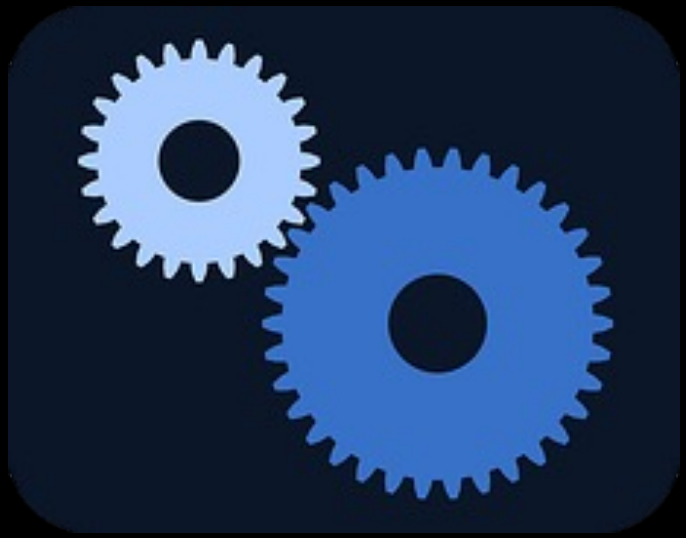
IBM Z System Automation

At a Glance

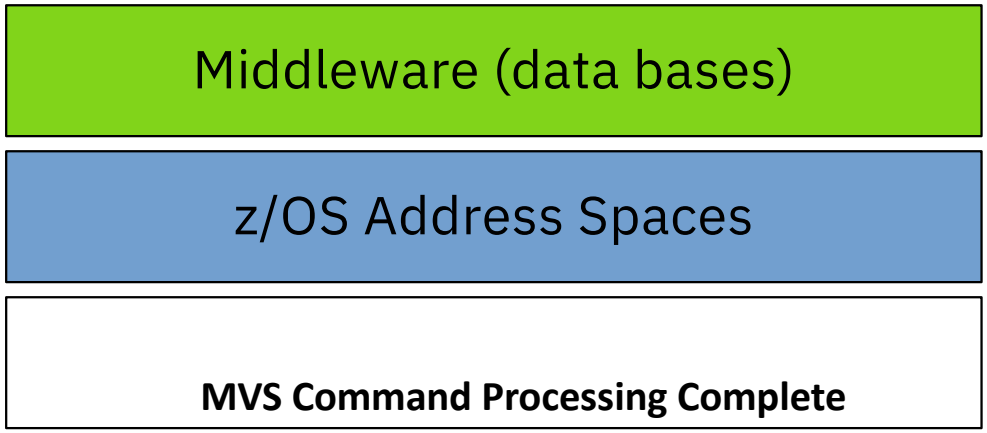


z/OS Academy, November 2022, IBM Boeblingen

by Janvidevi Gohil and Gunnar Freitag (IBM Development)

- Who we are & What we do
- IBM Z Service Management Suites
- IBM Service Management Unite
- IBM Z ChatOps
- IBM Z System Automation
  - Processor Operations
  - System Operations
    - Policy Based & Goal Oriented
    - Manage your business using Groups & Relationships
    - Benefit from Best Practice Automation Solutions
    - Add applications to automation
    - REST APIs
- Let's talk…
  - Forums, RFEs,
    IBM Design Thinking,
    Early Access Programs,

When is a system IPLed?



Questions:

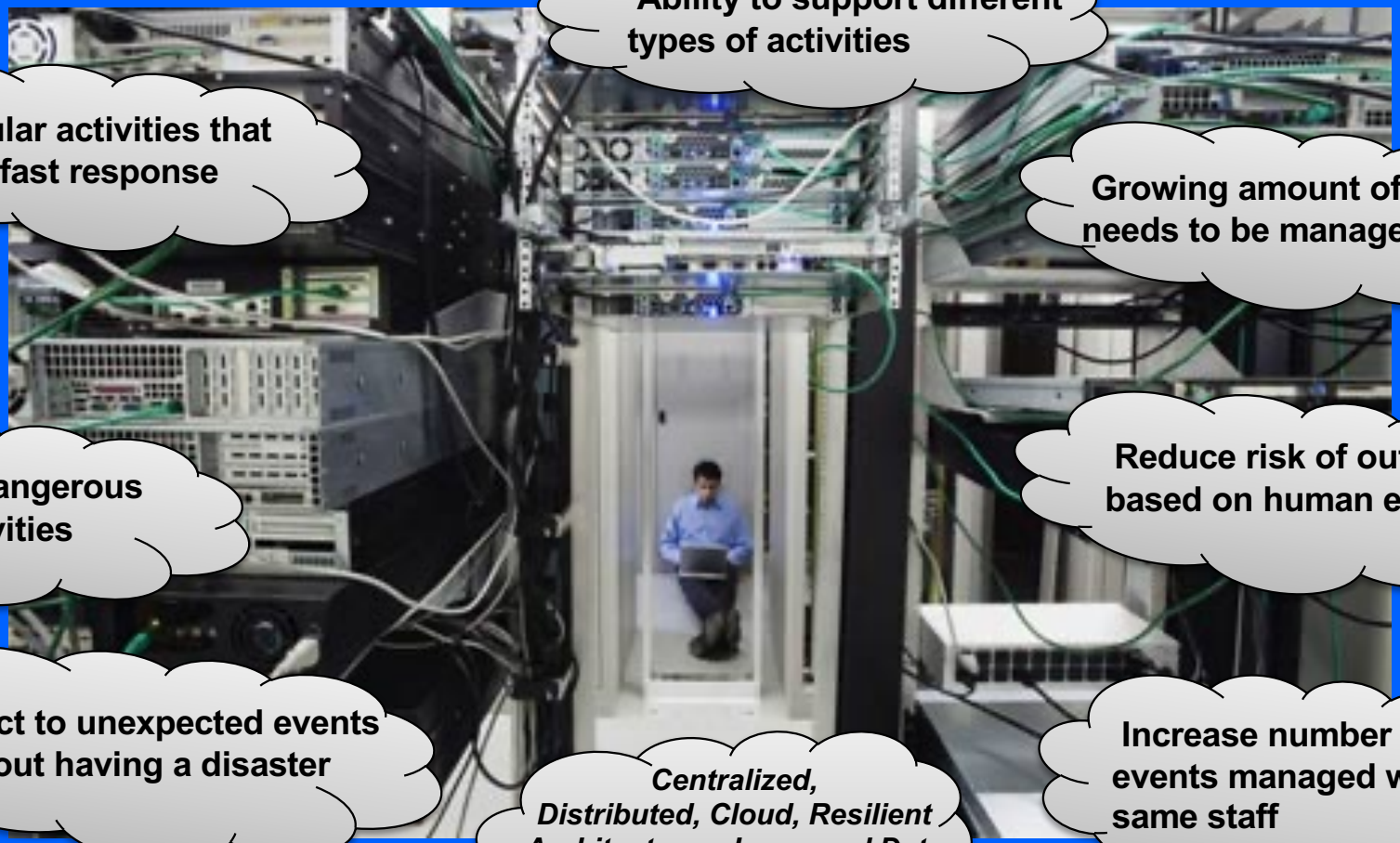
Who / what starts your system?

Who / what keeps your system available?

Who / what stops your system?

What happens when the responsible colleague retires?

Customer Concerns



Ability to support different types of activities

Regular activities that need fast response

Growing amount of data needs to be managed

Minimize dangerous human activities

Reduce risk of outages based on human error

React to unexpected events without having a disaster

Centralized, Distributed, Cloud, Resilient Architectures, Increased Data Volume and Complexity

Increase number of events managed with same staff

IBM Z Service Management Suites

IBM Z Service Management Suites:

IBM Z Service Automation Suite V1.5

IBM Z System Automation
IBM Z NetView®
IBM Z Workload Scheduler
IBM Service Management Unite
IBM Z ChatOps

... provides automation, network management, and scheduling to address business agility on IBM Z.

With new releases:

- IBM Z System Automation V4.3,
  (formerly known as IBM® System Automation for z/OS®)
- IBM Z NetView® V6.4,
  (formerly known as IBM Tivoli® NetView for z/OS)
- IBM Z Workload Scheduler 10.1
- IBM Service Management Unite V1.1.9
- IBM Z ChatOps 1.1.2

IBM Z Service Management Suites:

IBM Z Service Management Suite V2.3

IBM Z System Automation
IBM Z NetView®
IBM OMEGAMON Monitors
IBM Service Management Unite
IBM Z ChatOps
IBM Tivoli Asset Discovery for z/OS

... provides the tools necessary to support the dynamic growth of transaction workload and data sharing between mobile, cloud, and analytics platforms and the IBM Z platform

With new releases:

- IBM Z System Automation V4.3,
  (formerly known as IBM® System Automation for z/OS®)
- IBM Z NetView® V6.4,
  (formerly known as IBM Tivoli® NetView for z/OS)
- IBM Service Management Unite V1.1.9
- IBM Z ChatOps 1.1.2

IBM Z Service Management Suites:

IBM Z Monitoring Suite 1.3

IBM OMEGAMON Monitors
IBM Resource Management Facility (RMF)
IBM Service Management Unite
IBM Z ChatOps

- **Simply priced (OTC)**, **Single-PID** easy-to-order package of monitoring products that runs on IBM Z hardware.
- **Comprehensive performance monitoring** for IBM Z platform, networks, applications, subsystems, and processors.
- It introduces **new OMEGAMON Monitor offerings** replacing OMEGAMON for z/OS, OMEGAMON for Networks, and OMEGAMON Dashboard Edition.

