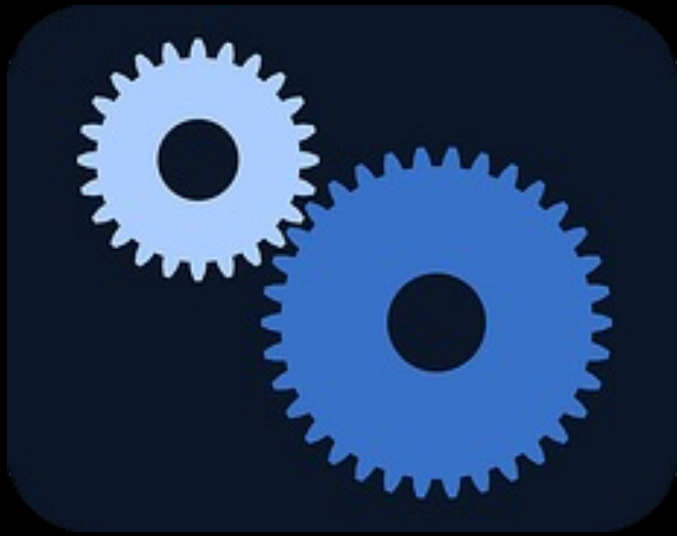


IBM Z System Automation

At a Glance



z/OS Academy, November 2022, IBM Boeblingen
by Janvidevi Gohil and Gunnar Freitag (IBM Development)

SA Team / November 2022 / © 2022 IBM Corporation

- 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?

Middleware (data bases)

z/OS Address Spaces

MVS Command Processing Complete

Questions:

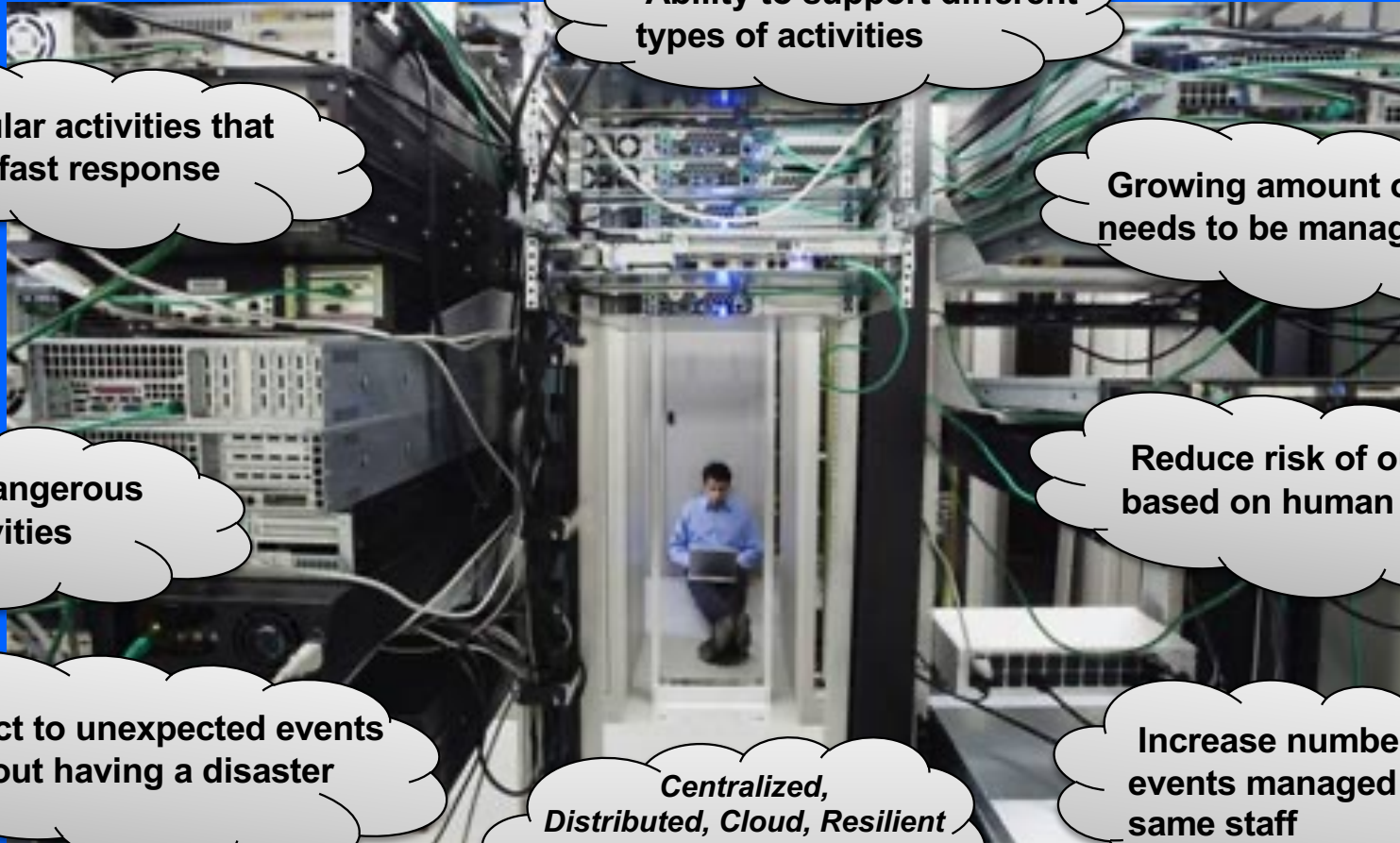
Who / what starts your system?

Who / what keeps your system available?

Who / what stops your system?

What happens when the responsible colleague retires?

Customer Concerns



Regular activities that need fast response

Ability to support different types of activities

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

Increase number of events managed with same staff

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

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



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

IBM Z ChatOps

Collaborative problem resolution
integrated in your chat platform



Slack



MatterMost

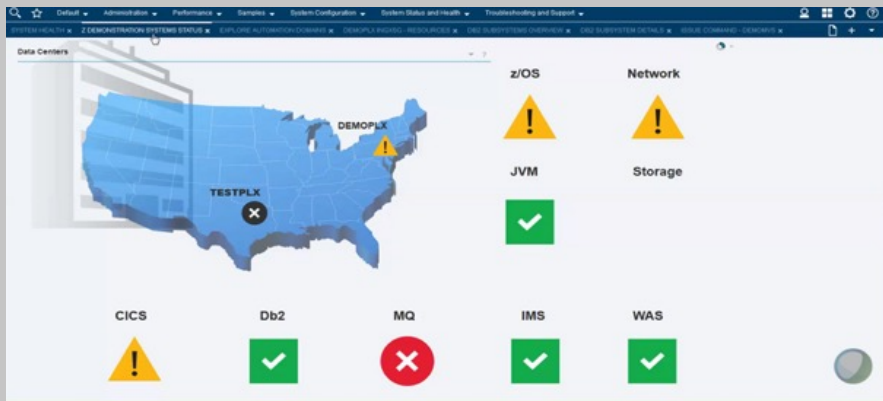


MS Teams

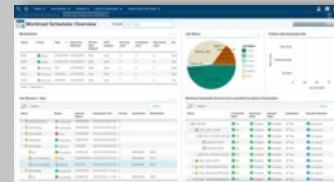


Z Operator

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

Domain Page Automation Domain: TESTPLX INGXSGA0

Resources

Name	Compound State	Observed State	Desired State	Automated	Operator Request
CICS/APG/TESTMVS	OK	Online	Online	Yes	No request
DB2/APG/TESTMVS	OK	Online	Online	Yes	No request
DB2T/APG/TESTMVS	OK	Online	Online	Yes	No request
DILSTC/APG/TESTMVS	OK	Online	Online	Yes	No request
E2E_ADPT_XIAPG	OK	Online	Online	Yes	No request
EAP_1/APG/TESTMV	Warning	Online	Online	Yes	No request
EAP_2/APG/TESTMV	Warning	Online	Online	Yes	No request
EAP_3/APG/TESTMV	Warning	Online	Online	Yes	No request
EAP_3CH/APL/TE	OK	Online	Online	Yes	No request
EAP_3ERR/APL/TE	Fatal Error	Offline	Offline	Yes	No request
EAP_3PA/APL/TE	OK	Online	Online	Yes	No request

