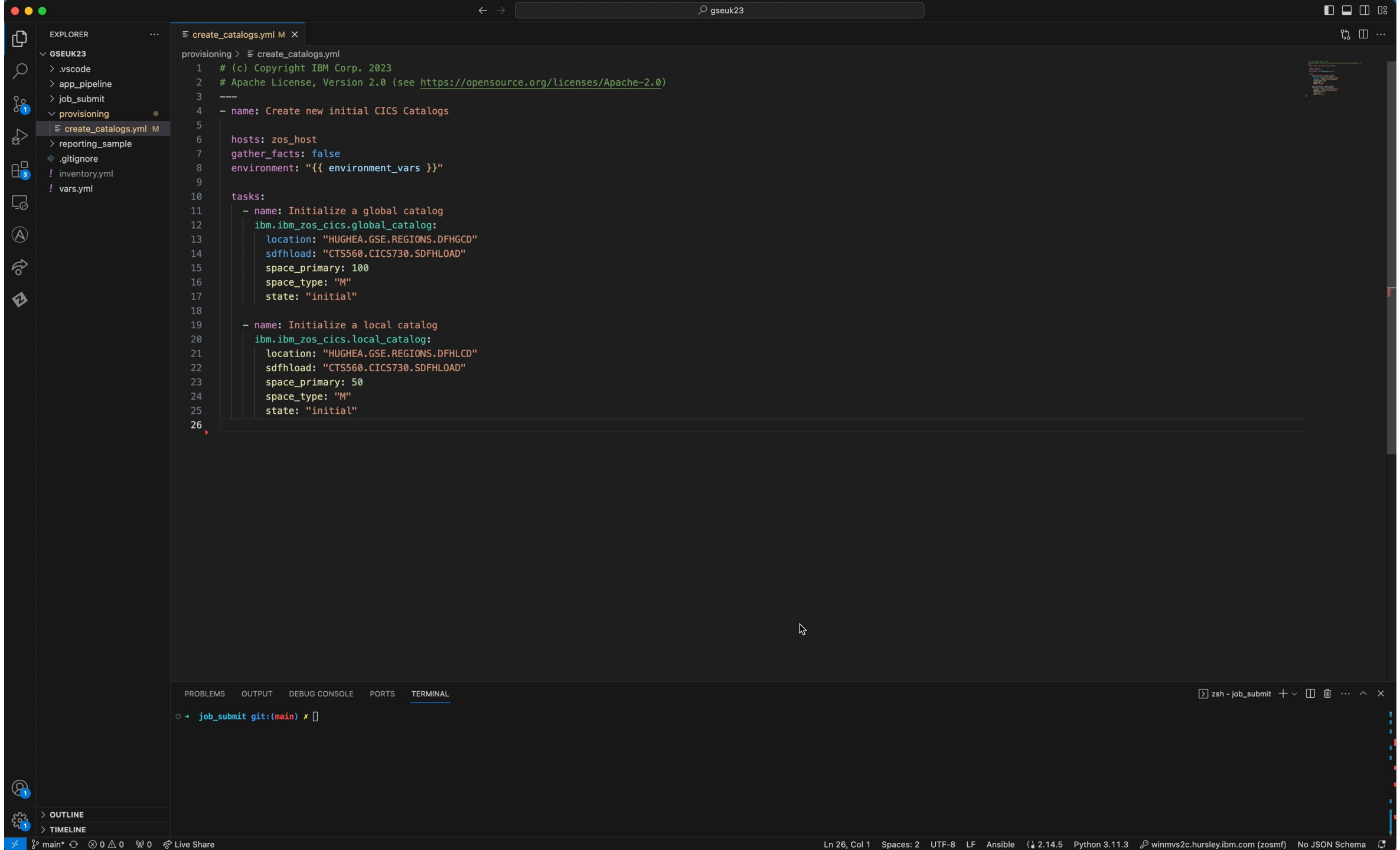
Ibm_zos_cics

- General purpose CICS functionality via CMCI
- Beta releases containing region provisioning modules
- Being developed in the open
  - github.com/ansible-collections/ibm_zos_cics.
- The collection is on Galaxy and Automation Hub
  - galaxy.ansible.com/ibm/ibm_zos_cics.