Bridge the skills gap with modern user experiences ... optimized for the right user role

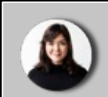
Chatbot

DevOps Team: Operator, Admin, Manager, SME, Developer, …

IBM Z ChatOps

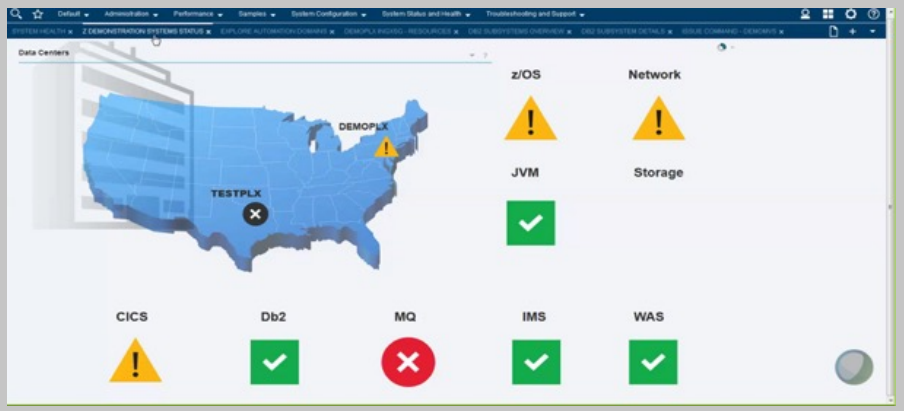
Collaborative problem resolution integrated in your chat platform

Slack MatterMost MS Teams



Z Operator

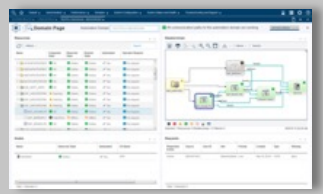
IBM Service Management Unite



- Time-saving integrated web dashboards
- Brings all disciplines together
- Guided problem isolation & custom dashboards

SMU Workload Scheduler: Dashboards for Z Workload Scheduler

SMU Performance Management: Dashboards for OMEGAMON



SMU Automation: Dashboards for Z System Automation and Z NetView

Z SME

IBM Z Systems Management Tools

Anomaly Detection

Automation

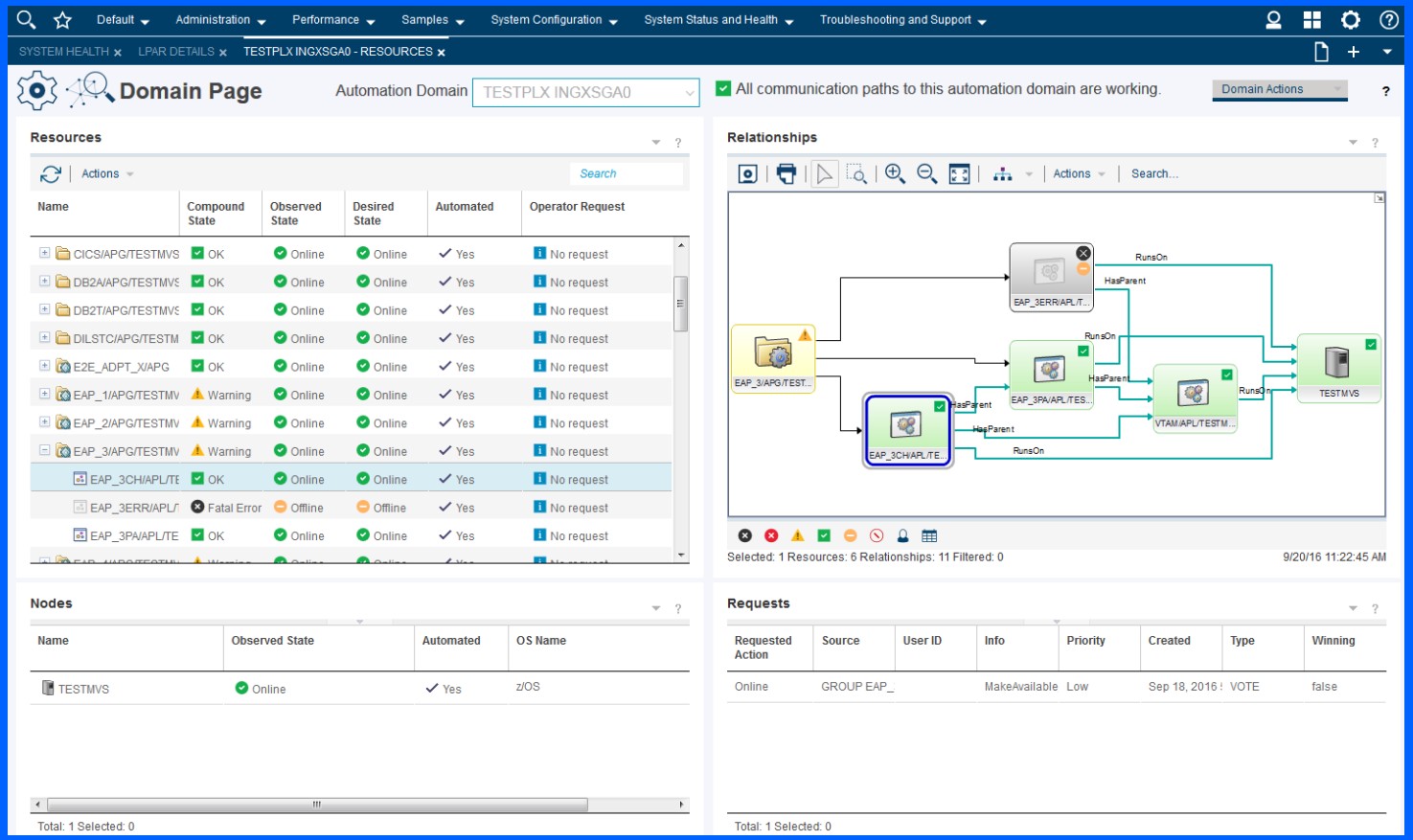
Monitoring

Scheduling

Network Management

Automation

IBM Service Management Unite



IBM Service Management Unite V1.1.7

Modern web dashboards integrating data from many different sources

"Faster for experts, simpler for beginners"

Monitor and analyze the performance and availability of your mainframe operating systems, databases and other environments.

OMEGAMON on z/OS

OMEGAMON for Networks

OMEGAMON for Storage

OMEGAMON for JVM

OMEGAMON for CICS

OMEGAMON for IMS

OMEGAMON for DB2 PE

OMEGAMON for Messaging

ITCAM for AD

Tivoli Enterprise Portal

Z APM Connect

IBM Application Performance Management

IBM Operational Analytics for z

Service Management Unite

SMU Performance Management

SMU Workload Scheduler

SMU Automation

Dynamic Workload Console

Z Workload Scheduler

Automate, plan and control the processing of IBM Z systems workloads

System Automation for z/OS

Automated Operations on non-z/OS systems

Automate your operations: Self-healing, high-availability solution to optimize availability of critical systems and applications on **multiple sysplexes**.

NetView for z/OS

Network & Event Management to increase efficiency with lower resources / personnel costs.

Your own data/apps

Zowe

Zowe JES Explorer

Zowe MVS Explorer

An extensible framework for connecting applications and tools to mainframe data and applications.

Bridge the skills gap with modern user experiences ... optimized for the right user role

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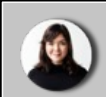
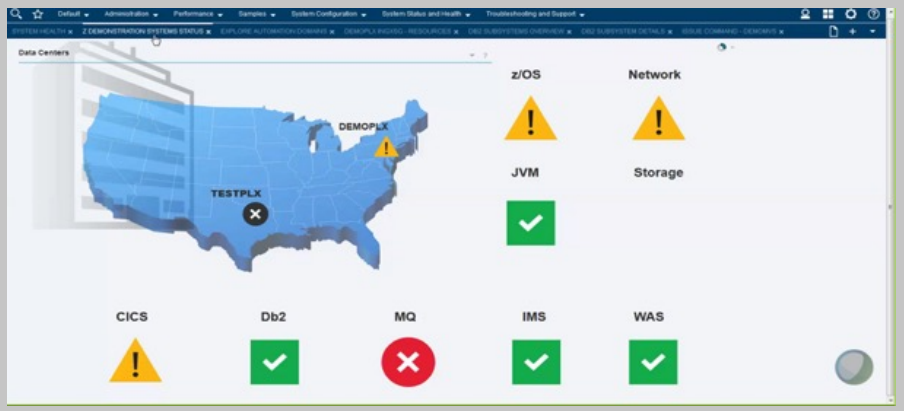


Z Operator

IBM Service Management Unite



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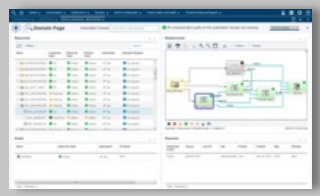