Nodes

Name	Observed State	Automated	OS Name
TESTMVS	Online	Yes	z/OS

Relationships

Selected: 1 Resources: 6 Relationships: 11 Filtered: 0

Requests

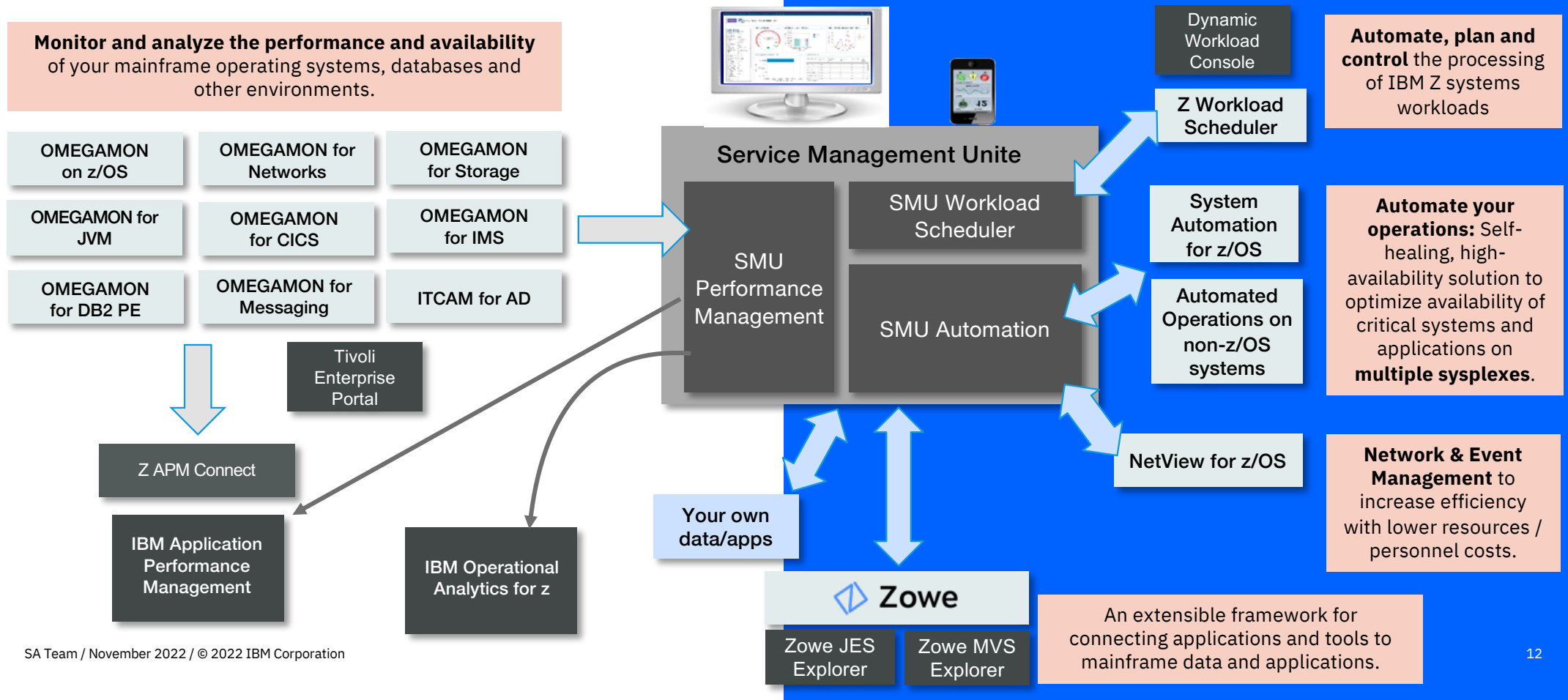
Requested Action	Source	User ID	Info	Priority	Created	Type	Winning
Online	GROUP EAP_		MakeAvailable	Low	Sep 18, 2016	VOTE	false

Total: 1 Selected: 0

IBM Service Management Unit V1.1.7

Modern web dashboards integrating data from many different sources

“Faster for experts, simpler for beginners”



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



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

IBM Z ChatOps

Collaborative problem resolution
integrated in your chat platform



Slack



MatterMost

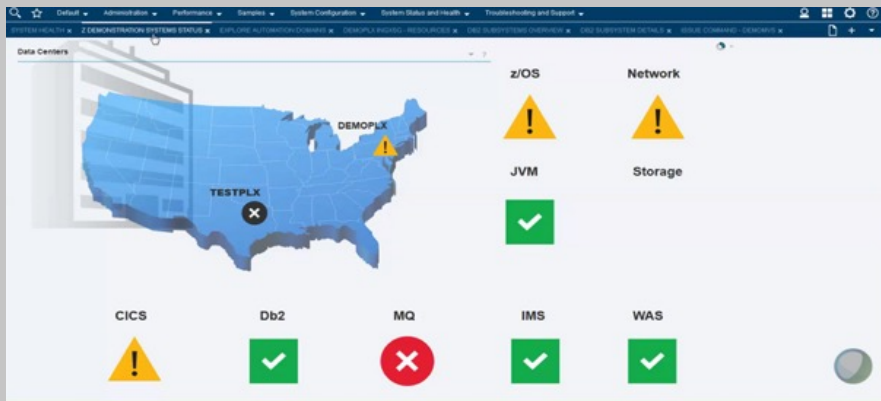


MS Teams

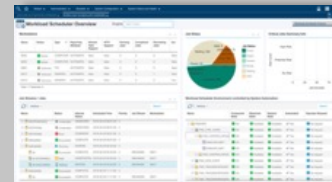


Z Operator

IBM Service Management Unite



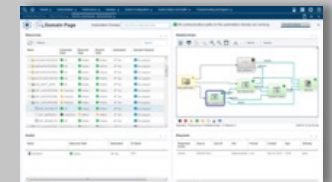
- Time-saving integrated web dashboards
- Brings all disciplines together
- Guided problem isolation & custom dashboards