Name	Type	Description
local_catalog	module	Create, remove, and manage the CICS local catalog
global_catalog	module	Create, remove, and manage the CICS global catalog
cmci_get	module	Query CICS and CICSPlex SM resources and definitions
cmci_create	module	Create CICS and CICSPlex SM definitions
cmci_delete	module	Delete CICS and CICSPlex SM resources
cmci_update	module	Update CICS and CICSPlex resources and definitions
cmci_action	module	Perform actions on CICS and CICSPlex SM resources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.vscode
app_pipeline
job_submit
provisioning
create_catalogs.yml M
reporting_sample
.gitignore
inventory.yml
vars.yml
create_catalogs.yml M
provisioning > create_catalogs.yml
1 # (c) Copyright IBM Corp. 2023
2 # Apache License, Version 2.0 (see https://opensource.org/licenses/Apache-2.0)
3 ---
4 - name: Create new initial CICS Catalogs
5
6 hosts: zos_host
7 gather_facts: false
8 environment: "{{ environment_vars }}"
9
10 tasks:
11 - name: Initialize a global catalog
12 ibm.ibm_zos_cics.global_catalog:
13 location: "HUGHEA.GSE.REGIONS.DFHGCD"
14 sdfhload: "CTS560.CICS730.SDFHLOAD"
15 space_primary: 100
16 space_type: "M"
17 state: "initial"
18
19 - name: Initialize a local catalog
20 ibm.ibm_zos_cics.local_catalog:
21 location: "HUGHEA.GSE.REGIONS.DFHLCD"
22 sdfhload: "CTS560.CICS730.SDFHLOAD"
23 space_primary: 50
24 space_type: "M"
25 state: "initial"
26
PROBLEMS
OUTPUT
DEBUG CONSOLE
PORTS
TERMINAL
zsh - job_submit
job_submit git:(main) ✗
OUTLINE
TIMELINE
main*
0 0 0
Live Share
Ln 26, Col 1
Spaces: 2
UTF-8
LF
Ansible
2.14.5
Python 3.11.3
winmvs2c.hursley.ibm.com (zosmf)
No JSON Schema

Ansible for z/OS

Zos_cics_operator

- Operator collection supporting region provisioning with Cloud Broker
- What we used in our demo at the start!
- Open Source
  - https://github.com/IBM/zos_cics_operator
- Implemented as Ansible playbooks
- Currently only supports CICS TS 6.1 on Wazi sandbox environments

More information and collections available on Galaxy

- https://galaxy.ansible.com/ui/namespaces/ibm/

Shared documentation site for all IBM collections

- https://ibm.github.io/z_ansible_collections_doc/index.html

All available on Ansible Automation Platform and are fully supported by Red Hat and IBM.