SMU Automation: Dashboards for Z System Automation and Z NetView

Z SME

IBM Z Systems Management Tools

Anomaly Detection

Automation

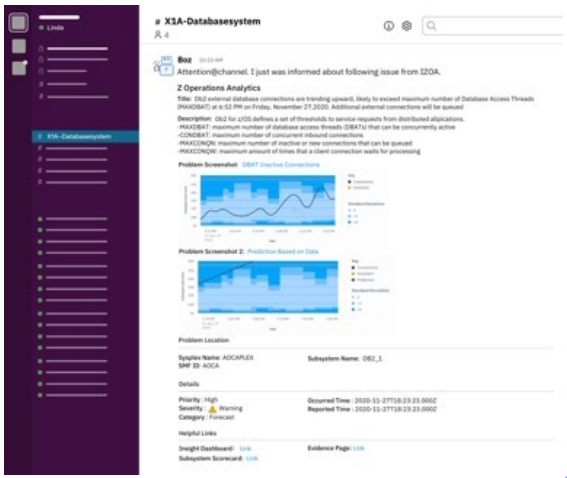
Monitoring

Scheduling

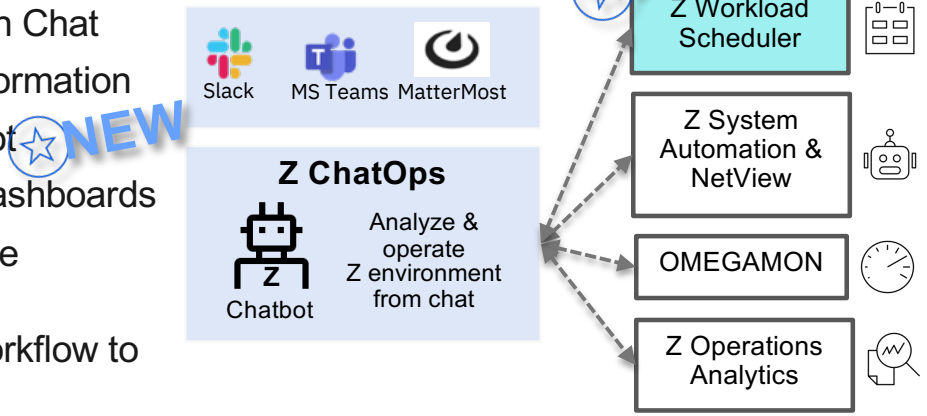
Network Management

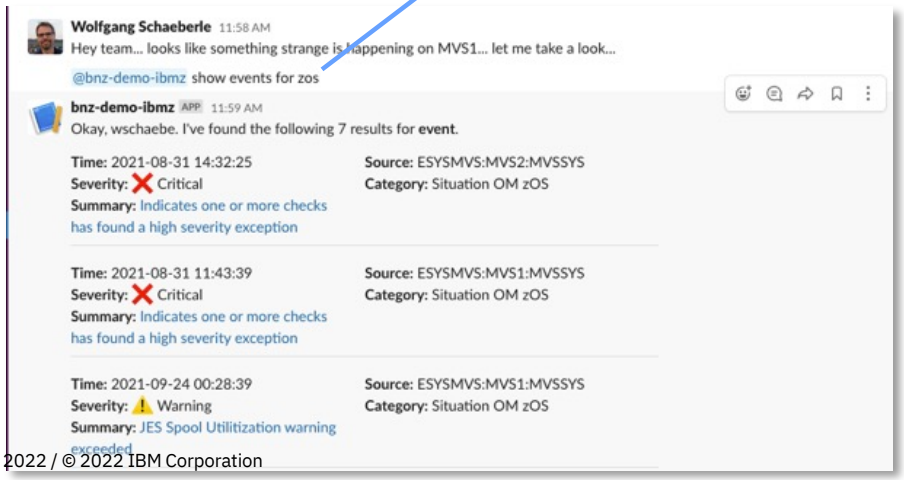
Collaborative Incident Detection and Remediation

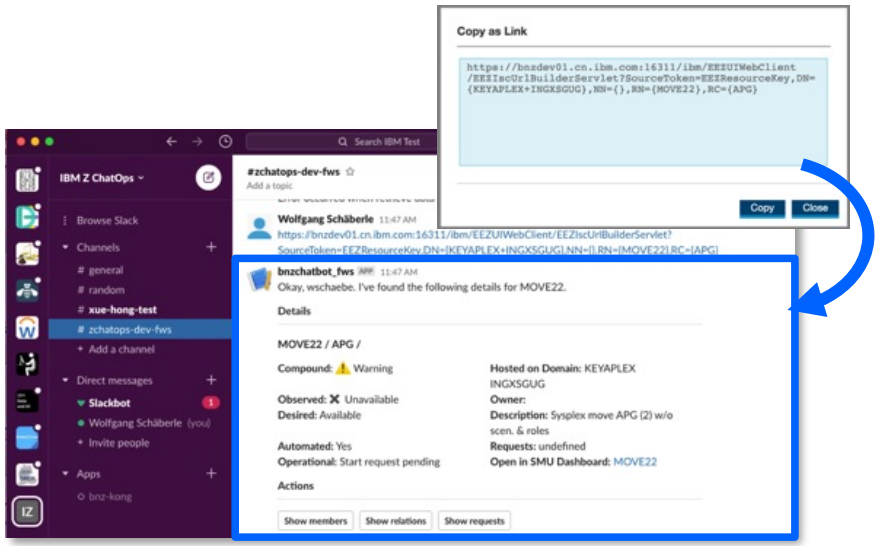
with IBM Z ChatOps



- Alerts and events appear in Chat
- Ask chatbot for domain information
- Take action through chatbot
- Drill down to web-based dashboards
- Easy sharing of Z Resource information
- Engage in collaborative workflow to resolve problems

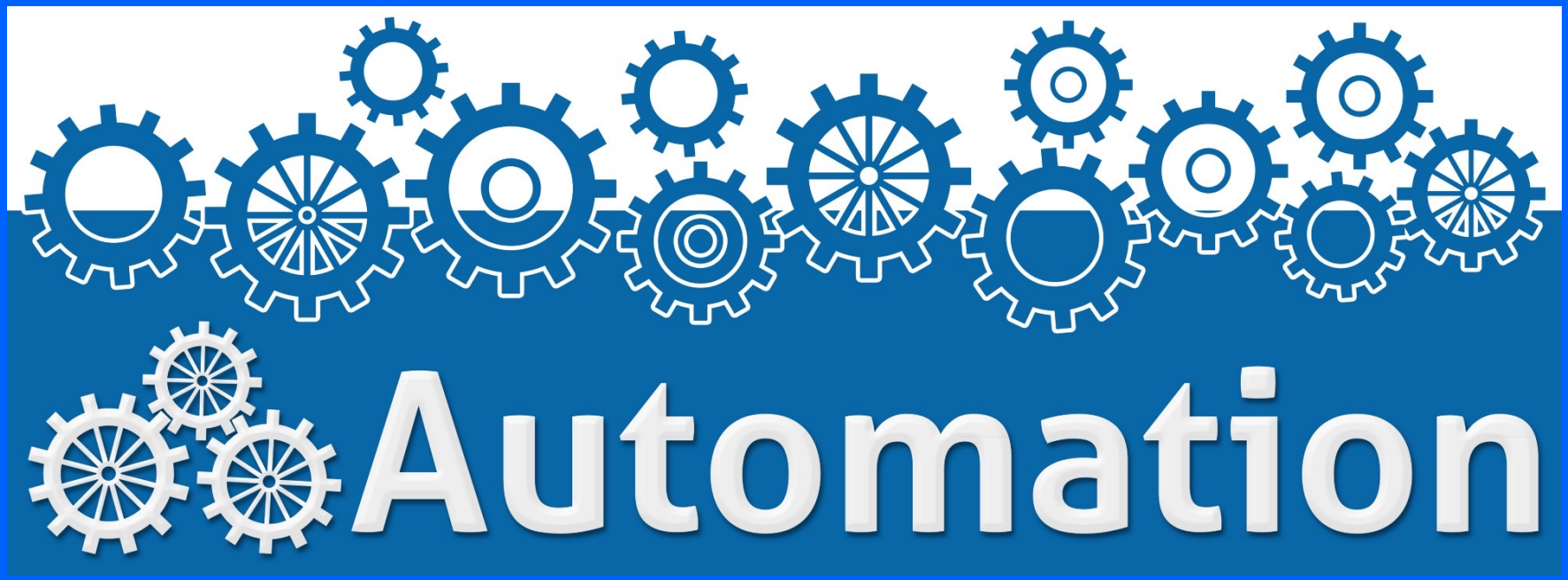






Automation

- IBM Z System Automation
  Components



Automation:

IBM Z System Automation V4.3

Processor Operations
(External Automation)

Source:https://www.ibm.com/demos/it-infrastructure/index.html#C1500

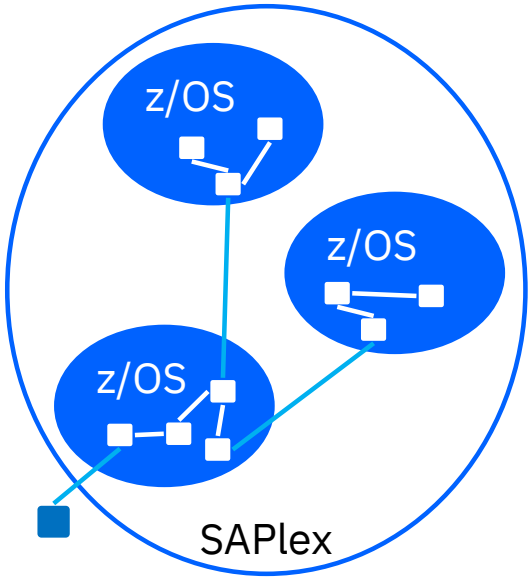
Monitors and Controls:
System z HW and Images

- Focal Point Concept (incl. Backup FP)
- Single Point of Control for operator and automated actions
  (Enterprise wide - not limited to a Sysplex scope)
- Re-IPL & LPAR Management
  - Weight, Capacity, Capping
- HW Monitoring
  - Alerts, Messages, Queries, Security log
- Manage Profiles
  - Image, Load, Group, Reset
- Server Time Protocol
- Capacity Management
  - CBU, TCM, OOCOD
- Power Management

Automation:

IBM Z System Automation V4.3

System Operations
(Internal Automation)



Source: https://www.ibm.com/demos/it-infrastructure/index.html#C1500

Monitors and Controls:
Applications & Sysplex/System Resources

Controls and Automates:
z/OS Address Spaces, USS Applications, Remote Applications, Sysplex & System resources

Policy based Automation:
Configuring instead of coding.

Goal Driven:
System Automation as your *goal keeper*.

Dependency Concept:
Who is parent, who is child?

Application Grouping Concept:
Making a smart move.

Best Practice:
Proven Automation Policies

Policy Report:
Share what Automation does!