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



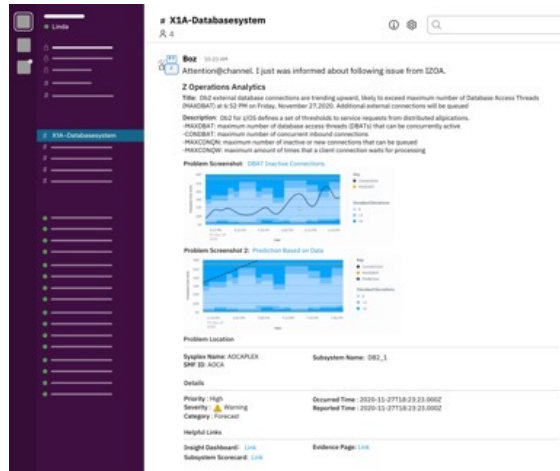
Scheduling



Network
Management

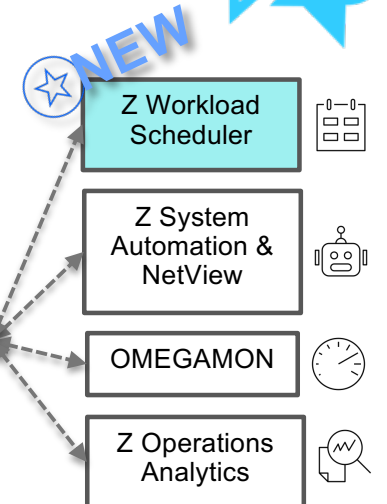
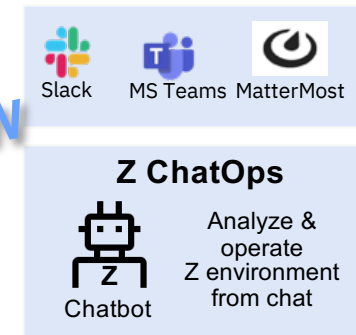
Collaborative Incident Detection and Remediation

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

@bnz-demo-ibmz show events for zos



Wolfgang Schaeberle 11:58 AM

Hey team... looks like something strange is happening on MVS1... let me take a look...

@bnz-demo-ibmz show events for zos

bnz-demo-ibmz 11:59 AM

Okay, wschaebe. I've found the following 7 results for event.

Time	Severity	Summary	Source	Category
2021-08-31 14:32:25	Critical	Indicates one or more checks has found a high severity exception	ESYSMVS:MVS2:MVSSYS	Situation OM zOS
2021-08-31 11:43:39	Critical	Indicates one or more checks has found a high severity exception	ESYSMVS:MVS1:MVSSYS	Situation OM zOS
2021-09-24 00:28:39	Warning	JES Spool Utilization warning exceeded	ESYSMVS:MVS1:MVSSYS	Situation OM zOS

IBM Z ChatOps

#zchatops-dev-fws

Wolfgang Schaeberle 11:47 AM

https://bnzdev01.cn.ibm.com:16311/ibm/EEZUIWebClient/EEZUIBuilderServlet?SourceToken=EEZResourceKeyDN=KEYAPLEX+INGXSGUG+NN=()&RC={APG}

bnzchatbot_fws 11:47 AM

Okay, wschaebe. I've found the following details for MOVE22.

Details

MOVE22 / APG /

Compound: Warning

Observed: Unavailable

Desired: Available

Automated: Yes

Operational: Start request pending

Actions

Hosted on Domain: KEYAPLEX

Owner: INGXSUGG

Description: Sysplex move APG (2) w/o scsn. & roles

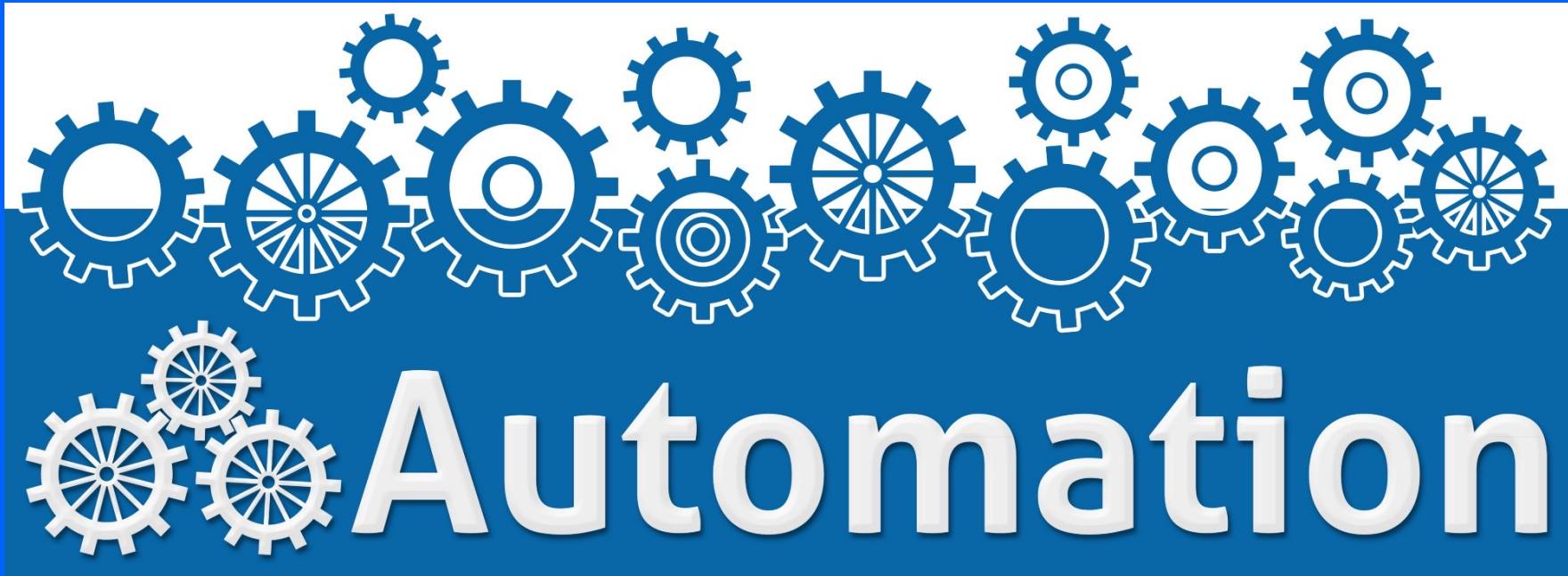
Requests: undefined

Open in SMU Dashboard: MOVE22

Show members **Show relations** **Show requests**

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

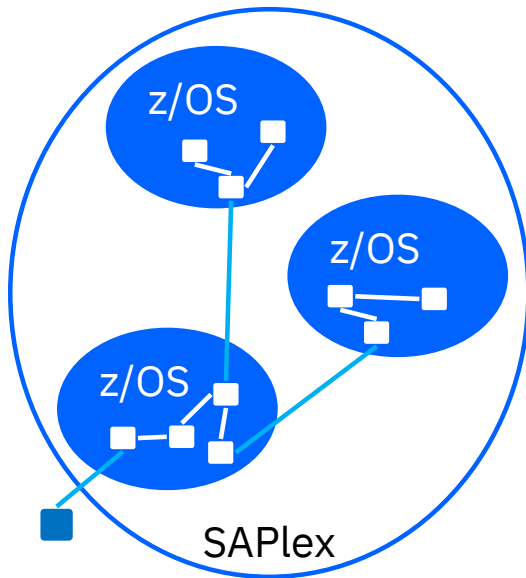
- Focal Point Concept (incl. Backup FP)
- Single Point of Control for operator and automated actions
(Enterprise wide - not limited to a Sysplex scope)
- Re-IPL & LPAR Management
- Weight, Capacity, Capping
- HW Monitoring
- Alerts, Messages, Queries, Security log
- Manage Profiles
- Image, Load, Group,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

