Ensemble Enabling z/VM and Linux for System z

Richard Young
IBM STG Lab Services

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Agenda

- Quick review what an Ensemble is composed of
- z/VM Ensemble Components
- Virtual Switch Controllers
- DIRMAINT authorizations
- Enable SMAPI Servers
- Validating the Enablement
- Linux Ensemble Considerations
**zEnterprise Ensemble**

- A zEnterprise node is a single zCEC with 0 to 4 zBX frames and up to two blade centers per frame.
- A zEnterprise Ensemble is a collection of 1 to 8 zEnterprise Nodes managed as a single virtualized pool of server resources.
- A zEnterprise node can be a member of a single ensemble.
- An ensemble is the management scope for the Unified Resource Manager.
- A primary / alternate pair of HMCs provide the management console for the ensemble.
Enhancements for the Unified Resource Manager

• **Software**
  - Supported SLES and RHEL distributions
    - Optional - Guest Platform Management Provider
    - IEDN/INMN (OSX/OSM) NIC support
    - Legacy NIC connection to IEDN or INMN via virtual switch (OSDSIM support)
  - **z/VM 6.1**
    - z/VM Management Guest – ZVMLXAPP
    - z/VM SMAPI enhancements
    - z/VM Directory Maintenance server (or equivalent)
    - INMN and IEDN virtual switch controllers
    - Control point for MAC assignment and VLAN access
Enhancements for the Unified Resource Manager

• z/VM 6.1 Continued…

  • INMN and IEDN access provided via new z/VM virtual switch types
    • Up-link can be virtual machine NIC (for Management Guest)
    • Automatic connection to INMN
    • Ensemble membership enforce Ensemble MAC for each IEDN NIC
  • SMAPI validates and updates SYSTEM CONFIG
  • z/VM is authoritative source of virtual machine state
    • State automatically reflected in Unified Resource Manager
z/VM System Management APIs

• As part of the support for the IBM zEnterprise Unified Resource Manager, new SMAPI servers were also created:
  • AF_MGMT request server – Used to communicate between the SE and SMAPI
  • INET6 request servers – Use IPv6 to connect with clients
  • VSMGUARD worker server – Guard server to provide resiliency and error recovery
  • Management Guest (ZVMLXAPP) – Automatic instantiation by the Unified Resource Manager
• New Systems Management APIs added
z/VM SMAPI Servers

- **VSMGUARD**  The VSMGUARD server is a new worker server that provides better resiliency and error recovery. You start this server and it automatically start the remaining SMAPI servers and management guest. Unlike the worker servers, VSMGUARD does not process any request.

- **VSMREQIM**  The VSMREQIM is a AF_MGMT request server. The AF_MGMT request server is used to communicate between the support element and the z/VM SMAPI server environment, only when z/VM is managed by the Unified Resource Manager. There can be one and only one AF_MGMT request server.

- **VSMREQI6**  VSMREQI6 is the AF_INET6 request server. This server handles requests over the IPV6 sockets.

- **VSMREQIN**  VSMREQIN is the AF_INET request server. This server handles request over the IPV4 sockets.

- **VSMPROXY**  VSMPROXY is the AF_SCLP request server. This server is used for communication between the support element and the z/VM SMAPI server environment. There can be one and only one AF_SCLP server.
z/VM SMAPI Servers & Management Guest

- **VSMREQIU**  
  VSMREQIU is the AF_IUCV request server. There can be one or more AF_IUCV request servers.

- **VSMWORK1**  
  VSMWORK1 is the short call request server. It is one of the three default worker servers. There must always be at least one short call worker server. The default SFS directories are owned by the “short call” request server VSMWORK1.

- **VSMWORK2**  
  VSMWORK2 is a long call request server. This is the one of two long call request servers. If all the request servers are busy, the request will be queued until on becomes available.

- **VSMWORK3**  
  VSMWORK3 is a long call request server. This is the one of two long call request servers. If all the request servers are busy, the request will be queued until on becomes available.