z/OS Prerequisites

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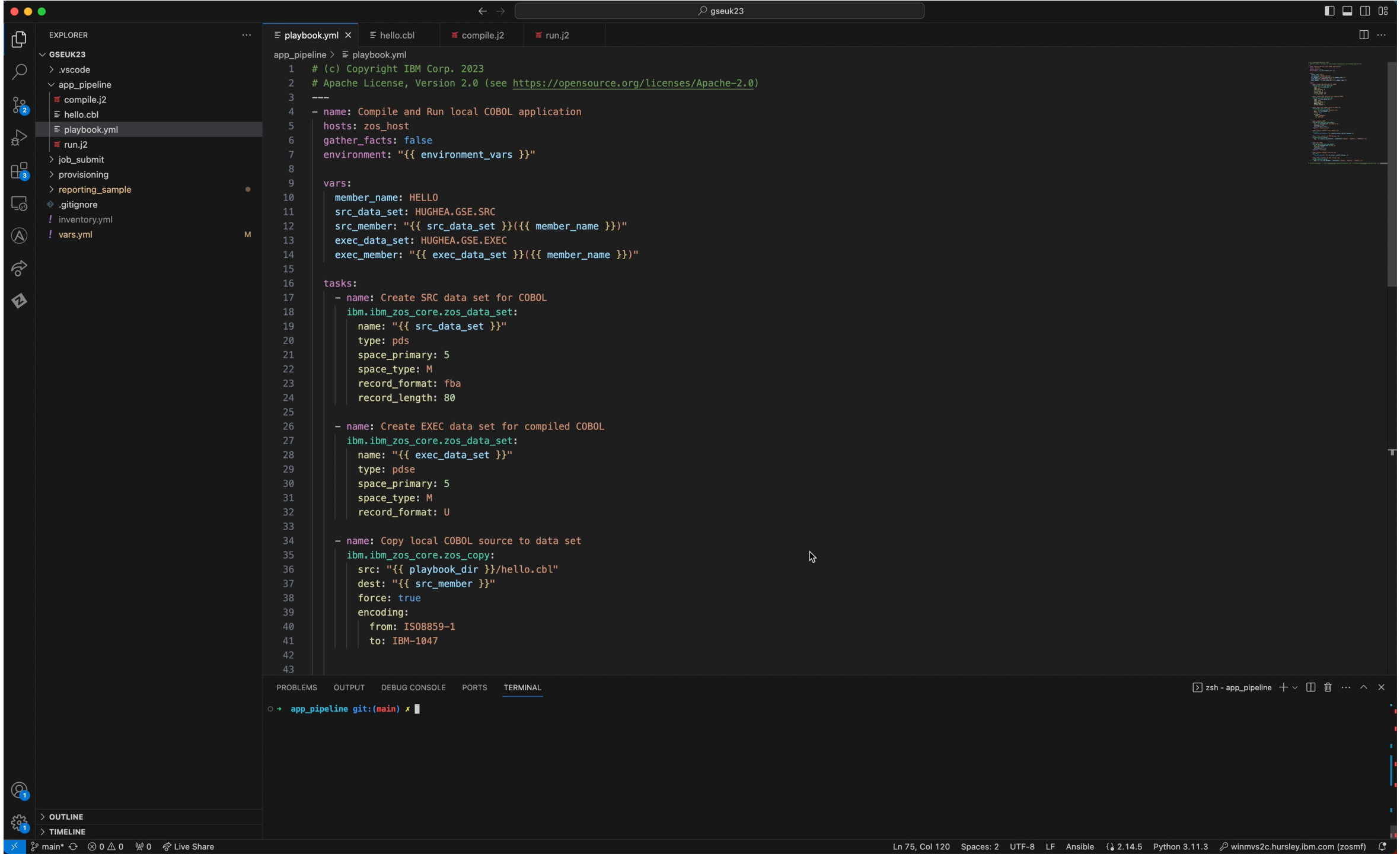
- z/OS OpenSSH
- IBM Open Enterprise SDK for Python 3.8.2+
  - Python runtime for z/OS
- IBM Z Open Automation Utilities
  - USS utilities for interacting with MVS resources
  - E.g. List all non-VSAM datasets under your default high-level-qualifier
  - dls -l “ ` hlq ` .*”
  - Also provides Python APIs (which are used by Ansible collection)
- Doc site for requirements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.vscode
app_pipeline
compile.j2
hello.cbl
playbook.yml
run.j2
job_submit
provisioning
reporting_sample
.gitignore
inventory.yml
vars.yml