SA Team / November 2022 / © 2022 IBM Corporation

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*



Application Group

Resource 1

Resource 2

Resource 3

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

Application Groups

Group Types:

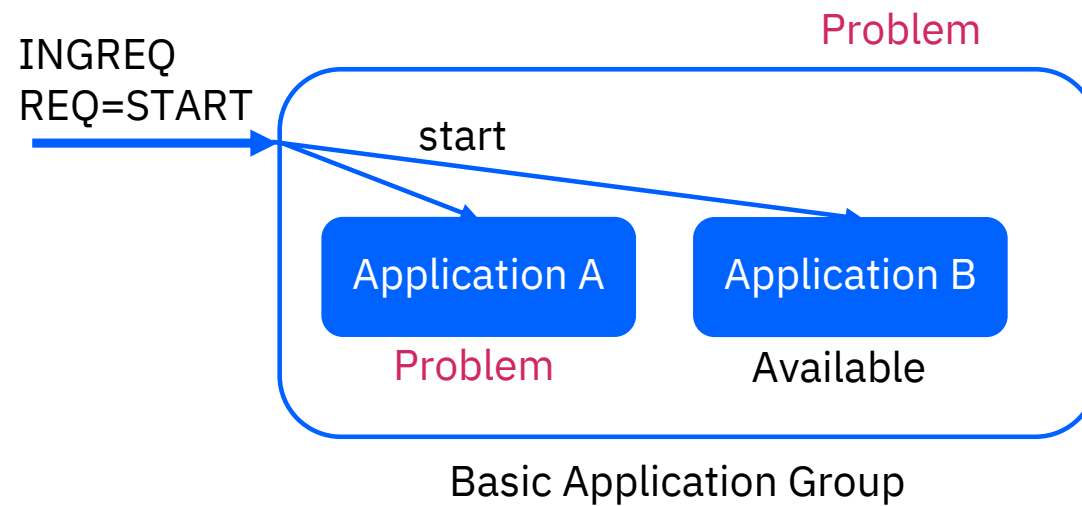
- **System**
Members run on a single system.
- **Sysplex**
Members run on any system in a Sysplex.

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.

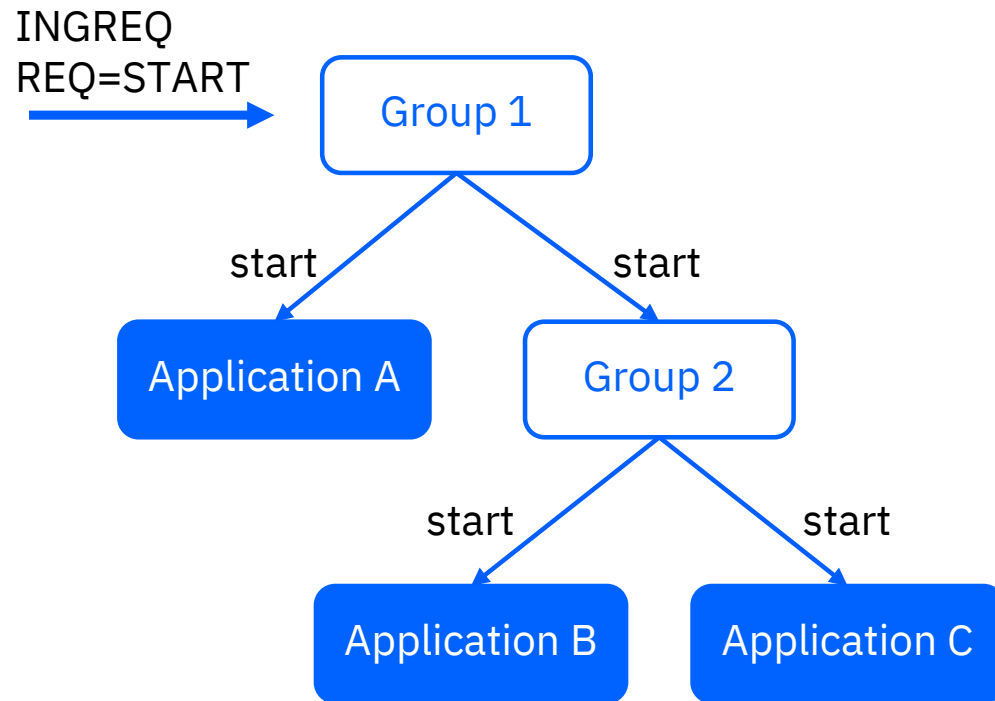
Basic Groups

Vote propagation / State aggregation

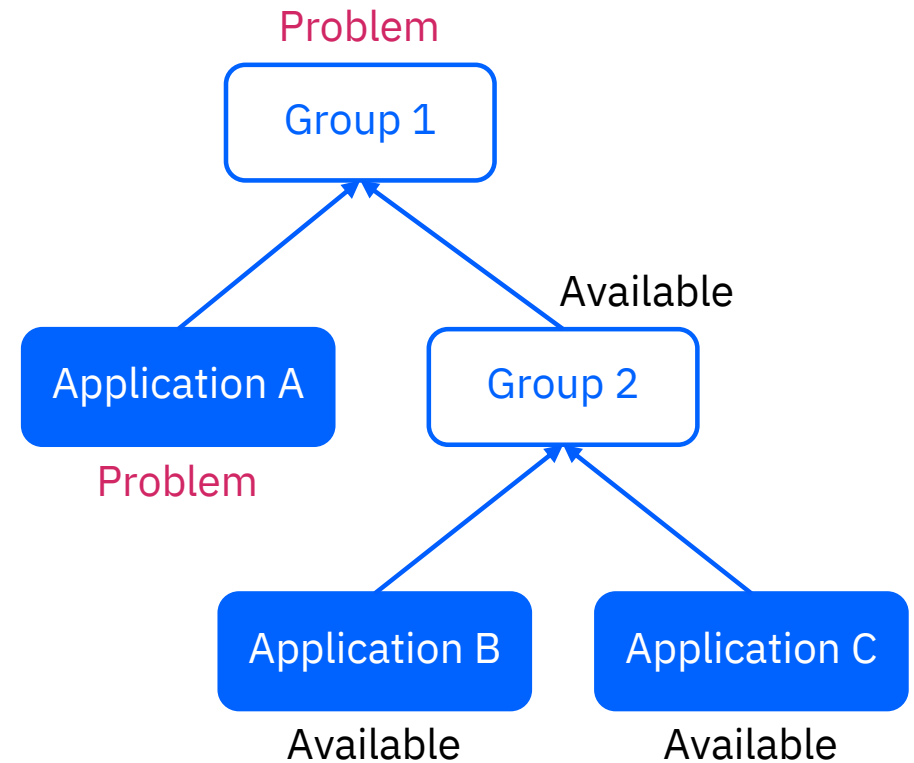


Basic Groups

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

```
COMMANDS  HELP
Details and Resources for TGRP2
Command ==>
Scenario Description. . . . .
Move Behavior. . . . . PrimaryOrSystemFailed
Move Back from SECONDARY. . . NO (YES NO)
Filter Resources with String.
Show all resources. . . . . NO (YES NO) Selected
Line Commands: Px (Primary), Sx (Secondary), O (Operator),
Cmd Role # Resource Name Entry Name
--- PRIMARY 1 APLM1/APL/AOC1 APLM1
--- SECONDARY 1 APLM2/APL/AOC1 APLM2
--- OPERATOR APLM3/APL/AOC1 APLM3
***** Bottom of data *****
```