- **ZVMLXAPP**  
  ZVMLXAPP is a the new Management Guest. The Management Guest is automatically instantiated by the Unified Resource Manager. It is also part of the INMN network communication past to Linux guest.
z/VM Ensemble Management (INMN) Infrastructure
z/VM Ensemble IEDN Infrastructure Options

ISOLATE = Optional

10 GbE Wrap Plugs
Required if no zBX!
Preparation for Enabling z/VM

• References
  • CP Planning and Admin Guide (SC24-6178-01) Chapter 16 for all the detailed installation steps
  • z/VM System Management Application Programming (SC24-6234-01)

• Software
  • zVM 6.1, current RSU, + VM64822, VM64904, VM64917, VM64956, VM64957
  • Check zVM prereq URL for the latest list
    • http://www.vm.ibm.com/service/vmrequrm.html
  • System z bundle 41z or higher

• Hardware
  • OSX and OSM CHPIDs genned and cabled
Validate OSX/OSM devices are available

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<th>OSA</th>
<th>Type</th>
<th>Ensemble</th>
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</table>
Validate OSX/OSM devices are available

Continued ...

OSA 2340 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2341 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2342 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2343 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2344 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2345 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2346 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2347 OFFLINE DEVTYPE INMN CHPID 0A OSM
OSA 2348 OFFLINE DEVTYPE INMN CHPID 0A OSM
Setup IEDN & INMN VSWITCH Controllers

- Steps
  - Add directory entries
  - Format 191 “a” disks
  - Copy PROFILE EXEC from TCPMAINT
  - Define “server” configuration files on TCPMAINT for the controllers
  - Update obeyfile authorizations
DTCENS1 Directory Entry

00001 USER DTCENS1 NEWPASS 32M 128M BG

00019 MDISK 191 3390 161 5 LX4U1R MR READ WRITE MULTIPLE
**DTCENS2 Directory Entry**

<table>
<thead>
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<th>00001 USER DTCENS2</th>
<th>NEWPASS</th>
<th>32M 128M G</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>00010 MDISK 191 3390 166 5 LX4U1R MR READ WRITE MULTIPLE</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Configure DIRMAINT Authorizations
DIRMAINT AUTHFOR CONTROL Additions

ALL VSMWORK1 * 140A ADGHMOPS
ALL VSMWORK1 * 150A ADGHMOPS
ALL VSMWORK2 * 140A ADGHMOPS
ALL VSMWORK2 * 150A ADGHMOPS
ALL VSMWORK3 * 140A ADGHMOPS
ALL VSMWORK3 * 150A ADGHMOPS
ALL VSMGUARD * 140A ADGHMOPS
ALL VSMGUARD * 150A ADGHMOPS
ALLOW_ASUSER_NOPASS_FROM= VSMWORK1 *
ALLOW_ASUSER_NOPASS_FROM= VSMWORK2 *
ALLOW_ASUSER_NOPASS_FROM= VSMWORK3 *
ALLOW_ASUSER_NOPASS_FROM= VSMGUARD *
Enabling z/VM SMAPI and Manage Guest Server

• Ensemble_Port = “55555” needs to be added to DMSSICNF COPY file on MAINTS 193
• Add the VSMREQI6, VSMREQIM, ZVMMAPLX, and VSMGUARD directory entries
• Propagate sample PROFILE EXEC (VSMREQIN SAMPPROF) to the request servers (VSMREQIN, VSMREQI6, VSMREQIU, VSMPROXY, VSMREQIM)
• Propagate sample PROFILE EXEC (VSMWORK1 SAMPPROF) to Guard and Worker Servers (VSMGUARD, VSMWORK1, VSMWORK2, VSMWORK3)

• IMPORTANT! – You need to replace existing PROFILE EXECs with the updated version
ZVMMAPLX Directory Entry

00001 USER ZVMLXAPP NEWPASS 1024M 2048M G
00002 COMMAND SET D8ONECGMD * OFF
00003 COMMAND SET RUN ON
00004 COMMAND TERM LINEND #
00005 CMD SET VSWITCH DTCINMN GRANT ZVMLXAPP OSDSIM ON
00006 CMD DEFINE VSWITCH SW2 TYPE INMN ETHERNET
00007 CMD SET VSWITCH SW2 GRANT ZVMLXAPP OSDSIM ON
00008 CMD SET VSWITCH SW2 UPLINK NIC ZVMLXAPP 200
00009 CMD DEFINE NIC 100 TYPE QDIO
00010 CMD DEFINE NIC 200 TYPE QDIO
00011 CMD COUPLE 100 TO SYSTEM DTCINMN
00012 CMD COUPLE 200 TO SYSTEM SW2
00013 COMMAND SPOOL CONS START *

00028 MDISK 0191 3390 2325 010 LX4W02 MR
Enabling z/VM … Next steps

- Install TCP DATA on A disk of AF_MGMT server (VSMREQIM)
- Update the TCP DATA to point to DTCENS1
- Authorize Management Guest (ZVMMAPLX) and VSMPROXY to perform all SMAPI functions
Authorize the Management Guest