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playbook.yml
hello.cbl
compile.j2
run.j2
app_pipeline > playbook.yml
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- name: Compile and Run local COBOL application
hosts: zos_host
gather_facts: false
environment: "{{ environment_vars }}"
vars:
member_name: HELLO
src_data_set: HUGHEA.GSE.SRC
src_member: "{{ src_data_set }}({{ member_name }})"
exec_data_set: HUGHEA.GSE.EXEC
exec_member: "{{ exec_data_set }}({{ member_name }})"
tasks:
- name: Create SRC data set for COBOL
ibm.ibm_zos_core.zos_data_set:
name: "{{ src_data_set }}"
type: pds
space_primary: 5
space_type: M
record_format: fba
record_length: 80
- name: Create EXEC data set for compiled COBOL
ibm.ibm_zos_core.zos_data_set:
name: "{{ exec_data_set }}"
type: pdse
space_primary: 5
space_type: M
record_format: U
- name: Copy local COBOL source to data set
ibm.ibm_zos_core.zos_copy:
src: "{{ playbook_dir }}/hello.cbl"
dest: "{{ src_member }}"
force: true
encoding:
from: ISO8859-1
to: IBM-1047
PROBLEMS
OUTPUT
DEBUG CONSOLE
PORTS
TERMINAL
zsh - app_pipeline
app_pipeline git:(main) ✗
OUTLINE
TIMELINE
main*
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Ln 75, Col 120
Spaces: 2
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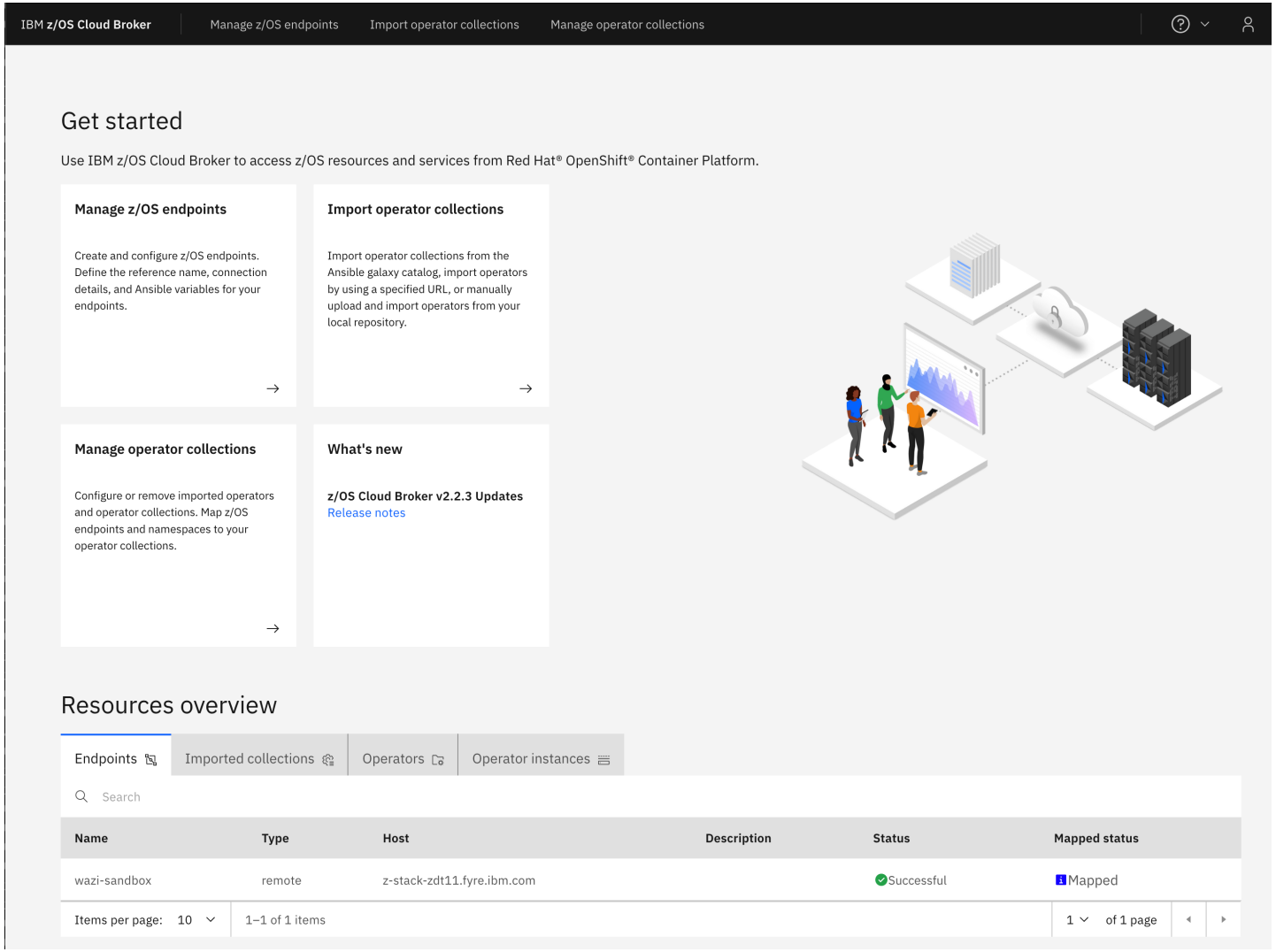
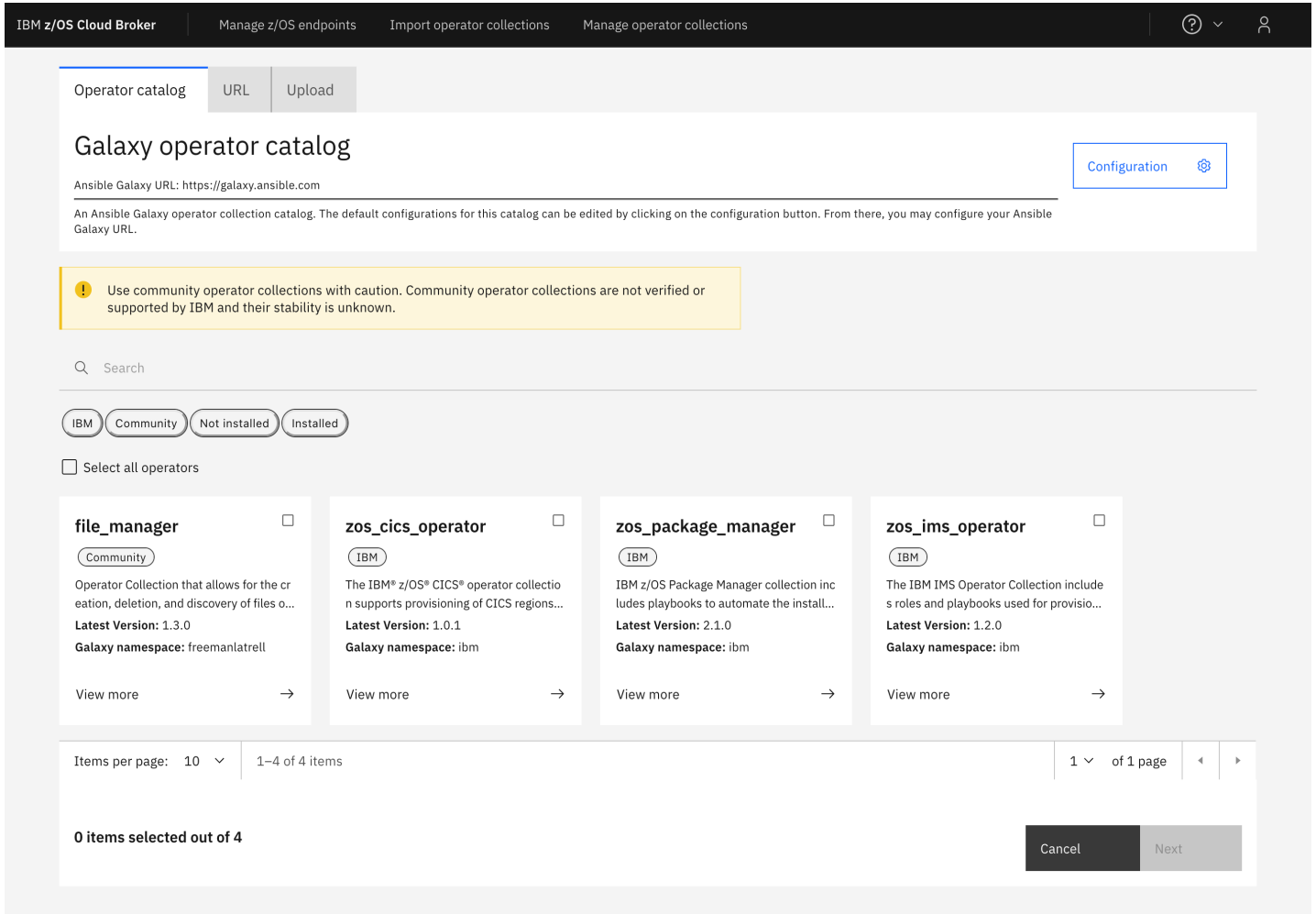
LF
Ansible
2.14.5
Python 3.11.3
winmvs2c.hursley.ibm.com (zosmf)

