IBM z Systems
System Automation for z/OS
Processor Operations
System Automation for z/OS: Processor Operations

- SA Components
- SA z/OS Hardware Management (ProcOps)
- Usage scenarios – What is for?
- ProcOps capabilities
- LPAR Management
- LPAR Management scenarios
- SA SYSOPS vs. ProcOps
- Network options
- Configuration – Is it complex?
- Implementation – How to use?
- Ongoing New Hardware Support
- Alternatives – Why not other alternatives?
(*) SA for z/OS V3.5 is the last release supporting IOOPS
SA z/OS Hardware Management (ProcOps)

- **Processor Operations**
  - **z/VM PSM**
  - **SA BCPii**
  - **zEnterprise zBX**

SA z/OS Hardware Management

- ProcOps – full HW Automation
- PSM – z/VM Second Level support
- BCPii – main interface for GDPS
  - Subset of functions (called LPAR Management) is available for all customers.
- zEnterprise zBX – REST API support; not yet exploited (zBX EOM)
### Usage scenarios – what is for?

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<td>System Information</td>
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<td>Perform Model Conversion</td>
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<td>Activate</td>
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<td>Reset Normal</td>
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<td>Deactivate</td>
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<tr>
<td>Grouping</td>
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</tbody>
</table>

**Same console tasks supported as on the Hardware Management Console**
Usage scenarios – what is for?

SPOC HMC Automation

- re-IPL
- Manage LPARs
  - Weight, Capacity, Capping
- HW Monitoring
  - Alerts, Messages, Queries, Security log
- Manage Profiles
  - Image, Load, Group, Reset
- Server Time Protocol
- CBU, TCM, OOCOD
- Power Management
LPAR Management

Capacity onDemand
- TCDATA
  - CPCDATA
  - GETSDGR
  - GETSINFO
  - GETSSTAT

Query/Monitor
- GETIINFO
- GETISTAT
- GETITKN
- GETIPSW

Configure
- PROFILE
- CCNTL
- ICNTL
- GETCLUSTER

GDPS

Server Time
- STPDATA
LPAR Management

- HW Monitoring
  - CPCDATA & GETISTAT etc.

- Queries
  - STPDATA, TCDATA

- Profile management (Activation, Image)

- LPAR Weights, Capping, Power, ...

- ProcOps/LPAR management & GDPS coexistence
  - GDPS is MASTER

Example:

Query LPAR Weight for LPAR KEY7 on T99:

ISQCCMD T99.KEY7 ICNTL CMD(READ) VAR(PWC)
LPAR Management Scenarios: Automatic CPC & LPAR capacity changes

• **ProcOps Management API to:**
  - Query current CPC configuration details
  - Query and set LPAR-specific controls
  - Query and set the default CPC RESET activation profile
  - Manage RESET, IMAGE, GROUP and LOAD activation profiles
  - Automate IPLs from SCSI devices (Linux, z/VM)

• **Allows you to automate based on schedule, workload, application**
  - **LPAR weight (defined, initial, minimal, maximal, current (R/O))**
  - Defined capacity to lower your software costs
  - **Group capacity & Absolute Capping**
  - Reserve of CPC (or reserve query)
  - Switch between WLM and PR/SM management
  - IPL profiles for easier operations

• **Example: change LPAR settings:**

• **ISQCCMD target_system_ProcOps_name ICNTL target_hardware_name.lparname CMD(UPDATE) VAR(vnm) VAL(vvl)
LPAR Management scenarios: Capping and load distribution

Software cost challenges:
• Charges based on peak rolling 4 hour average or the LPAR Defined Capacity whichever is lower
• Capping might cap priority workload

Solutions using SA z/OS:
• Move workload to under-utilized system using server/move groups based on
  • Predicted free capacity and WLM data
  • Using OMEGAMON metrics
• Use ProcOps API to adjust capacity across LPARs and WLM capacity groups automatically
  • Absolute capping supported
  • Policy-based looping jobs resolution
SYSOPS

- Policy based
- SYSPLEX scope
- Run in NetView

PROCOPS

- Policy definitions
- Script based
- Enterprise scope
- Run in NetView
Network options – TCPIP (ProcOps connections)
Network configuration

- **ProcOps**
  - SNMP connection to HMC and/or SE
  - SNMP v2 and v3 are supported

- **PSM**
  - TCPIP connection to PSM
  - SA PSM – guest CMS program

- **BCPii**
  - Internal communication services (SCLP) to SE

- **zEnterprise**
  - HTTPS to Enterprise HMC Rest API
Configuration – is it complex?