1. Logon to the VSMWORK1 guest
2. Issue the following commands
3. #CP IPL CMS
4. acc (noprof
5. set filepool VMSYS
6. access VMSYS:VSMWORK1. B
7. xedit vsmwork1 authlist B
Authorize the Management Guest

======= * * * Top of File * * *
|...+....1....+....2....+....3....+....4....+....5....+....6....+....7...
======= DO.NOT.REMOVE
DO.NOT.RE
MOVE
======= MAINT
       ALL
======= VSMPROXY
       ALL
======= ZVMLXAPP
       ALL
======= * * * End of File * * *
=======>
Authorize the Management Guest

- 8. Repeat the VMSPROXY line and add ZVMLXAPP as shown
- 9. Issue the “file” subcommand to save the changes
- 10. Issue #CP IPL CMS to restart VSMWORK1
- 11. Issue #CP DISCONNECT
- Note: It is suggested to repeat an existing line in the file and alter the server name
Enabling z/VM … Next steps

- Update DMSSISVR NAMES as a local modification using the “automated local modification procedure”
- Issue enrolls and grants for VSMGUARD
- Authorize VSMGUARD as an ADMIN in DMSPARMS for VMSERVS 191
- Enroll VSMWORK and Request servers
z/VM Local Modification

- z/VM Guide for Automated Installation and Service - Appendix D
- Begin by ensuring the MAINT 512 disk is accessed as the D disk
- Next issue: `localmod CMS DMSISVR NAMES`
- Ensure all 13 entries shown in the CP Planning & Admin Guide Chapter 16 are merged in to the file

* Default AF_INET Server
* AF_INET6 Server
* Default AF_IUCV Server
* Default AF_SCLP Server
* Management Network Server
* Management Guest
* Guard Server
* Default Short Call Server
* Default Long Call Server 1
* Default Long Call Server 2
* Primary Vswitch Controller
* Backup Vswitch Controller
* Directory Manager
z/VM Local Modification

- After saving the changes
- Run: service CMS build
- When complete run: put2prod
Enroll & Grant VSMGUARD

- ENROLL USER VSMGUARD VMSYS:

- GRANT AUTHORITY VMSYS:VSMWORK1. TO VSMGUARD (WRITE NEWWRITE

- GRANT AUTHORITY VMSYS:VSMWORK1.DATA TO VSMGUARD (WRITE NEWWRITE

- GRANT AUTHORITY * * VMSYS:VSMWORK1.DATA TO VSMGUARD (WRITE

- GRANT AUTHORITY * * VMSYS:VSMWORK1. TO VSMGUARD (READ
VSMGUARD ADMIN authority in DMSPARMS

- On VMSERVS 191 minidisk

00000 * * * Top of File * * *
00001 ADMIN MAINT 6VMTCP10 VSMGUARD
00002 NOBACKUP
00003 SAVESEGID CMSFILES
00004 FILEPOOLID VMSYS
00005 USERS 100
00006 * * * End of File * * *
Enrolling Request and Worker Servers

- enroll user vsmreqin vmsys:
- enroll user vsmreqi6 vmsys:
- enroll user vsmreqiu vmsys:
- enroll user vsmproxy vmsys:
- enroll user vsmreqim vmsys:
- enroll user vsmwork1 vmsys:
- enroll user vsmwork2 vmsys:
- enroll user vsmwork3 vmsys:
How to operate this new infrastructure?