Task-50	27 Oct 2023, 10:34	Succeeded	Create and initialize a new CICS CSD
Task-51	27 Oct 2023, 10:34	Succeeded	provision_csd : Validating arguments against arg spec 'main'
Task-52	27 Oct 2023, 10:34	Succeeded	Create and initialize a new CICS CSD
Task-53	27 Oct 2023, 10:34	Succeeded	zos_job_submit_template : Validating arguments against arg spec 'main' - Submit a z/OS job after applying a template
Task-54	27 Oct 2023, 10:34	Succeeded	zos_job_submit_template : Create a temporary file for job template CCICSCCS.j2
Task-55	27 Oct 2023, 10:34	Succeeded	zos_job_submit_template : Apply the job template CCICSCCS.j2
Task-56	27 Oct 2023, 10:36	Succeeded	zos_job_submit_template : Submit JCL for the job CCICSCCS.j2
Task-57	27 Oct 2023, 10:36	Succeeded	zos_job_submit_template : Set response fact for CCICSCCS
Task-58	27 Oct 2023, 10:36	Succeeded	zos_job_submit_template : Delete the templated job temporary file for CCICSCCS.j2
Task-59	27 Oct 2023, 10:36	Succeeded	Create and initialize a new CICS GCD
Task-60	27 Oct 2023, 10:36	Succeeded	provision_gcd : Validating arguments against arg spec 'main'
Task-61	27 Oct 2023, 10:36	Succeeded	Create and initialize a new CICS GCD
Task-62	27 Oct 2023, 10:36	Succeeded	zos_job_submit_template : Validating arguments against arg spec 'main' - Submit a z/OS job after applying a template
Task-63	27 Oct 2023, 10:36	Succeeded	zos_job_submit_template : Create a temporary file for job template GCD.j2
Task-64	27 Oct 2023, 10:36	Succeeded	zos_job_submit_template : Apply the job template GCD.j2
Task-65	27 Oct 2023, 10:37	Succeeded	zos_job_submit_template : Submit JCL for the job GCD.j2
Task-66	27 Oct 2023, 10:37	Succeeded	zos_job_submit_template : Set response fact for GCD
Task-67	27 Oct 2023, 10:37	Succeeded	zos_job_submit_template : Delete the templated job temporary file for GCD.j2
Task-68	27 Oct 2023, 10:37	Succeeded	Create and initialize a new CICS LCD