- SE/HMC – enable SNMP API
  - For BCPii – cross-partition flag
    - LIC changes enable
    - All CPC defined on Master HMC
    - Allow Capacity Management

- NetView
  - PROCOPS Tower
  - AUTOOOPS
  - ISQSTART

- SA PDB
  - Processors
  - LPARs & Systems
  - HW Operators
  - Optional – IPL Automation
  - Optional – Alerts for HW Msgs
  - Optional – ProcOps START cmd

Note: BCPii started automatically!
### Processor Information

**Command ==>**

<table>
<thead>
<tr>
<th>Entry Type</th>
<th>Processor</th>
<th>PolicyDB Name</th>
<th>COSTOPT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Name</td>
<td>P57</td>
<td>Enterprise Name</td>
<td>ISQ_LTD</td>
</tr>
<tr>
<td>Processor Type</td>
<td>Mainframe</td>
<td>Processor Mode</td>
<td>LPAR</td>
</tr>
<tr>
<td>Connection Protocol</td>
<td>SNMP HTTP</td>
<td>(INTERNAL SNMP HTTP)</td>
<td></td>
</tr>
<tr>
<td>HW Resource Name</td>
<td>P57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Network Name</td>
<td>IBM390PS</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site/Location Name</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPAR Scope</td>
<td>DEFONLY</td>
<td>(ALL DEFONLY)</td>
<td></td>
</tr>
</tbody>
</table>

The following specifications are for **INTERNAL** processors only:
- Auth Token: 
- Connection Monitor Interval: (mm:ss NONE)

The following specifications are for **SNMP** processors only:
- Community Name: PROCOPS
- ProcOps Target HW Name: HP57
- SNMPv3: NO (YES NO)
- SNMPv3 User Name: 
- SNMPv3 Password: 
- IP Stack: 
- Activation Reset Profile: 
- Path Poll Option: CONN (CPC CONN)
- Path Poll Frequency: 30 (0 to 99 minutes)
- Path Poll Retries: 2 (0 to 99)
- Command Retries: 10 (0 to 99)
- Command Retry Wait Time: 1 (0 to 99 seconds)

At least one address must be specified:
- TCP/IP Address or Hostname: 9.152.88.11
- Alternate Address or Hostname: 9.152.93.21
SA z/OS LPAR Scope DEFONLY

Performance & CPU
- HW Validation
- Initialization
- CPCDATA

LPAR related commands and notifications

LPAR should be defined twice:
- PRO
- GDPS UET (GEOPLEX)

<table>
<thead>
<tr>
<th>Entry Type</th>
<th>Processor</th>
<th>PolicyDB Name</th>
<th>DEV35</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Name</td>
<td>T99</td>
<td>Enterprise Name</td>
<td>ISQ_LTD</td>
</tr>
<tr>
<td>Processor Type</td>
<td>Mainframe</td>
<td>Processor Mode</td>
<td>LPAR</td>
</tr>
</tbody>
</table>

**Connection Protocol**
- SNMP INTERNAL (INTERNAL SNMP HTTP)

**HW Resource Name**
- T99

**Network Name**
- IBM390OPS

**Site/Location Name**
- BB-Lab

**LPAR Scope**
- ALL (ALL DEFONLY)

The following specifications are for INTERNAL processors only:
- Auth Token: MSYSOPS
- Connection Monitor Interval: 30:00 (mm:ss NONE)

The following specifications are for SNMP processors only:
- Community Name: PROCOPS
- ProcOps Target HW Name: T99PRO
- SNMPv3 Target Mode: YES (YES NO)
- SNMPv3 User Name: YDRA Gun1
- SNMPv3 Password: SAFPW
- IP Stack: SAF0SR01
- Activation Reset Profile: SAF0SR01

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**LPAR Definitions**

<table>
<thead>
<tr>
<th>Action</th>
<th>LPAR Name</th>
<th>Target Mode</th>
<th>Target System Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KEY6</td>
<td>ESA</td>
<td>KEY6</td>
</tr>
<tr>
<td></td>
<td>KEY6CFF</td>
<td>CF</td>
<td>KEY6CFF</td>
</tr>
<tr>
<td></td>
<td>KEY6CF1</td>
<td>CF</td>
<td>KEY6CF1</td>
</tr>
<tr>
<td></td>
<td>KEY7</td>
<td>ESA</td>
<td>KEY7</td>
</tr>
<tr>
<td></td>
<td>LNXSA01</td>
<td>LINUX</td>
<td>LNXTO</td>
</tr>
<tr>
<td></td>
<td>VMTSA</td>
<td>ESA</td>
<td>BOEVMTSA</td>
</tr>
</tbody>
</table>
Security

• Support of Resource and Command authorization
  • All ISQ* commands can be protected by NV CAT
  • Granular access to target hardware using FACILITY class

HSA.ET32TGT.netid.nau

HSA.ET32TGT.netid.nau.lpar

READ: Retrieve, get configuration information from the CPC
WRITE: Update, set configuration information of the CPC
CONTROL: Issue operations management commands of the CPC

By giving operators READ access to a CPC resource and CONTROL access only to LPARS according to the business needs, a flexible security scheme can be implemented.