- To start the SMAPI servers, XAUTOLOG VSMGUARD
- To automate, add it to the PROFILE EXEC of AUTOLOG1 or AUTOLOG2
- VSMGUARD will start the SMAPI servers and the Management Guest will start automatically.
- Do NOT add the new vswitch controllers to your AUTOLOGx or other automation, they will be automatically started when the management guest starts.
- ZVMLXAPP can be restarted via zManager
Validating the configuration

```
q vmlan
VMLAN maintenance level:
    Latest Service: VM64780
VMLAN MAC address assignment:
    System MAC Protection: OFF
    MACADDR Prefix: 020000 USER Prefix: 020000
    MACIDRANGE SYSTEM: 000001-FFFFFF
    USER: 000000-000000
VMLAN Unified Resource Manager status:
    Hypervisor Access: YES Status: MANAGED
    ID: 52BD737254BF11E0B85A0010184CB262
    MAC Prefix: 023C90
VMLAN default accounting status:
    SYSTEM Accounting: OFF USER Accounting: OFF
VMLAN general activity:
    PERSISTENT Limit: INFINITE Current: 5
    TRANSIENT Limit: INFINITE Current: 0
    Ready: T=0.01/0.01 16:19:45
```
Validating the configuration

```
q vswitch dtcinmn
VSWITCH SYSTEM DTCINMN  Type: INMN  Connected: 2  Maxconn: INFINITE
              PERSISTENT  RESTRICTED    ETHERNET           Accounting: OFF
VLAN Unaware
MAC address: 02-3C-90-00-00-01  MAC Protection: Unspecified
State: Ready
IPTTimeout: 5    QueueStorage: 8
Isolation Status: ON
Uplink Port:
RDEV: 236D.P00  VDEV: 236D  Controller: DTCENS1
RDEV: 234D.P00  VDEV: 234D  Controller: DTCENS1  BACKUP
```
Validating the configuration

```
q vswitch sw2
VSWITCH SYSTEM SW2 Type: INMN Connected: 1 Maxconn: INFINITE
PERSISTENT RESTRICTED ETHERNET Accounting: OFF
VLAN Unaware
MAC address: 02-3C-90-00-00-03 MAC Protection: Unspecified
State: Ready
IPTimeout: 5 QueueStorage: 8
Isolation Status: ON
Uplink Port:
NIC: ZVMLXAPP VDEV: 0200
```
Validating the configuration

q controller
Controller DTCVSW2  Available: YES  VDEV Range: *  Level 610
  Capability: IP ETHERNET VLAN_ARP GVRP  LINKAGG  ISOLATION
    NO_ENSEMBLE  NO_INMN
SYSTEM VSWITCH1  Primary  Controller: <list>  VDEV: 2100
Controller DTCVSW1  Available: YES  VDEV Range: *  Level 610
  Capability: IP ETHERNET VLAN_ARP GVRP  LINKAGG  ISOLATION
    NO_ENSEMBLE  NO_INMN
SYSTEM VSWITCH1  Backup  Controller: <list>  VDEV: 2120
Controller DTCENS1  Available: YES  VDEV Range: *  Level 610
  Capability: IP ETHERNET VLAN_ARP GVRP  LINKAGG  ISOLATION
    ENSEMBLE  INMN
SYSTEM DTCINMN  Primary  Controller: DTCENS1  VDEV: 236D
SYSTEM DTCINMN  Backup  Controller: DTCENS1  VDEV: 234D
Controller DTCENS2  Available: YES  VDEV Range: *  Level 610
  Capability: IP ETHERNET VLAN_ARP GVRP  LINKAGG  ISOLATION
    ENSEMBLE  NO_INMN
Validating your configuration

```sql
q auth vmsys:vsmwork1.
```

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Grantee</td>
<td>R</td>
</tr>
<tr>
<td>MAINT</td>
<td>X</td>
</tr>
<tr>
<td>VSMWORK1</td>
<td>X</td>
</tr>
<tr>
<td>VSMGUARD</td>
<td>X</td>
</tr>
<tr>
<td>VSMPROXY</td>
<td>X</td>
</tr>
<tr>
<td>VSMREQIM</td>
<td>X</td>
</tr>
<tr>
<td>VSMREQIN</td>
<td>X</td>
</tr>
<tr>
<td>VSMREQIU</td>
<td>X</td>
</tr>
<tr>
<td>VSMREQI6</td>
<td>X</td>
</tr>
<tr>
<td>VSMWORK2</td>
<td>X</td>
</tr>
<tr>
<td>VSMWORK3</td>
<td>X</td>
</tr>
</tbody>
</table>
Validating your configuration

```sql
q auth vmsys:vsmwork1.data.

Directory = VMSYS:VSMWORK1.DATA

Grantee   R  W  NR  NW
MAINT     X  X  X  X
VSMWORK1  X  X  X  X
VSMGUARD  X  X  X  X
VSMPROXY  X  X  X  X
VSMREQIM  X  X  X  X
VSMREQIN  X  X  X  X
VSMREQIU  X  X  X  X
VSMREQI6  X  X  X  X
VSMWORK2  X  X  X  X
VSMWORK3  X  X  X  X
```
Validating your configuration