Automation

- IBM Z System Automation

System Operations Concepts

Policy Based Automation

Automation Policy

- Managed through a Dialog
- Minimize need for users to write code
- Define automated resources (APL, MTR, APG, ...) through their specific behaviour:
  - Start/Stop - Messages – Dependencies
  - Grouping – Monitoring - Alerting
  - Info links (Help, Owner, Shift plans...)
- Available or Unavailable by default
- Service Schedules (active / down times)
- Builds NetView Automation Tables, NetView Message Revision Tables, Message Processing Facility
- Transparent automation behaviour through html/flat/JSON Policy Reports

Goal Oriented Automation

Keeping a Goal vs. Fire-and-forget

- Keep the ‘Desired Status’ of complex IT environment
- Status evaluation through messages / monitors
- Recovery (customizable)

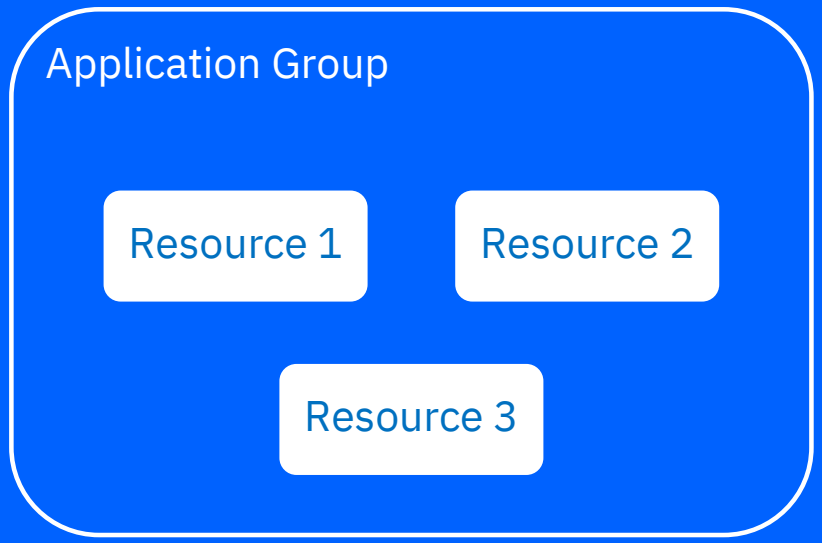
- Requests sent to a Resource
  - MakeAvailable, MakeUnavailable, Suspend/Resume
  - Vote propagation to dependent resources

- Request originators
  - Operators, Schedules, Run Modes, e2e Automation Mgr, …
  - Priorities: low, medium, high

Grouping

Seeing the wood for the trees

→ *Reduces Complexity*



A collection of application resources
so that you can manage them as one entity

Application Groups

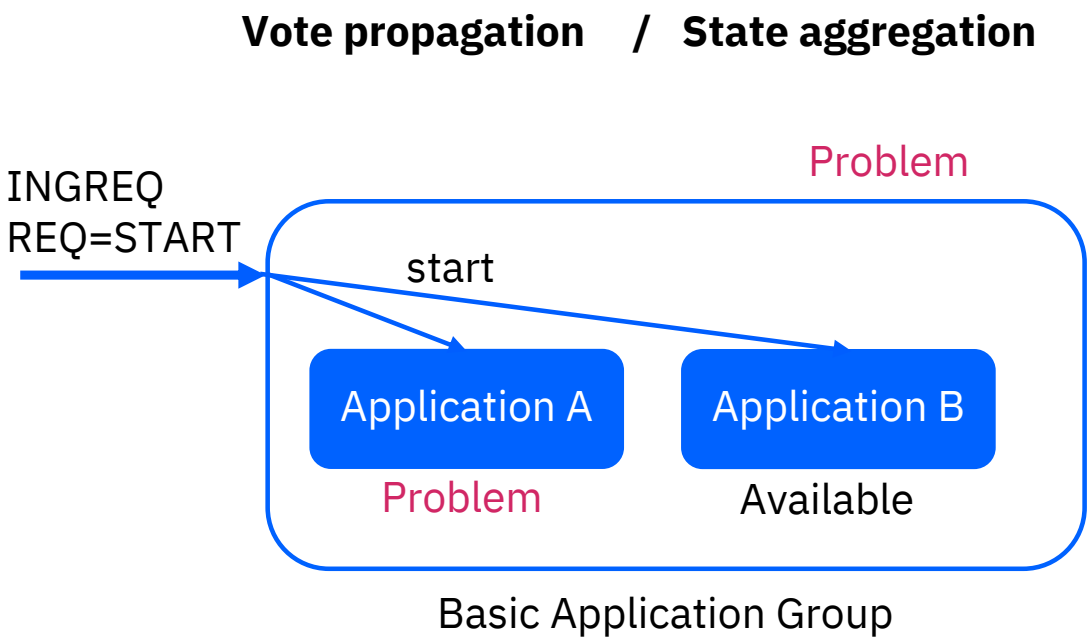
Group Types:

- System
  Members run on a single system.
- Sysplex
  Members run on any system in a Sysplex.

Group Natures

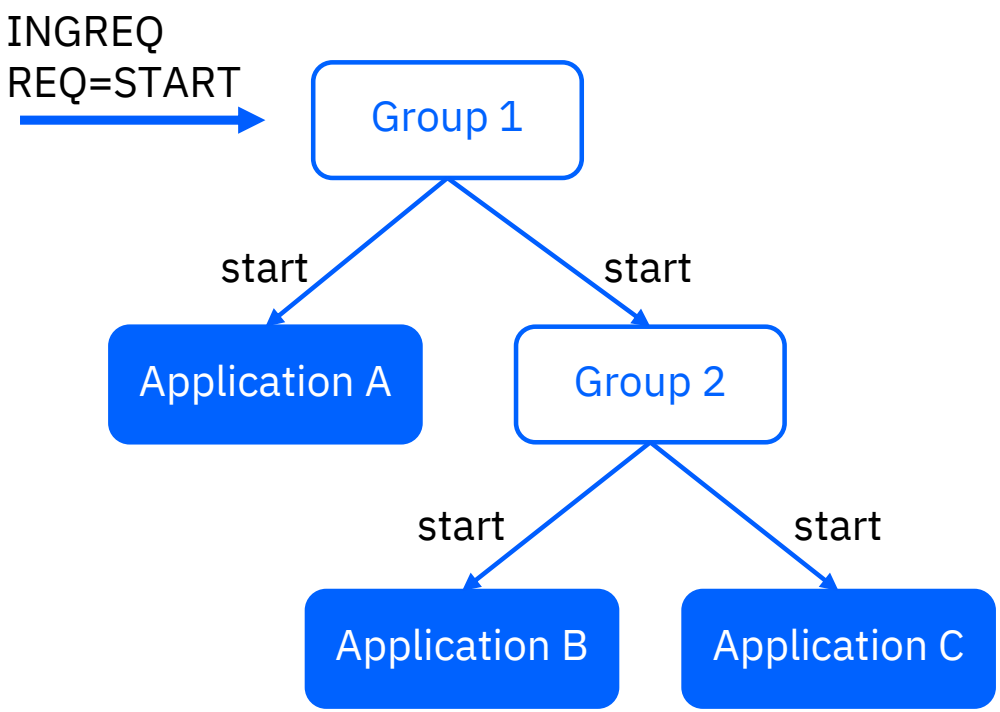
- Basic
  The group is available if all members are available.
- Move
  The group is available if one member is available.
- Server
  The group is available if a set of members are available.