IBM z/OS Cloud broker

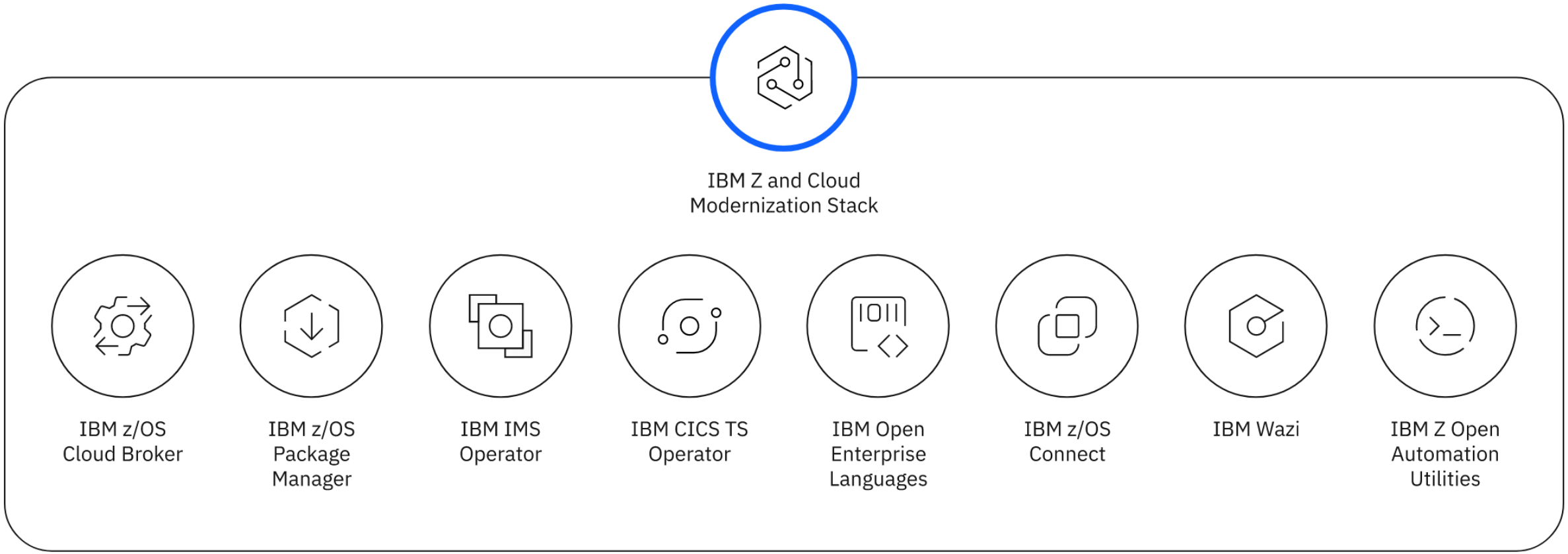


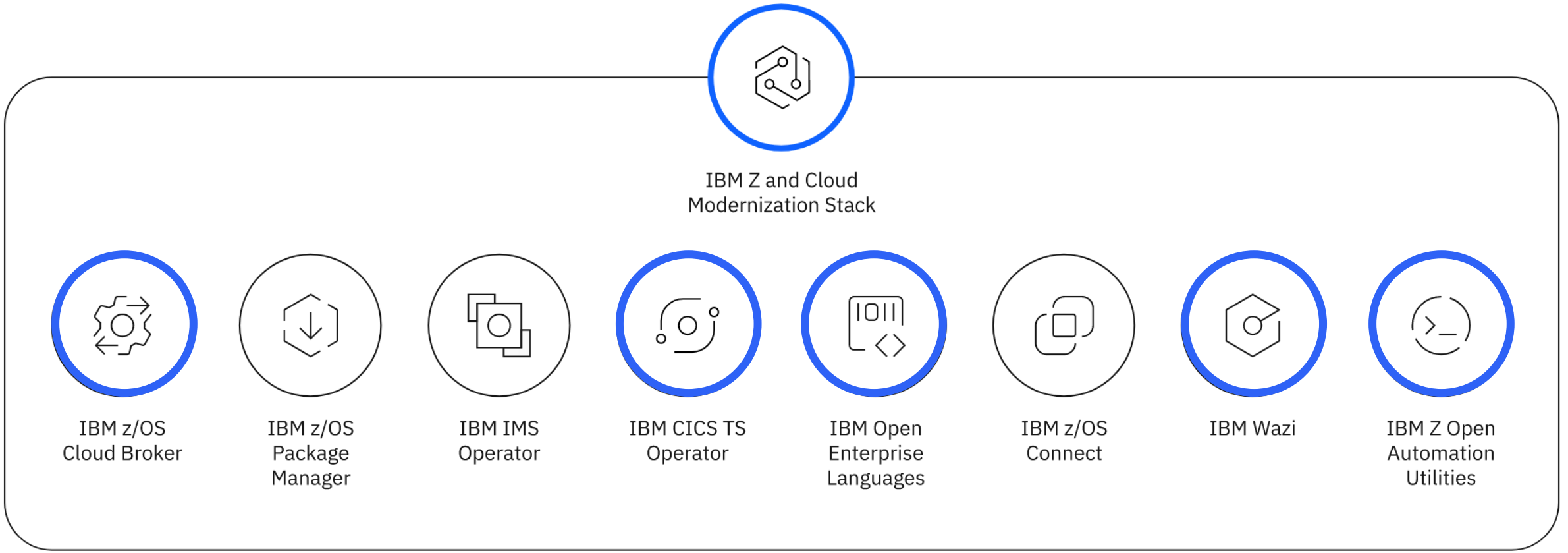
Operator catalog



Wazi Sandbox

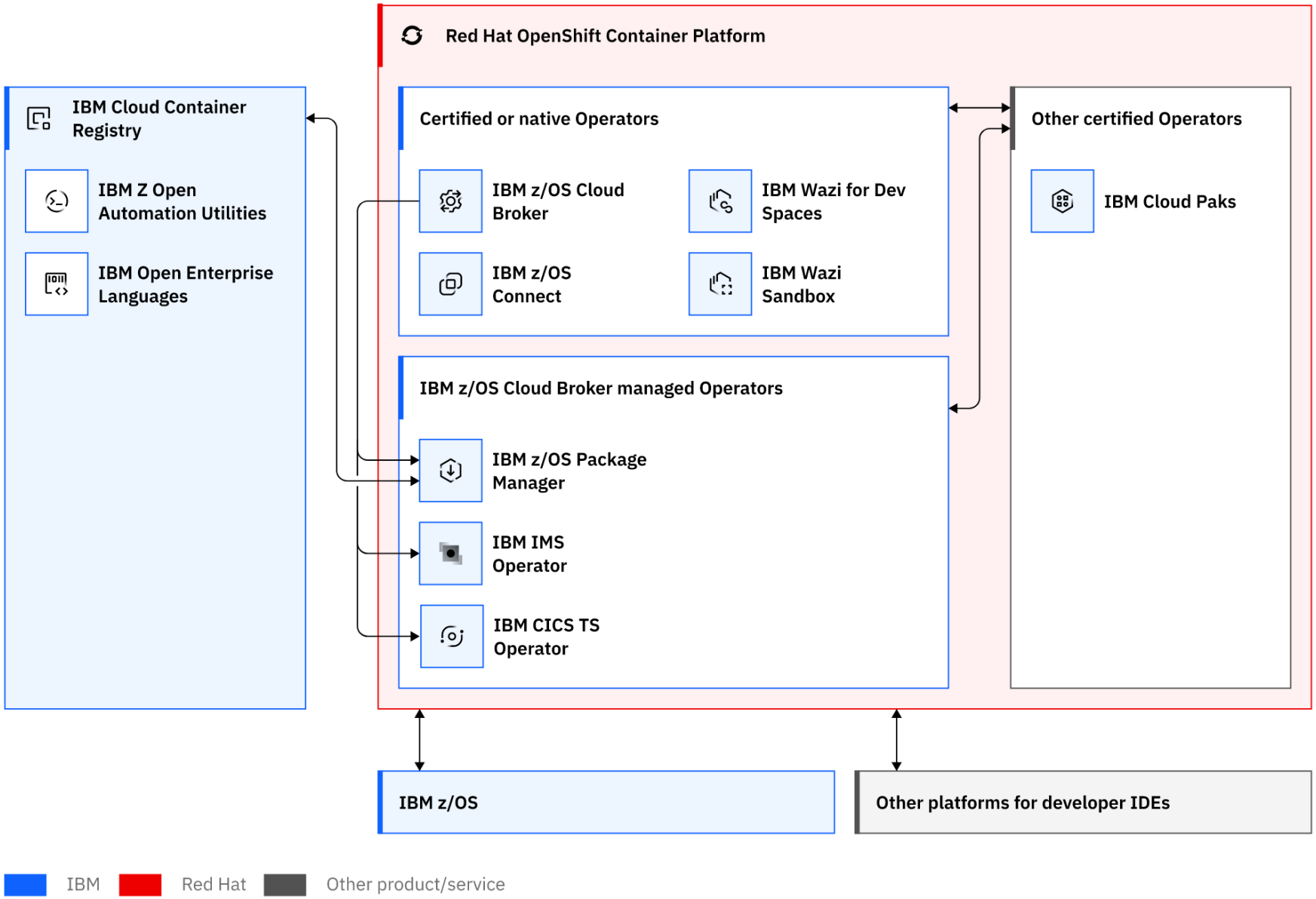
- A fully virtual z/OS environment
- Self-provision z/OS runtimes and databases such as CICS, IMS, DB2 etc.
- Enables development and testing of z/OS applications on OpenShift running on x86_64 hardware
- Gives developers their own isolated environment where they can make changes without impacting any other systems


IBM Z and Cloud Modernization Stack
IBM z/OS Cloud Broker
IBM z/OS Package Manager
IBM IMS Operator
IBM CICS TS Operator
IBM Open Enterprise Languages
IBM z/OS Connect
IBM Wazi
IBM Z Open Automation Utilities


IBM Z and Cloud Modernization Stack
IBM z/OS Cloud Broker
IBM z/OS Package Manager
IBM IMS Operator
IBM CICS TS Operator
IBM Open Enterprise Languages
IBM z/OS Connect
IBM Wazi
IBM Z Open Automation Utilities

IBM Z and Cloud Modernization stack

- Uses OpenShift to integrate IBM Z assets into a hybrid cloud and connect hybrid cloud assets to IBM Z
- Collection of products from across the IBM Z software portfolio
- Built on OpenShift operators and Cloud Broker suboperators to simplify the install and lifecycle
- Provide streamlined automation for system programmers to simplify complicated z/OS specific tasks
- Enable application developers to use isolated, preconfigured environments to develop faster


Red Hat OpenShift Container Platform
IBM Cloud Container Registry
IBM Z Open Automation Utilities
IBM Open Enterprise Languages
Certified or native Operators
IBM z/OS Cloud Broker
IBM Wazi for Dev Spaces
IBM z/OS Connect
IBM Wazi Sandbox
IBM z/OS Cloud Broker managed Operators
IBM z/OS Package Manager
IBM IMS Operator
IBM CICS TS Operator
Other certified Operators
IBM Cloud Paks
IBM z/OS
Other platforms for developer IDEs
IBM
Red Hat
Other product/service

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