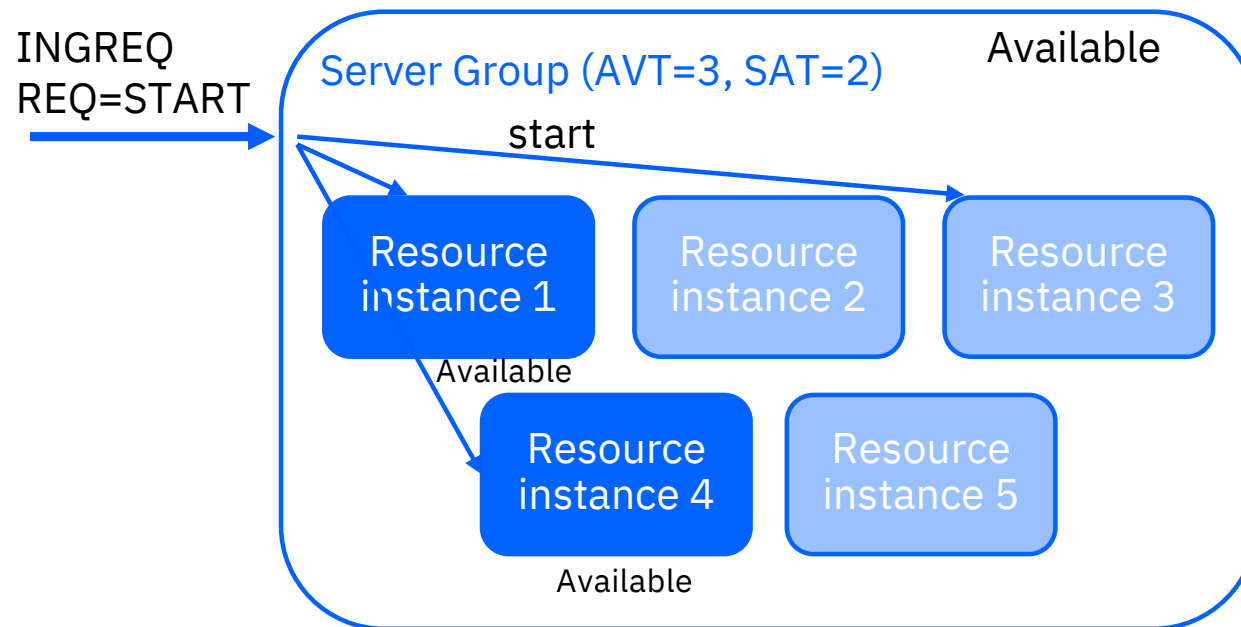
Move Behavior:

- 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.*



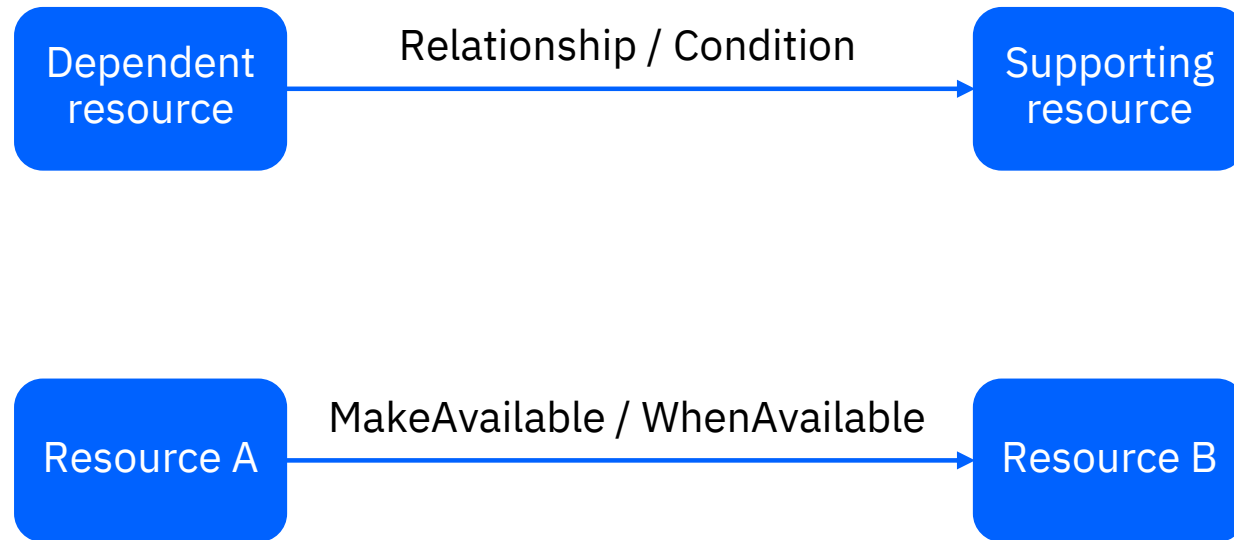
Resource A

Resource B

Resource C

Automate related resources

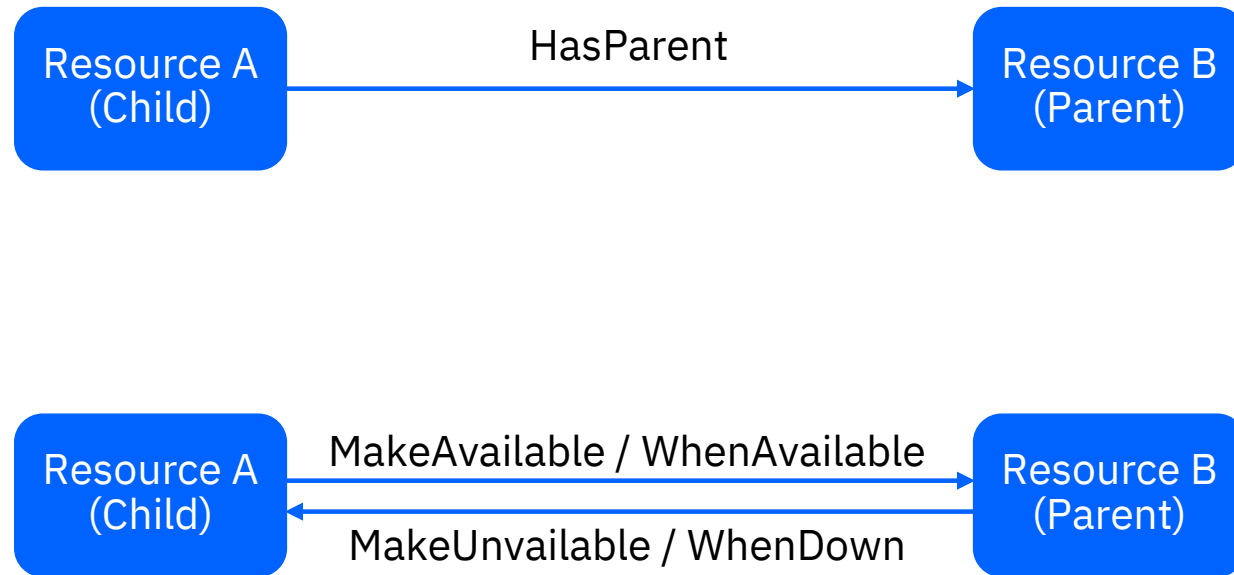
Relationships



Relationships and Conditions

- MakeAvailable
- MakeUnavailable
- PrepAvailable
- PrepUnavailable
- Externally
- HasMonitor
- PeerOf
- ForceDown
- WhenAvailable
- WhenDown/WhenSoftDown/WhenHardDown
- WhenAvailableOrStarting
- WhenObservedAvailable
- WhenObservedWasAvailable
- WhenRunning
- WhenHealthNormal
- WhenHealthAssumedNormal
- WhenHealthNotFatal
- ...