Basic Groups

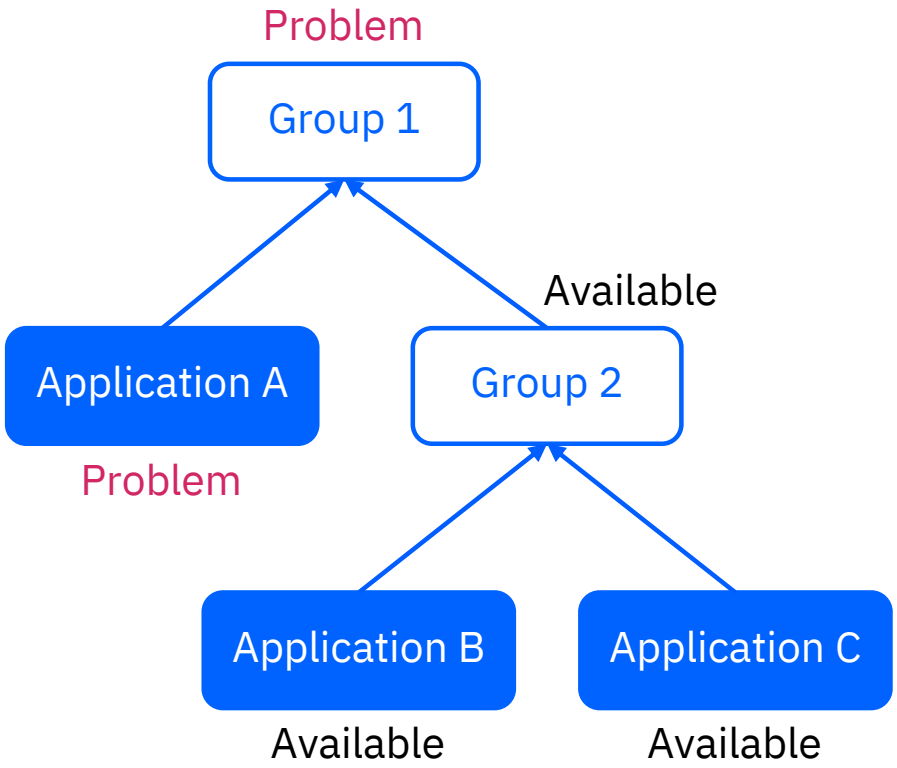


Basic Groups

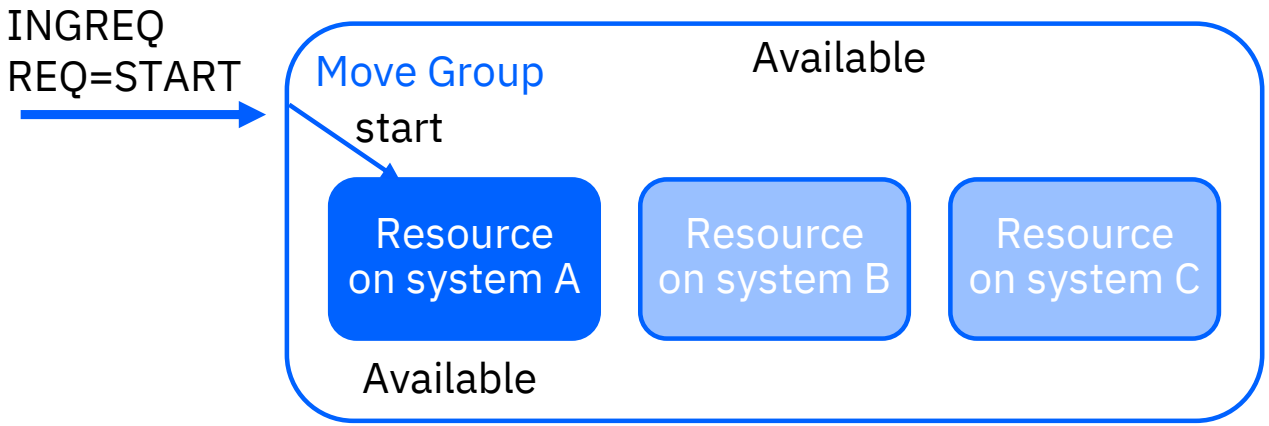
Vote propagation



State aggregation



Move Groups

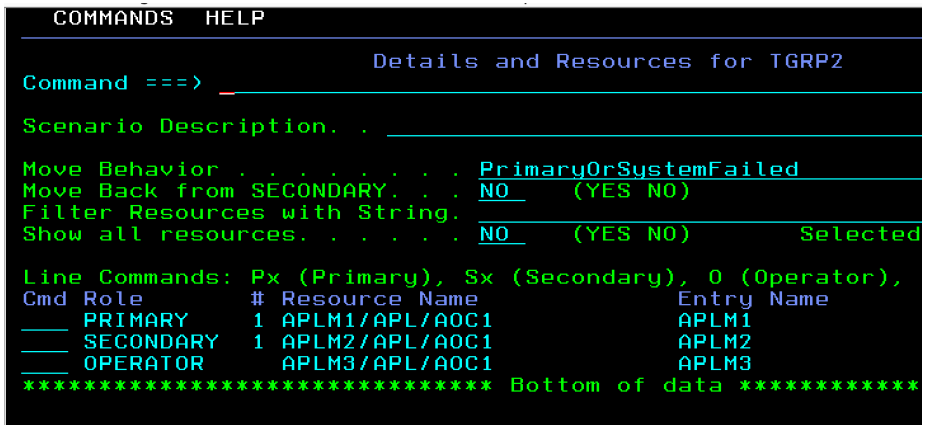


- Select exactly one member,
  based on preferences (Model 1)
- In case of a problem on system A,
  automation will move to another system

Group Model 2

Roles:

- Primary
- Secondary
- Operator



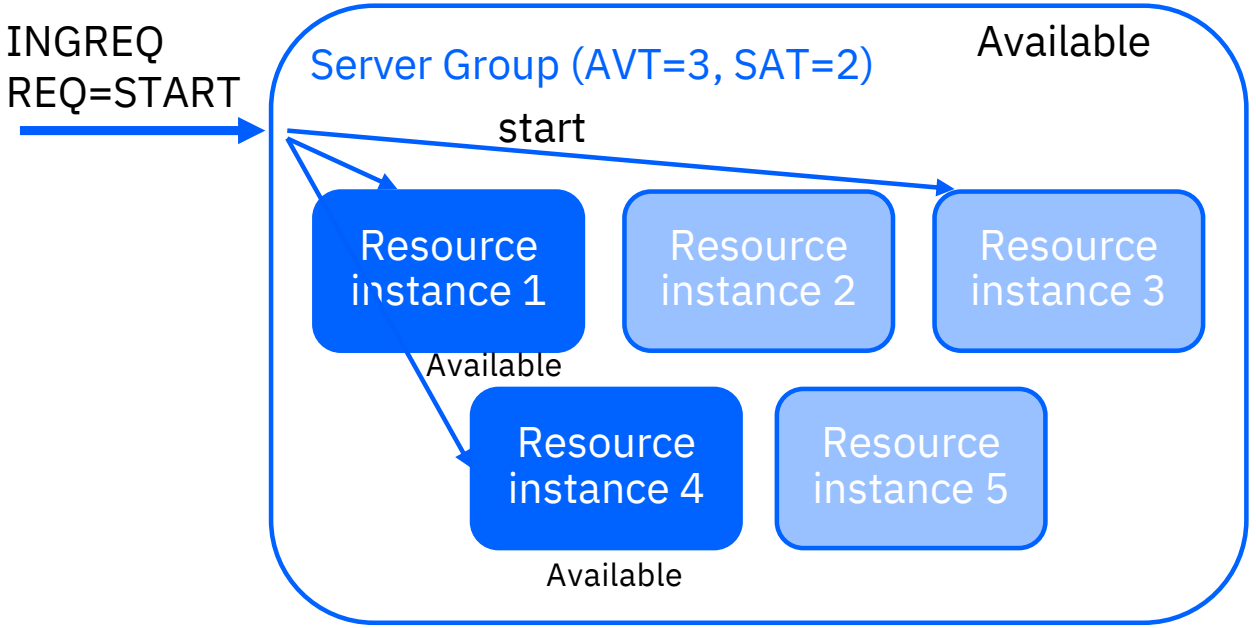
Move Behavior:

- 1 SystemFailed
- 2 SystemStoppedOrFailed
- 3 PrimaryOrSystemFailed
- 4 PrimaryFailedOrSystemStoppedOrFailed
- 5 PrimaryOrSystemStoppedOrFailed
- 6 Never

Move Back from Secondary:

- Yes
- No

Server Groups



- Availability Target (AVT)
  The number of members that automation tries to start
- Satisfactory Target (SAT)
  The minimum number of members that must be available to make group available

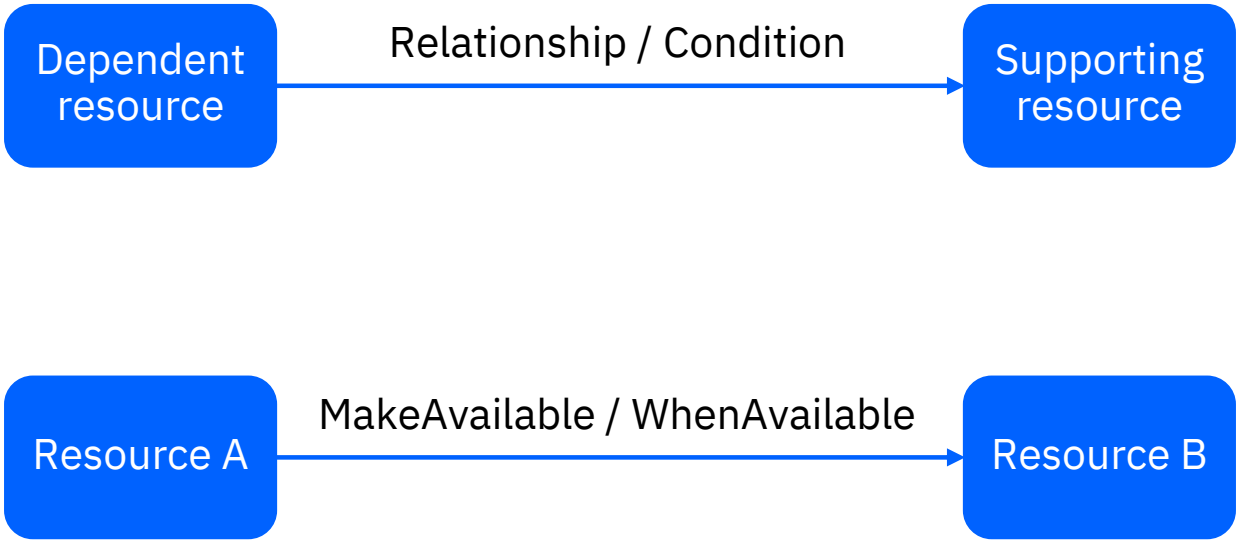
Relationships

Maintaining good relationships!