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<th>Foreign Socket</th>
<th>State</th>
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</thead>
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<td>*.*TELNET</td>
<td><em>.</em></td>
<td>Listen</td>
<td></td>
</tr>
<tr>
<td>INTCLIE1 1007</td>
<td>9.12.4.189..TELNET</td>
<td>9.76.158.39..50358</td>
<td>Established</td>
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<td><em>.</em></td>
<td>Listen</td>
<td></td>
</tr>
<tr>
<td>VSM.Proxy 1003</td>
<td>*.*55555</td>
<td><em>.</em></td>
<td>Listen</td>
<td></td>
</tr>
</tbody>
</table>

<table>
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<th>Conn</th>
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<tbody>
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<tr>
<td></td>
<td>Local Socket: *.*44445</td>
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</tr>
<tr>
<td></td>
<td>Foreign Socket: <em>.</em>*</td>
<td></td>
</tr>
</tbody>
</table>
Validating your configuration
Validating your configuration

- The IPV6 IP address will display when the management guest is activated and zVM is part of the Ensemble
Implementation Tips

• Existing SMAPI servers need their existing PROFILE EXECs updated

• You can NOT manually define via CP commands an IEDN vswitch and attach to a guest. This must happen via zManager

• z/VM Ensemble configuration and logging in VMSYS file system. Back it up with the rest of your system.

• Resources must work without zManager if they are going to work with zManager. (ie FCP devices must be able to access LUNs without zManager if they are going to be able to do it with zManager)

• Console output from VSMGUARD, VSMWORK1, and VSMREQIU can hold clues if you have trouble.
Implementation Tips

• If you vary all devices offline in the SYSTEM CONFIG and then vary on only the ones you know about, zManager defined FCP devices could be a problem. You may want to have a predefined range of devices for this.

• zManager is not a RACF security administration application. DIRMAINT actions driven by zManager can still invoke the DIRMAINT RACF interface.

• If ZVMLXAPP does not start, the other SMAPI service machines will not be started.
Once setup, Possible Next Steps

- Define IEDN Virtual Switches via Unified Resource Manager
- Define disk storage resources in the Unified Resource Manager
- Define virtual server containers for Linux guests or migrate existing guest
- Manage guest resources via Unified Resource Manager
Managing guest priorities from zManager

- Only one resource manager at a time
  - If you are managing a guest with VMRM don’t enable zManager to also manage its resources at the same time
  - Enable one or the other, not both
Ensemble Enabling Linux on System z Guests
Linux considerations for residing in an Ensemble

- Native OSX interfaces are supported by the more recent kernel levels (RHEL 6.1, SLES 10 SP3, SLES 11 SP1).
- Keep this in mind when installing, you won’t find that OSX OSA, unless the kernel has OSX support.
- Might need to add a udev entry for OSX devices.
- Utilize OSDSIM support when you can’t get to the latest kernel level.
- If your Linux network configuration contains a MAC, remove it.
  - The ensemble could assign a different MAC next time.
  - If that macs don’t match, you won’t be able to communicate.
OSX Interface Defined to Virtual Server

Virtual Server Details - LBSZWAS2 [SCZP301:A12:VMLINUX9]

Network Prefix: 02:3c:90:00:00:00/24

Network Adapters:

<table>
<thead>
<tr>
<th>Select</th>
<th>Virtual Device Count</th>
<th>Device Type</th>
<th>Switch</th>
<th>Port Mode</th>
<th>Network</th>
<th>VLAN IDs</th>
<th>CHIPID</th>
<th>Real Device</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td>OSX</td>
<td>IEDN250</td>
<td>Access</td>
<td>LBS VLAN 250</td>
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</table>

Total: 1
Installer Boot With OSX Interface

• The SLES 11 SP1 Installer System will NOT find an OSX interface

• Install with OSD Interface and add or convert existing after supporting kernel level is in place
Boot with same interface defined as OSD

If the Network Adapter is redefined as OSD instead of OSX (Utilizing OSDSIM) the OSA devices are discovered
Layer 2 MAC Address

- The layer 2 MAC address can be automatically recorded in the `/etc/sysconfig/network` scripts when the interface is configured.
- The virtual MAC assigned to the guest by the Unified Resource Manager may change.
- Remove the LLADDR entry from your IEDN interfaces.
- An update to Linux should be available to correct this behavior.
Sample script with MAC coded