HasParent



IBM Z System Automation System Operations - Concepts

Best Practice Automation Solutions



```
boeblingen-server - A - FU0T4880
File Edit Settings View Communication Actions Help
ACTIONS HELP

Option ==> Import Add-on Policies Row 1 to 13 of 13

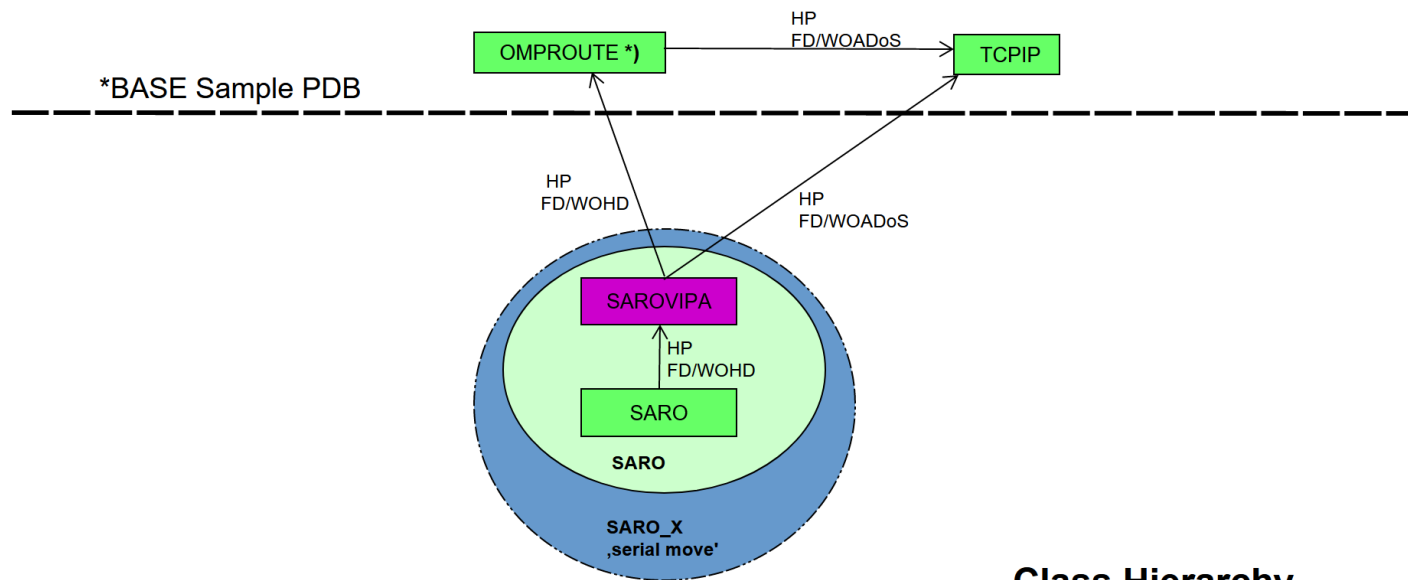
1 Import selected add-on policies
2 View import report

Current Policy Database: STARTUP_42
Add-on policies to be added to the current policy database:
Action Status Add-on Policy Customizable
-----
*BASE YES
*CICS
*DB2
*EZE YES
*GDPS
*HYPERSWAP
*IBMCOMP YES
*IMS
*ITM YES
*PROCOPS
*SAPSRV
*TBSM
*ZWS
***** Bottom of data *****
```

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)