→ *Makes Complexity manageable.*

Automate related resources

Relationships

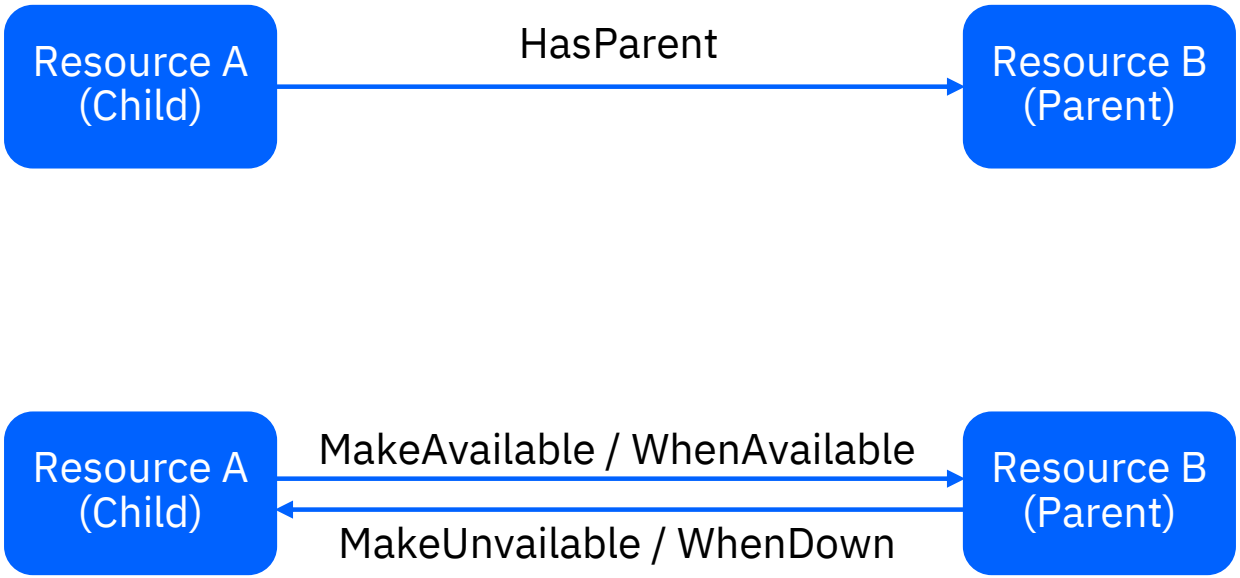


Relationships and Conditions

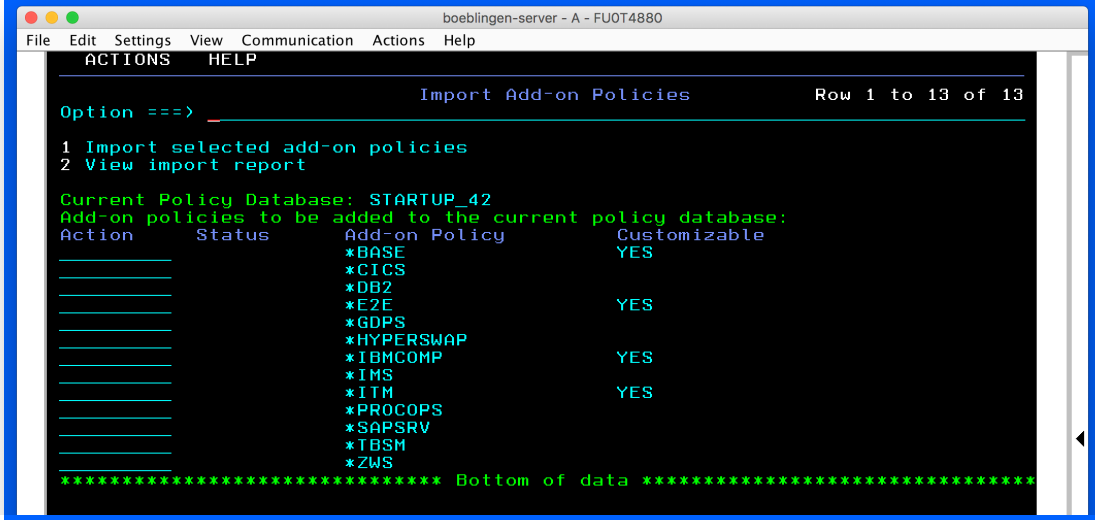
- MakeAvailable
- MakeUnavailable
- PrepAvailable
- PrepUnvailable
- Externally
- HasMonitor
- PeerOf
- ForceDown

- WhenAvailable
- WhenDown/WhenSoftDown/WhenHardDown
- WhenAvailableOrStarting
- WhenObservedAvailable
- WhenObservedWasAvailable
- WhenRunning
- WhenHealthNormal
- WhenHealthAssumedNormal
- WhenHealthNotFatal
- …

HasParent


Resource A
(Child)
HasParent
Resource B
(Parent)
Resource A
(Child)
MakeAvailable / WhenAvailable
MakeUnvailable / WhenDown
Resource B
(Parent)

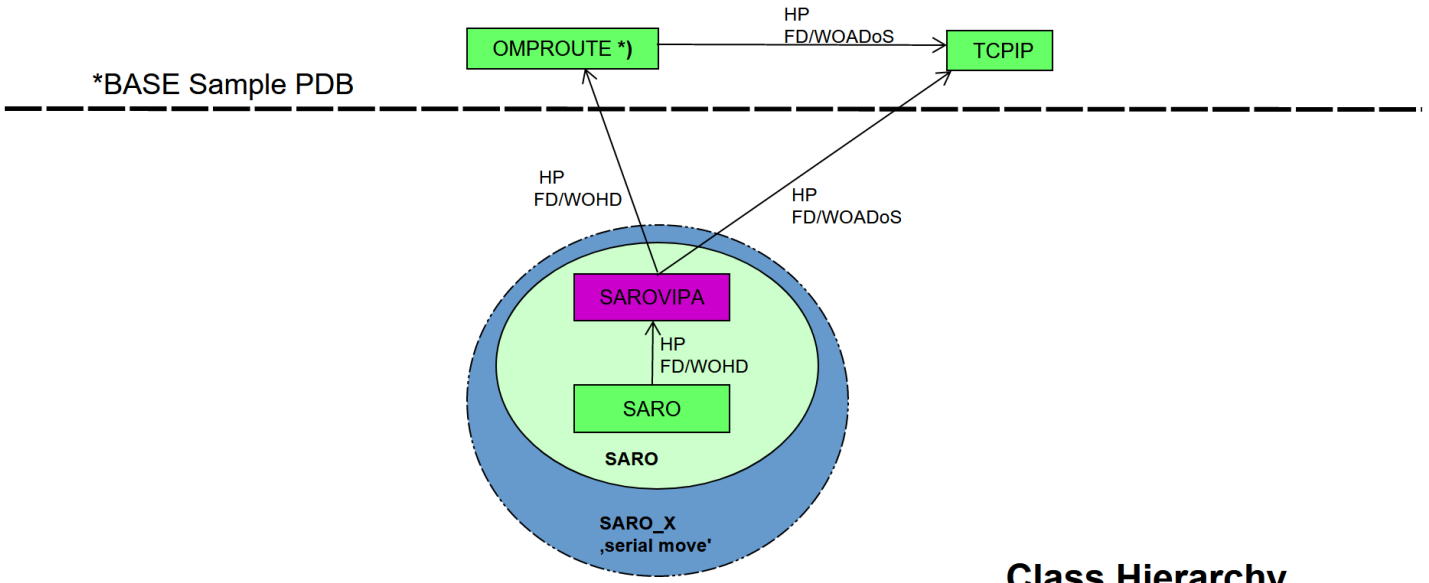
Best Practice Automation Solutions



Best Practices: REST Server Operations

*IBMCOMP– Best Practice Policy

• SA REST Operations - embedded



Class Hierarchy

Colors denote class inheritance

C_APPL C_DVIPA

*) if ONLY this component is selected and APL OMPROUTE is not part of your configuration then it must be added (add-on policy *BASE) and linked manually (see page 2 in *BASE –Best Practice Policy)

pdf's are located in USS:/usr/lpp/ing/doc/policies/

Run Modes

Activate Workload based on Run Modes

Run Mode ↓

Token on APL →

	No Token	red	red + green	red + blue
ALL	X	X	X	X
BLUE				X
RED		X	X	X
GREEN			X	

- E.g.
  Run Mode = Basic:
  Runs z/OS base components, apply maintenance

  Run Mode = Db2-Reorg:
  Run Db2 reorg

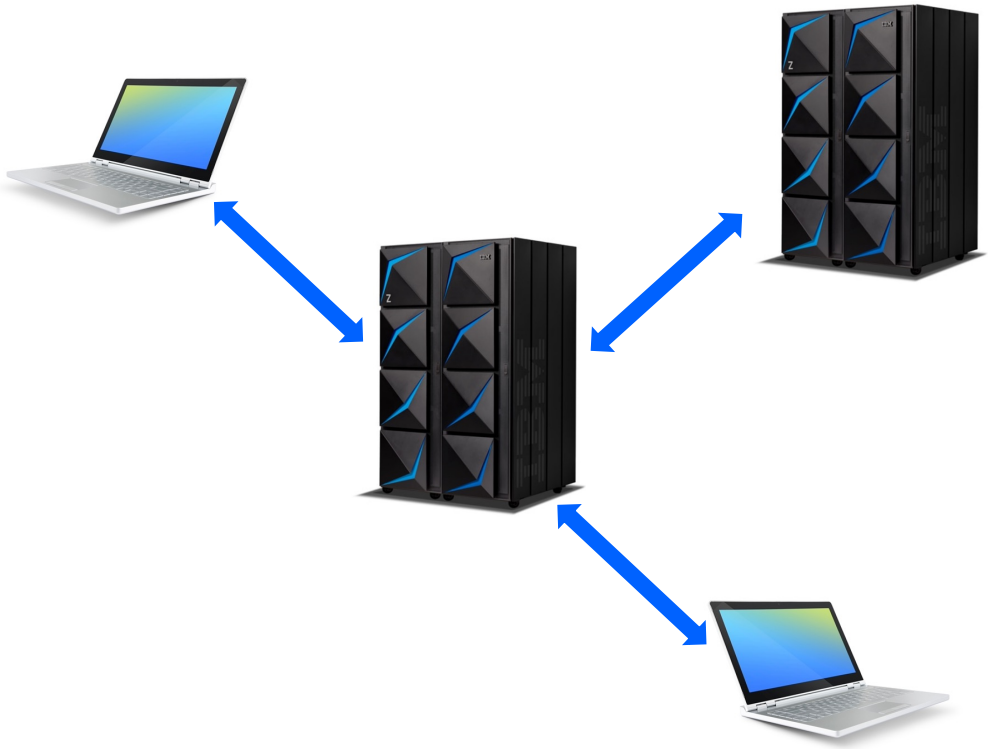
  Run Mode = Ultimo (end of month):
  Run Ultimo workload