• TCPIP connections protected by SNMP v2 and v3 security
• BCPii transport protected by security profile

HSA.ET32AON.HSAET32
LPARSCOP = ALL
• No need to define LPARs in SA
• K-SYS will discover ALL PROD1...PROD72 LPARs
• CPCDATA will show 72 LPARs
• BCPii management available for ALL LPARs

LPAR SCOPE = DEFONLY
• SA PDB includes PROD1,2,3
• SA/K-SYS will discover only 3 PROD1...PROD3
• CPCDATA will show 3 LPARs
• BCPii management available only for 3 LPARs

Useful if multiple LPARs are not managed by GDPS or SA.
Implementation – how to use?

**ISQCCMD KEY7 CPCDATA**

**ISQCCMD KEY7 ACTIVATE CNAME(PROF01)**

**ISQSEND KEY7 OC D A,L**

```plaintext
mytgt = 'KEY4'  // our TGT system name //
’ISQCCMD ’mytgt’ PROFILE CMD(LIST) TYPE(LOAD)’  // Read profile //
If RC > 0 Then Do  // Error occurred //
End
Else Do  // All went well //
’PIPE KEEP ISQ.SNMP | CONS ONLY’  // ...display HW report//
End  // ...more to add //

ISQ901I T53.KEY7 SC AOFA0020 APROF SA02 STATUS(ACCEPTED) CPSCNAME...
ISQ901I T53.KEY7 SC AOFA0020 LOAD(DEFAULTLOAD)
...
ISQ901I T53.KEY7 SC AOFA0020 LOAD(ISQ0IPUFM)
ISQ901I T53.KEY7 SC AOFA0020 APROF REPORT COMPLETE
```
Implementation – how to use? - Console Panels

SDF

ISQX DST

ISQESUM  SA z/OS  - Proc-Ops Target Status Summary  Updates: Dynamic
Control file in use: BHOL.JHSAPLEX.V320.POCNTL  NMC Bridge: INACTIVE
I isqxiii C isqxcls O isqxopt A,B view netlogs E events  Debug Mode: OFF

Cmd  Target System  Status  Focal Points - Primary: IPXNG Backup:
___  BOEVM TSA (*)  INITI ALIZED
___  KEY A  INITI ALIZED
___  KEY B  INITI ALIZED
___  KEY 1  INITI ALIZED
___  KEY1CFF  INITI ALIZED
___  KEY1CF1  INITI ALIZED
___  KEY2  SNMP SESSION PROBLEM
___  KEY 6  INITI ALIZED
___  KEY6CFF  CLOSED
___  KEY6CF1  INITI ALIZED
___  KEY 7  IPL COMPLETE
___  LNX T1  UNKNOWN

Enter=Static  PF1=Help  PF3=Exit  PF4=Tgt Sys Summary  PF5=Debug On/Off
PF6=Roll  PF7=Up  PF8=Down  PF9=Tgt HW Summary  PF11=PATH Details  PF12=Quit

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## Built-in automation: IPL

<table>
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<tr>
<th>Command</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entry Type: System</td>
<td>PolicyDB Name: JHSAPLEX_V320</td>
</tr>
<tr>
<td>Entry Name: KEYA</td>
<td>Enterprise Name: ACME</td>
</tr>
</tbody>
</table>

Enter responses to the following messages for the target system.

- **IEA101A** specify system parameters
  - R 00,101A

- **IEA347A** specify master catalog parameter
  - R 00,347A

- **IEA213A** or **IEA214A** DUPLICATE VOLUME
  - 1111 2222

Provide default response when neither device is specified . . . YES

Hardware messages can be automated as any other message

IPL INFO Policy Item specifies responses for IPL

- Also supported for z/VM
• OA47967 – z13 GA1 Exploitation
  • Support for Absolute Capping
  • CPC Control Parameter Updates
  • IPL Token Detection
    • new GETITKN query
  • Last Used LOAD Information:
    • GETILDI query
  • HWMCA_EVENT_COMMAND_RESPONSE support
  • HWMSGDEL – delete HW Messages
  • Support for Keep-alive Firewall rules
  • and more…
• OA49543 – z13 GA2 Exploitation
  • Support for KVM on z System: PDB and run-time CPC Control
  • Support for new z System Appliance Container Infrastructure
    • Customization Dialog (PDB and run-time)
  • Hardware Common Command extensions for
    • STP, ICNTL, CCNTL, and PROFILE
  • Performance: HwmcaEnhancedGet/Set exploitation (*)

• and more...

(*) can be shipped with a different APAR later
Alternatives – why not other solutions?

**ProcOps vs HWIBCP II & Co:**

- Ease of use
- Integration with SA z/OS
- Integration with NetView Automation Tables
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Automation Control for z/OS: [Link to Automation Control Wiki]
Service Management Suite for z/OS: [Link to Service Management Suite Wiki]
IBM System z Community: [Link to IBM System z Community]

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[Link to IBM Automation Control for z/OS User Forum]
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*The purpose of this group is to discuss technical issues related to *IBM Tivoli System Automation for z/OS* with your peers.*