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

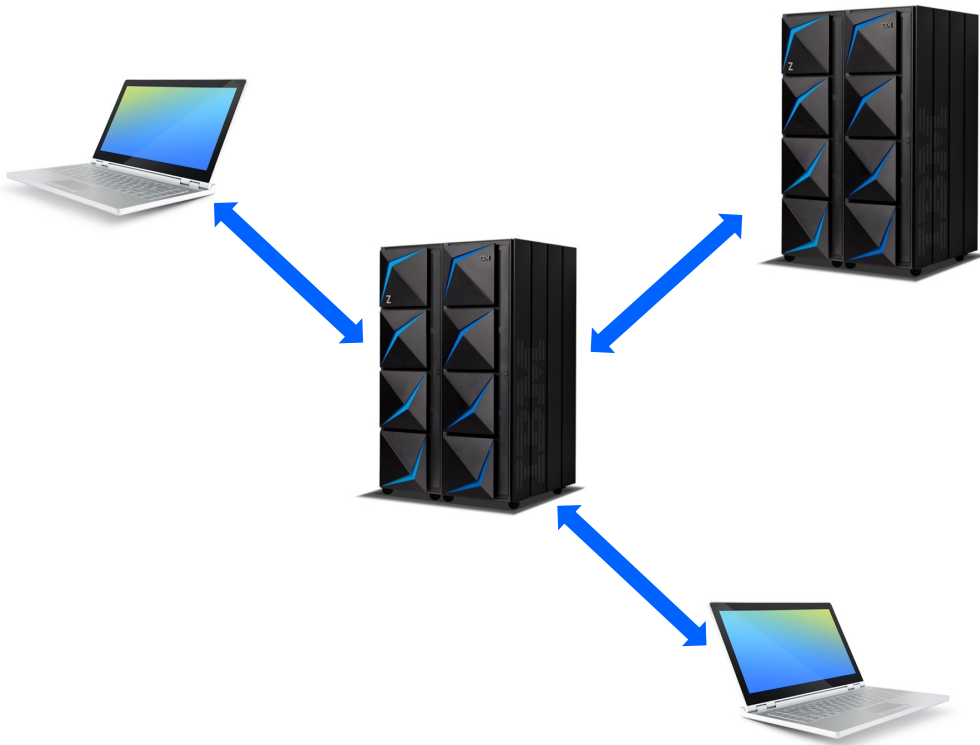
Dynamic Resources

Fast and safe resource creation at automation time

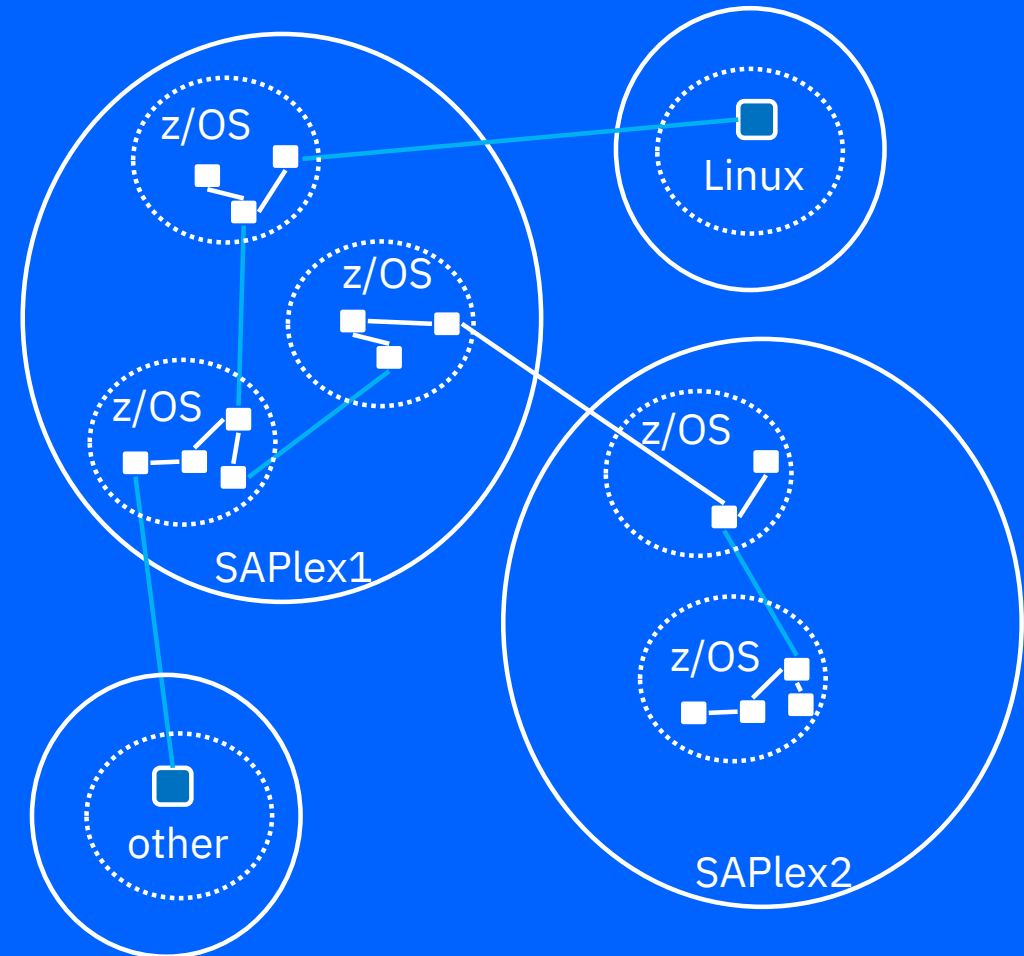
- Demand for immediate resource automation (e.g. CICS regions)
- Templates are defined in the Automation Policy.
Template definitions:
 - Start/stop commands
 - Messages
 - ...
- Resource is defined at automation time based on a template.
Resource definitions:
 - Subsystem, Job, Procedure name
 - System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

IBM Z System Automation System Operations - Concepts

End-to-End Automation



Automation across Sysplex and platform boundaries



IBM Z System Automation Operations REST API



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.

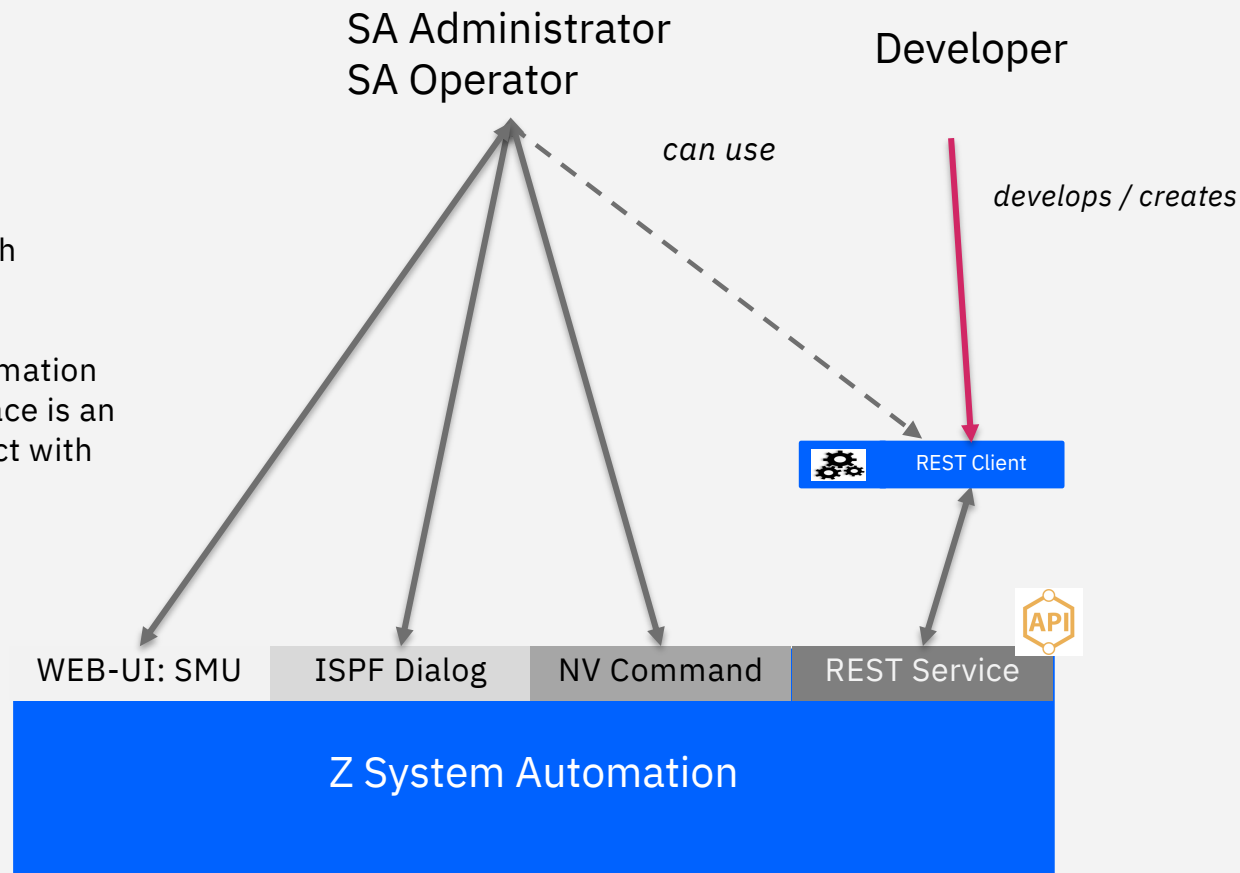
Representational state transfer (REST)
- is a [software architectural](#) style that defines a set of constraints to be used for creating [Web services](#).
- Web services that conform to the REST architectural style, called *RESTful* Web services, ...
- provide interoperability between computer systems 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.