Dynamic Resources

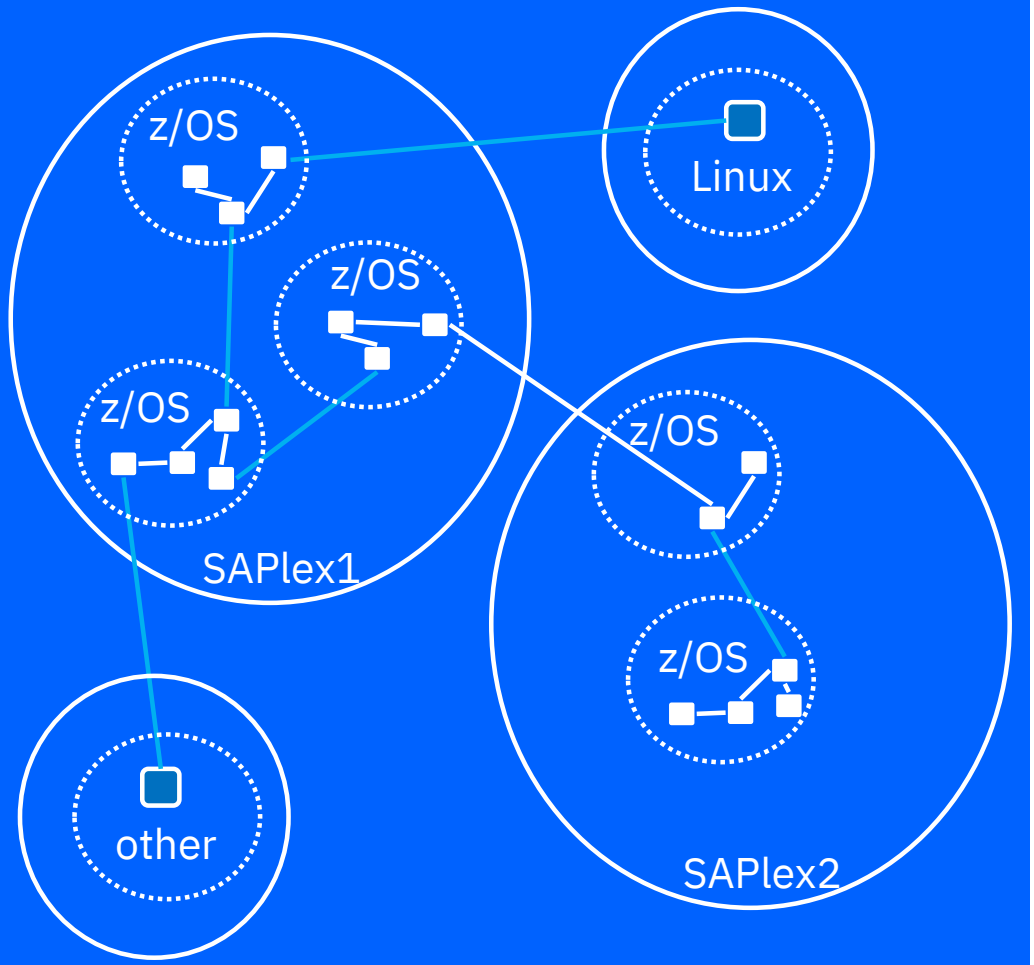
Fast and safe resource creation at automation time

- Demand for immediate resource automation (e.g. CICS regions)
- Templates are defined in the Automation Policy.
  Template definitions:
  - Start/stop commands
  - Messages
  - ...
- Resource is defined at automation time based on a template.
  Resource definitions:
  - Subsystem, Job, Procedure name
  - System name
  - Comment & Short Description (optional)
  - Group membership (optional)
  - User Exits (optional)

End-to-End Automation



Automation across
Sysplex and platform boundaries



IBM Z System Automation
Operations REST API

Representational state transfer (**REST**)
- is a software architectural style that defines a set of constraints to be used for creating Web services.
  Web services that conform to the REST architectural style, called *RESTful* Web services, …
- provide interoperability between computer systems on the Internet. …
- RESTful Web services allow the requesting systems to access and manipulate textual representations of Web resources by using a uniform and predefined set of stateless operations.

This new Application Programming Interface (API) added to IBM Z System Automation allows to exploit capabilities to automate applications and services controlled by SA.

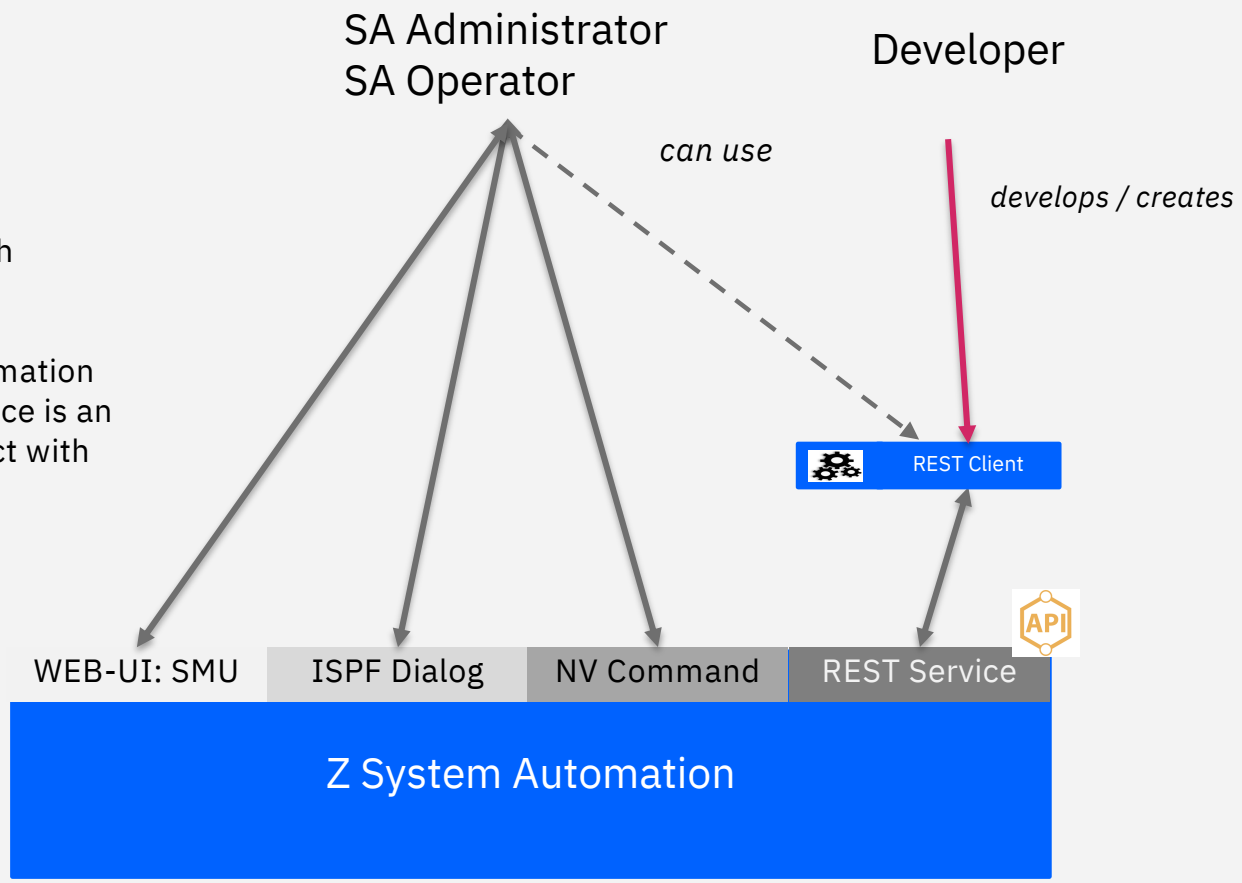
- You can query, start ,and stop resources defined in the current active automation policy.
- You can create and delete dynamic resources from a defined template.

These actions can be added to other programs / solutions which allow to exploit REST interfaces.

IBM Z System Automation Usage

This graphic shows an overview of typical user groups working with Z System Automation.

The new Z System Automation Operations REST Interface is an additional way to interact with Z SA – and does not re



REST API calls

These are the so called „**Endpoints**“ of our API – all starting with:
https://<RESTSERVER>/ibm/sa/v1/...

Standard HTTP **operations** that are also implemented by our API. *(A Web-Browser only uses GET)*

Standard HTTP **Return Codes** are:
- *2xx – Success*
- *4xx – Client Error*
- *5xx – Server Error*

Data that is sent / received as JSON data structures.

Endpoint	Operation	Possible Retun Code(s)	Input / Returned Data
/templates	**GET**	200, 400, 401, 500	**IN:** None **RET:** JSON with Array of Defined Templates
/resources	**GET**	200, 400, 401, 500	**IN:** None **RET:** JSON with Array of Automated Resources
	POST	201, 400, 401, 404, 409, 500	**IN:** JSON with all properties defining template and req. data to create instance **RET:** None – Created instance is in returned HTTP Header.
/resources/{resourceID}	**GET**	200, 400, 401, 500	**IN:** None – The Resource ID is a query parameter (filter) **RET:** JSON with Array containing 0 or 1 Automated Resource
	DELETE	204, 400, 401, 404, 500	**IN:** None – The Resource ID to delete is a query parameter (filter) **RET:** None
/resources/{resourceID}/start	**POST**	202, 400, 401, 404, 500	**IN:** JSON for start request & The Resource ID to start is a query parameter (filter) **RET:** None
/resources/{resourceID}/stop	**POST**	202, 400, 401, 404, 500	**IN:** JSON for stop request & The Resource ID to stop is a query parameter (filter) **RET:** None
/resources/{resourceID}/suspend	**POST**	202, 400, 401, 404, 500	**IN:** JSON for suspend parameter & The Resource ID to suspend is a query parameter (filter) **RET:** None
/resources/{resourceID}/resume	**POST**	202, 400, 401, 404, 500	**IN:** None - The Resource ID to resume is a query parameter (filter) **RET:** None

REST API calls – Using Filter

Example: Get all resources, with **observed** state **SYSGONE** and **starting with name „WEB10“**

Filter Parameter are appended with „?“

Multiple filter are concatenated with „&“

Some filters allow wildcards – eg. „*“

https://[redacted]st.com:3276/ibm/sa/v1/resources?observed=SYSGONE&name=WEB10*

Filter 1 „observed“

Filter 2 „name“

```
[bjost@sasmux01 ~]$ curl -s -k -u RT[redacted]MU -X GET 'https://ex[redacted]st.com:3276/ibm/sa/v1/resources?observed=SYSGONE&name=WEB10*' | jq '.'

  "id"   "5sXC8fDE1NVhxNTV"
  "name"   "WEB10DMN"
  "type"   "DMN"
  "status"
    "observed"   "SYSGONE"
    "desired"   "AVAILABLE"
    "compound"   "INHIBITED"

  "description"   "Domain 10 on ext191nx"
  "dynamic"   false


  "id"   "5sXC8fDZxcZh2cXGYebFwvHwxNTV"
  "name"   "WEB10REE"
  "type"   "REE"
  "system"   "WEB10DMN"
  "status"
    "observed"   "SYSGONE"
    "desired"   "UNAVAILABLE"
    "compound"   "INHIBITED"

  "description"   "WebServer 10"
  "dynamic"   false
```

As Developer – Get API documentation

The IBM Knowledge Center for Z System Automation contains documentation about automation concepts and how to install, configure and operate SA.