16:00:40 cat ifcfg-eth0
16:00:41 BOOTPROTO='static'
16:00:41 IPADDR='172.27.250.7/24'
16:00:41 BROADCAST='172.27.250.255'
16:00:41 STARTMODE='onboot'
16:00:41 LLADDR='02:3c:90:00:00:0e'
16:00:41 NAME='OSA Express Network card (0.0.0600)'
16:00:41 lbxzwas1:/etc/sysconfig/network #
The LLADDR can be removed

16:03:56 cp ifcfg-eth0 backup-ifcfg-eth0
16:03:56 lbxzwas1:/etc/sysconfig/network # 16:04:36 sed '/LLADDR/d' backup-ifcfg-eth0 > ifcfg-eth0
16:04:36 sed '/LLADDR/d' backup-ifcfg-eth0 > ifcfg-e <work # sed '/LLADDR/d' backup-ifcfg-eth0 > ifcfg-et
16:04:36 lbxzwas1:/etc/sysconfig/network #
Desired Script with LLADDR Removed

```
16:05:04 cat ifcfg-eth0
16:05:05 BOOTPROTO='static'
16:05:05 IPADDR='172.27.250.7/24'
16:05:05 BROADCAST='172.27.250.255'
16:05:05 STARTMODE='onboot'
16:05:05 NAME='OSA Express Network card (0.0.0600)'
16:05:05 lbxzwas1:/etc/sysconfig/network #
```
Migrating an Existing Virtual Server

• You could either create new guest containers and copy or point them at existing disk storage
• Or you can migrate them directly to be “Managed” by the Unified Resource Manager
• You do NOT have to migrate all guests. You may chose to just migrate the ones you want.
Migrating an Existing Virtual Server

Hardware Management Console

Virtual Server Details

- Ensemble Management > ITSO Ensemble > Members > SCZP301

Virtual Servers | Hypervisors | Blades | Topology

<table>
<thead>
<tr>
<th>Select</th>
<th>Name</th>
<th>Status</th>
<th>Processors</th>
<th>Memory (MB)</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A02</td>
<td>Operating</td>
<td></td>
<td></td>
<td>z/VM</td>
</tr>
<tr>
<td></td>
<td>A12</td>
<td>Operating</td>
<td></td>
<td></td>
<td>z/VM</td>
</tr>
<tr>
<td></td>
<td>A17</td>
<td>Operating</td>
<td></td>
<td></td>
<td>z/VM</td>
</tr>
<tr>
<td></td>
<td>B.1.01</td>
<td>Operating</td>
<td></td>
<td></td>
<td>PowerVM</td>
</tr>
<tr>
<td></td>
<td>B.1.02</td>
<td>Operating</td>
<td></td>
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<td>PowerVM</td>
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<td>B.1.03</td>
<td>Operating</td>
<td></td>
<td></td>
<td>PowerVM</td>
</tr>
</tbody>
</table>

Tasks: A12
- Image Details
- Toggle Lock
- Daily

Configuration:
- Choose z/VM Virtual Servers to Manage
  - Manage Storage Resources
  - Manage Virtual Switches
  - New Virtual Server

- Recovery
- Service
Migrating an Existing Virtual Server

Choose z/VM Virtual Machines to Manage - SCZP301:A12

Select or deselect the z/VM virtual machines that are to be managed by this console.

- GSKADMIN
- IBMUSER
- iMAP
- IMAPAUTH
- LBSOV5
- LBSZWS1
- LBSZWS2
- LBSZWS3
- LDAPSRV
- LGLOPR
- LNMXINT
- LPSERVE
- MAINT
- MIGMAINT
- MONWRITE
- MROUTE
- NAMESRV
- NDBPMGR
- NDBSERVER01
- NOBODY
- OR1

Page 1 of 1  Total 125  Filtered 125  Displayed 125  Selected 4

[Diagram showing a list of virtual machines with options to select or deselect]
Migrating an Existing Virtual Server

Choose z/VM Virtual Machines to Manage - SCZP301:A12

Select or deselect the z/VM virtual machines that are to be managed by this console.