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 Return 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“**

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

Filter Parameter are appended with „?“

Multiple filter are concatenated with „&“

Some filters allow wildcards – eg. „*“

Filter 1
„observed“

Filter 2
„name“

```
[bjost@sasmux01 ~]$ curl -s -k -u RT[redacted]SMU -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 ext19lnx",
  "dynamic": false
},
{
  "id": "5sXC8fDEZxc2h2cXGYebFvvHwxNTV",
  "name": "WEB10REF",
  "type": "REF",
  "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.

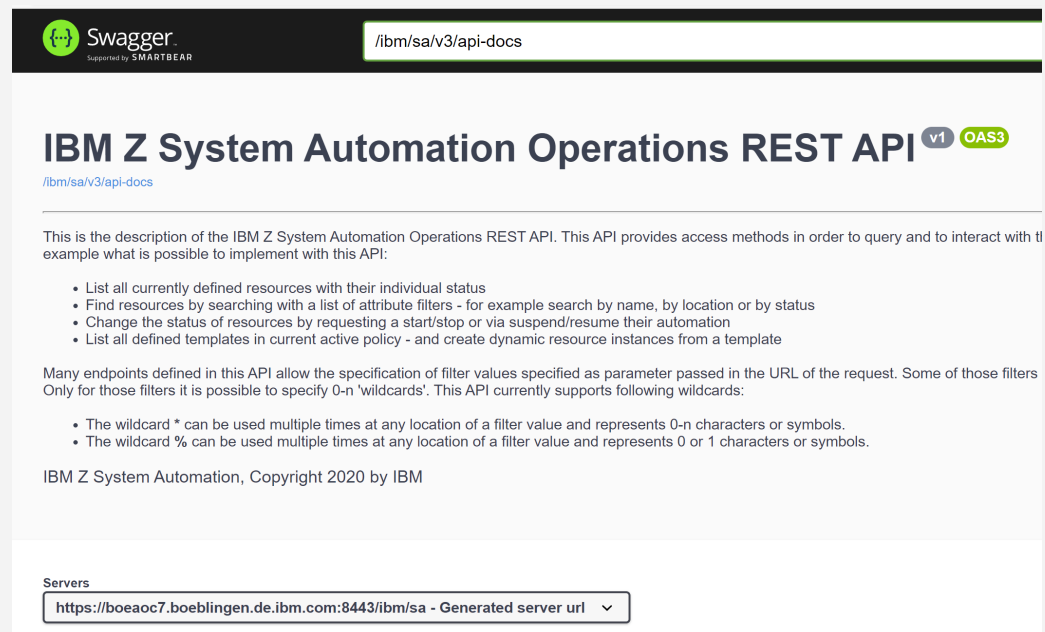
Detailed information for a developer about the provided SA Operations API is not described there.

Instead all details of this API can be retrieved 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



The screenshot shows the Swagger UI interface. At the top, there's a Swagger logo and a search bar containing "/ibm/sa/v3/api-docs". Below this, the title "IBM Z System Automation Operations REST API" is displayed with version "v1" and "OAS3" tags. A description follows: "This is the description of the IBM Z System Automation Operations REST API. This API provides access methods in order to query and to interact with the example what is possible to implement with this API:". A bulleted list of capabilities is provided: listing resources, finding resources by filters, changing resource status, and creating dynamic resource instances. Below this, a note explains that filter values can be specified in the URL and that wildcards are supported. Two examples of wildcard usage are given: "*" for 0-n characters and "%" for 0 or 1 characters. At the bottom, a "Servers" section shows a dropdown menu with the URL "https://boeaoc7.boeblingen.de.ibm.com:8443/ibm/sa - Generated server url".

Embedded Swagger UI

Visualize & Interact → Authorize

 /ibm/sa/v3/api-docs Explore

IBM Z System Automation Resources API v1 OAS3

[/ibm/sa/v3/api-docs](#)

STATUS: DRAFT v0.1.4:

This is the description of the IBM Z System Automation Resources API. This API provides access methods in order to query and to interact with the resources of IBM Z System Automation. Following is a list of scenarios as example what is possible to implement with this API:

- List all currently defined resources with their individual status
- Find resources by searching with a list of attribute filters - for example search by name, by location or by status
- Change the status of resources by requesting a start/stop or via suspend/resume their automation
- List all defined templates in current active policy - and create dynamic resource instances from a template

Many endpoints defined in this API allow the specification of filter values specified as parameter passed in the URL of the request. Some of those filters throughout this API state 'wildcards' are supported. Only for those filters it is possible to specify 0-n 'wildcards'. This API currently supports following wildcards:

- The wildcard * can be used multiple times at any location of a filter value and represents 0-n characters or symbols.
- The wildcard % can be used multiple times at any location of a filter value and represents 0 or 1 characters or symbols.

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Servers

<https://aocavipa.boeblingen.de.ibm.com:9444/ibm/sa - Generated server url>

Templates

Service to access templates that are defined in the current active IBM Z System Automation policy. These templates can be used to create so called dynamic resource instances.

GET	/v1/templates	Find all templates defined in the loaded policy.	🔒
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Resources

Service to access resources currently managed by IBM Z System Automation. Resources are defined in the current active automation policy - and can be created dynamically following the definition in so called templates that are also defined in the current active automation policy.

GET	/v1/resources	Find all managed resources.	🔒
POST	/v1/resources	Create a new dynamic resource.	🔒
GET	/v1/resources/{resourceId}	Get a managed resource by its ID.	🔒
DELETE	/v1/resources/{resourceId}	Delete a dynamically created resource by its ID.	🔒
POST	/v1/resources/{resourceId}/start	Send a start request for a managed resource.	🔒

Authorize

Available authorizations

basicAuth (http, Basic)

Username:

Password:

Authorize Close

JWT (http, Bearer)

Value:

Authorize Close

Example Workflow

Z System Automation

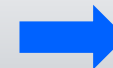
Find Template
by Name



Create dynamic
Resource from
template



Inspect created
Resource



Resume
Automation of
dynamic Resource

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

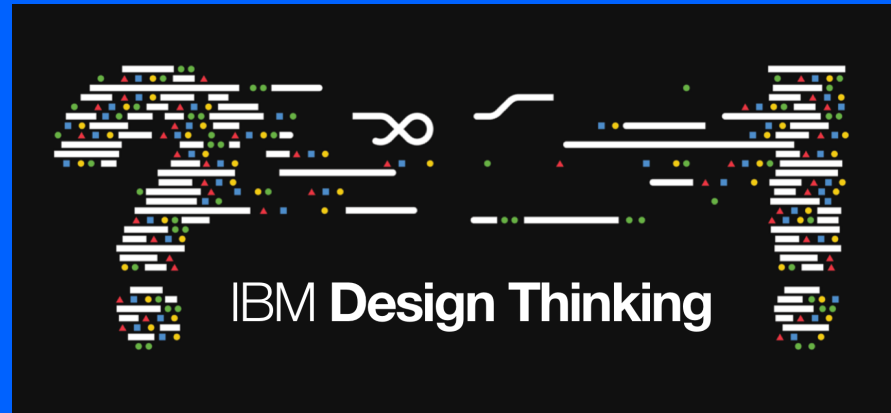


User Groups

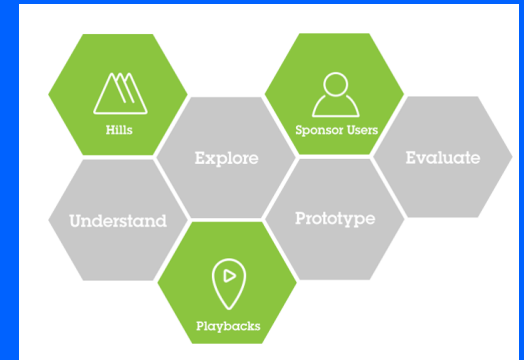


<http://groups.yahoo.com/group/SAUSERS/>

Sponsor Users



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



IBM Ideas

<https://ideas.ibm.com>



Thank You !