For the new Z System Automation Operations Server you find basic information, how to install and configure in this Knowledge Center as well.

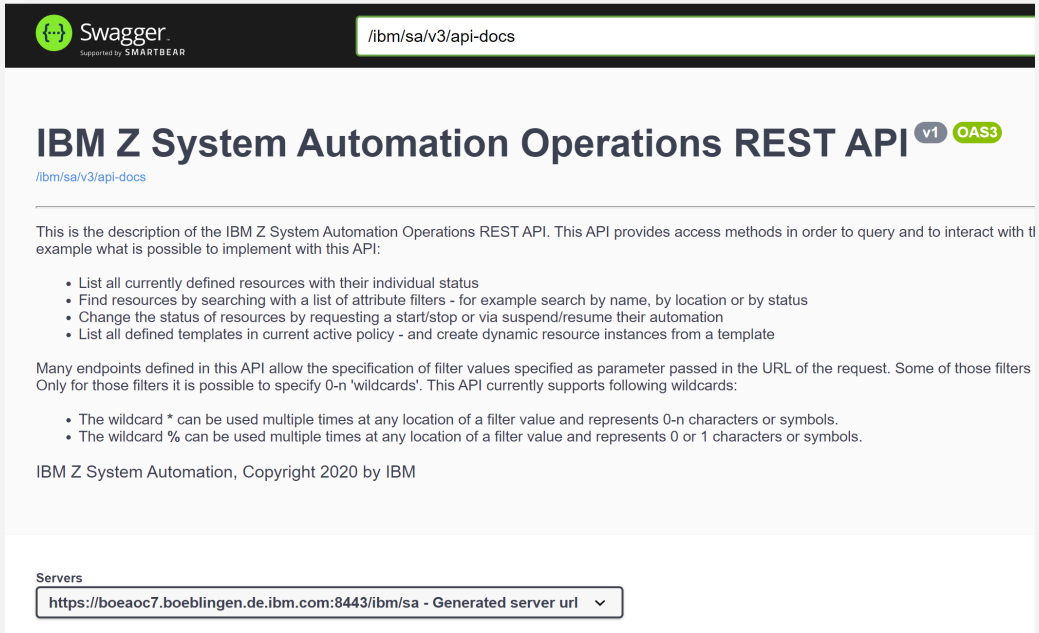
Detailed information for a developer about the provided SA Operations API is not described there.

Instead all details of this API can be retreived by the embedded Swagger UI.

https://<REST_SERVER>:<PORT>/ibm/sa/swagger-ui/index.html?configUrl=/ibm/sa/v3/api-docs/swagger-config#/

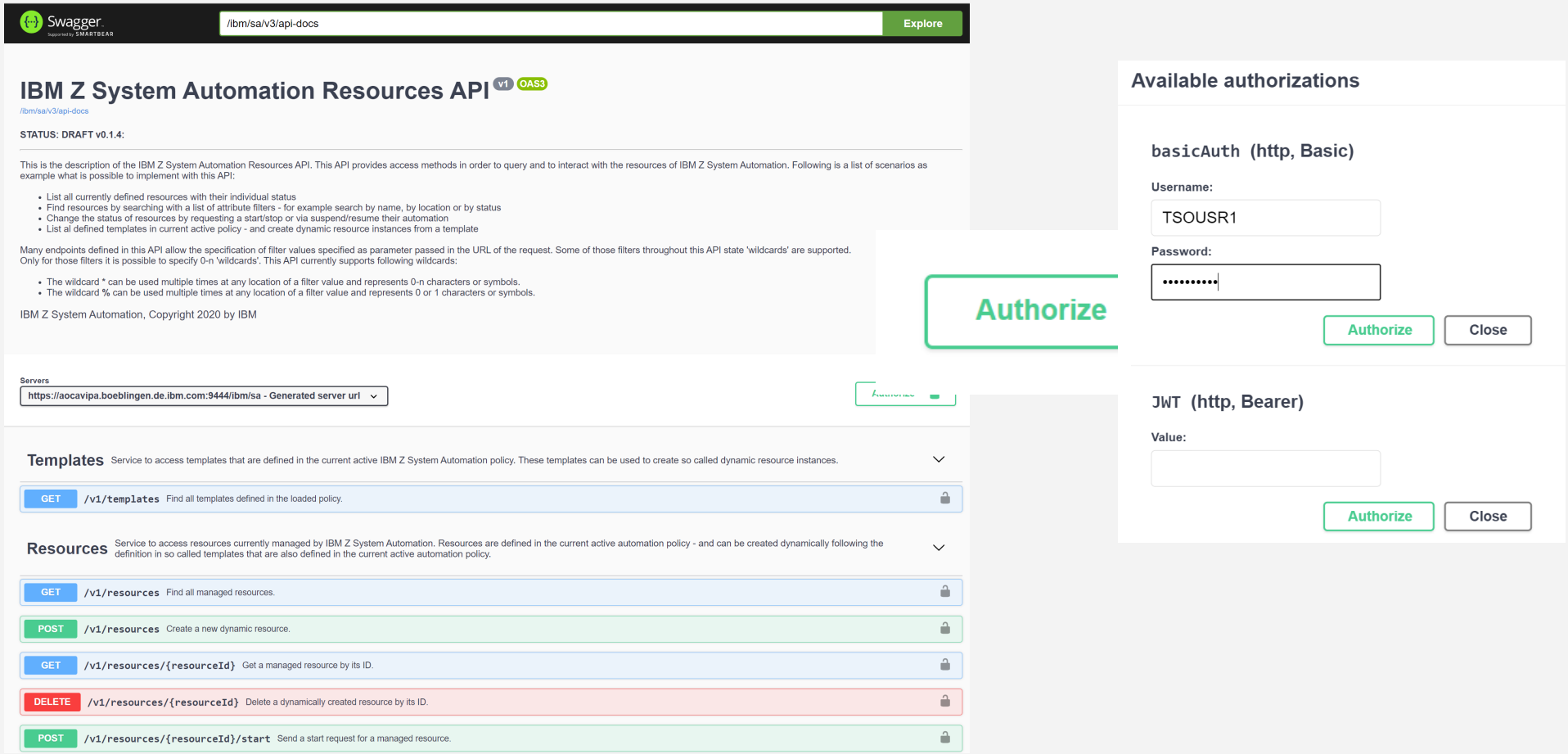
The **OASv3** document, that is just visualized by this UI can also be downloaded, by using following URL in your WEB browser:

https://<REST_SERVER>:<PORT>/ibm/sa/v3/api-docs.yml

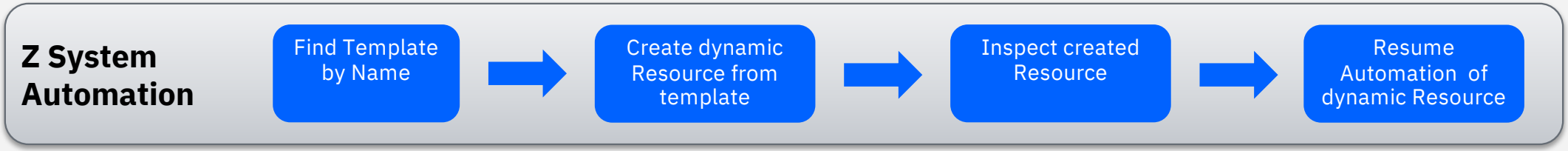


Embedded Swagger UI

Visualize & Interact → Authorize



Example Workflow



GET
https://<SRV>/ibm/sa/v1/**templates**
?name=„ABC*“

POST
https://<SRV>/ibm/sa/v1/**resources**
BODY:
JSON with template ID + instance data

GET
https://<SRV>/ibm/sa/v1/**resources**

POST
https://<SRV>/ibm/sa/v1/
resources/{ID}/**resume**

Automation

“ Let’s talk …”

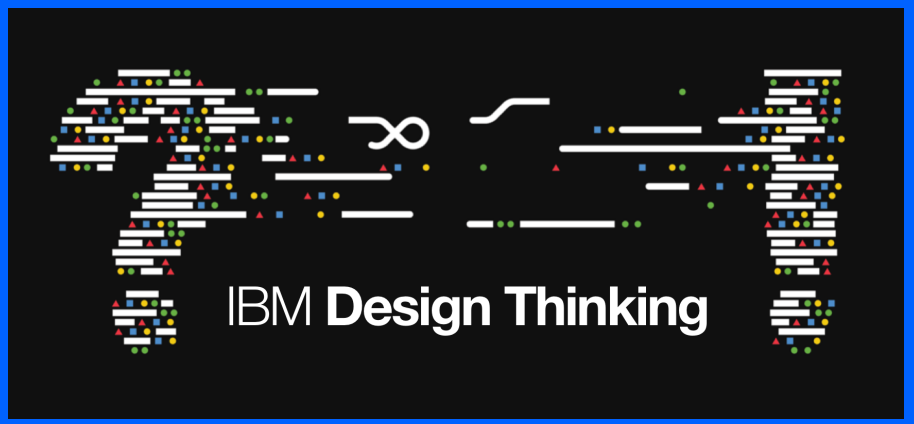
Early Access Program

Conferences

-EOTC
-AOTC
-German Workgroup

User Groups

http://groups.yahoo.com/group/SAUSERS/



https://www.youtube.com/watch?v=jU4fTt2DszE

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Thank You !