<table>
<thead>
<tr>
<th>Select</th>
<th>Virtual Machine Name</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GSKADMIN</td>
</tr>
<tr>
<td></td>
<td>IBMUSER</td>
</tr>
<tr>
<td></td>
<td>IMAP</td>
</tr>
<tr>
<td></td>
<td>IMAPAUTH</td>
</tr>
<tr>
<td></td>
<td>LBSOVS</td>
</tr>
<tr>
<td></td>
<td>LBSZWAS1</td>
</tr>
<tr>
<td></td>
<td>LBSZWAS2</td>
</tr>
<tr>
<td></td>
<td>LBSZWAS3</td>
</tr>
<tr>
<td></td>
<td>LDAPSRV</td>
</tr>
<tr>
<td></td>
<td>LGLOPR</td>
</tr>
<tr>
<td></td>
<td>LNXMNT</td>
</tr>
<tr>
<td></td>
<td>LPSERVE</td>
</tr>
<tr>
<td></td>
<td>MAINT</td>
</tr>
<tr>
<td></td>
<td>MIGMAINT</td>
</tr>
<tr>
<td></td>
<td>MONWRITE</td>
</tr>
<tr>
<td></td>
<td>MPROUTE</td>
</tr>
<tr>
<td></td>
<td>NAMESRV</td>
</tr>
<tr>
<td></td>
<td>NDBPMGR</td>
</tr>
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<td></td>
<td>NDBSRV01</td>
</tr>
<tr>
<td></td>
<td>NOBODY</td>
</tr>
</tbody>
</table>

Page 1 of 1  Total: 125  Filtered: 125  Displayed: 125  Selected: 5
# Migrating an Existing Virtual Server

## Hardware Management Console

### Ensemble Management > ITSO Ensemble > Members > SCZP301

<table>
<thead>
<tr>
<th>Select</th>
<th>Name</th>
<th>Status</th>
<th>Processors</th>
<th>Memory (MB)</th>
<th>Type</th>
<th>Auto Start</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A02</td>
<td>Operating</td>
<td></td>
<td></td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td>✔️</td>
<td>A12</td>
<td>Operating</td>
<td></td>
<td></td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LECOV3</td>
<td>Operating</td>
<td>1</td>
<td>1,500</td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LECZWAS1</td>
<td>Not Activated</td>
<td>1</td>
<td>1,500</td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LECZWAS2</td>
<td>Not Activated</td>
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<td>1,500</td>
<td>z/VM</td>
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<tr>
<td></td>
<td>LECZWAS3</td>
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<td>1,500</td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LZXMWNT</td>
<td>Not Activated</td>
<td>1</td>
<td>1,024</td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>A17</td>
<td>Operating</td>
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<td></td>
<td>z/VM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.1.01</td>
<td>Operating</td>
<td>6</td>
<td>32,768</td>
<td>PowerVM</td>
<td></td>
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<tr>
<td></td>
<td>B.1.02</td>
<td>Operating</td>
<td>6</td>
<td>32,768</td>
<td>PowerVM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.1.03</td>
<td>Operating</td>
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<td>32,768</td>
<td>PowerVM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>B.1.04</td>
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<td>32,768</td>
<td>PowerVM</td>
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</tr>
<tr>
<td></td>
<td>B.1.05</td>
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<td>32,768</td>
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</tr>
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<td>Operating</td>
<td>8</td>
<td>32,768</td>
<td>PowerVM</td>
<td></td>
</tr>
</tbody>
</table>

Max Page Size: 90  Total: 14  Filtered: 14  Selected: 1
Migrating an Existing Virtual Server

Once a guest is known to the Unified Resource Manager as a Virtual Server, you can change its configuration from the Unified Resource Manager.
When migrated this guest had no NICs defined to it, so we will add two of them via the Unified Resource Manager.
Migrating an Existing Virtual Server

### Virtual Server Details - LBSZWAS3 [SCZP301:A12:VMLINUX9]

<table>
<thead>
<tr>
<th>Name</th>
<th>Status</th>
<th>Processors</th>
<th>Memory</th>
<th>Network</th>
<th>Storage</th>
<th>Options</th>
<th>Workloads</th>
<th>Performance</th>
</tr>
</thead>
</table>

**Network**

- **MAC Prefix:** 02:3c:90:00:00:00/24

#### Network Adapters:

<table>
<thead>
<tr>
<th>Select</th>
<th>Virtual Device</th>
<th>Device Count</th>
<th>Type</th>
<th>Switch</th>
<th>Port Mode</th>
<th>Network</th>
<th>VLAN IDs</th>
<th>CHIPID</th>
<th>Real Device</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>600</td>
<td>3</td>
<td>OSD</td>
<td>IEDN250</td>
<td>Access</td>
<td>LBS VLAN 250</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>700</td>
<td>3</td>
<td>OSX</td>
<td>IEDN251</td>
<td>Access</td>
<td>LBS VLAN 251</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Total:** 2

- **Add**
- **Edit**
- **Remove**

- **Manage Virtual Networks**
The Guest Platform Management Provider

- Provides more detailed level performance data from the guest operating system
- Connects to the INMN
- Optional, but is required if you want to feed Application Response Measurement data (ARM) to the zManager
- Is provided via the zManager code stream
Enabling INMN on Linux for System z

In order to support the Guest Platform Management Provider, a resource monitoring and control network device will be added to this virtual server.

Device: 1000
Count: 3
Type: RMC

[Add RMC Device dialog]

Remember we do not want to code a MAC address in the configuration files. The Ensemble could assign a different virtual MAC the next time this guest is started. Communications would fail if we tried to assign a different MAC.
Enabling INMN on Linux for System z

• Utilize “Zeroconf” to dynamically assign the IP address
• The assignment is made by the Ensemble
Validating INMN on Linux for System z

eth3  Link encap:Ethernet  HWaddr 02:D2:DB:00:00:37
inet addr:169.254.250.130  Bcast:169.254.255.255  Mask:255.255.0.0
inet6 addr: fe80::d2:dbff:fe00:37/64 Scope:Link
UP BROADCAST RUNNING MULTICAST  MTU:1492  Metric:1
RX packets:0  errors:0  dropped:0  overruns:0  frame:0
TX packets:11  errors:0  dropped:0  overruns:0  carrier:0
collisions:0  txqueuelen:1000
RX bytes:0 (0.0 b)  TX bytes:678 (678.0 b)
Validating INMN on Linux for System z

SCZP301:A17 Details - SCZP301:A17

Instance Information
Acceptable Status
Hypervisor Information

Description:

Virtual Server shutdown timeout (seconds): 300

Management Guest IPv6 Address: fe80:0:0:0:d2:dbff:fe00:17

Apply  Change Options...  Cancel  Help
Validating INMN on Linux for System z

Here we ping the IPV6 address of the management guest (ZVMLXAPP) from the previous slide.

The INMN interface is also coded on this ping.
Enabling the GPMP on Linux for System z

The installation of the GPMP rpm is performed by retrieving the code from the Management Guest.

```
wass1:~ # rpm -ivh http://[fe80:0:0:0:d2:dbff:fe00:17%eth3]:80/gpmp.s390x.rpm
Retrieving http://[fe80:0:0:0:d2:dbff:fe00:17%eth3]:80/gpmp.s390x.rpm
Preparing...                                        # [100%]
Making group ibmlarm
Creating user ibmlarm with default group ibmlarm
Making group ibmgpmp
Creating user ibmgpmp with default group ibmgpmp
Adding user ibmgpmp to group ibmlarm
Running ldconfig to set up ARM libraries... Done with ldconfig.
Fixing permissions
chown ibmgpmp:ibmgpmp /opt/ibm/gpmp
chmod 555 /opt/ibm/gpmp
```
Enabling the GPMP on Linux for System z

Adding the gpmpcheck process to crontab for user ibmgpmp.

Note: Run /opt/ibm/gpmp/post-install-config to grant permissions to other users to access GPMP and ARM components. Currently, only the ibmgpmp user has all the necessary access permissions.
Enabling the GPMP on Linux for System z

- The gpmp is started with the ibmgpmp userid
- The second command will cause it to “autostart” on subsequent IPLs
- You can not start the GPMP under the root userid
Enabling the GPMP on Linux for System z
Enabling ARM, WebSphere on Linux for System z

wasql:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin # /opt/ibm/gpmp/post-install-config

GPMP configuration:
Default GPMP owner: ibmgpmp
Default GPMP group: ibmgpmp
Default ARM owner: ibmlarm
Default ARM group: ibmlarm

You can change these values by specifying different answers below.
In addition, you can add additional users to the above named groups.

Default user for GPMP processes? [ibmgpmp]
Default group for GPMP access? [ibmgpmp]
Users to be granted access to GPMP? (comma separated) []
Default owner for Lightweight ARM shared memory? [ibmlarm]
Default group for access to Lightweight ARM data? [ibmlarm]
Users to be granted access to ARM data? (comma separated) [] root

About to change GPMP configuration:
Default GPMP owner: ibmgpmp
Default GPMP group: ibmgpmp
Additional users granted access to GPMP:
Default ARM owner: ibmlarm
Default ARM group: ibmlarm
Additional users granted access to ARM: root

Is this okay? [default is NO] yes
Proceeding with re-configuration.

Adding user root to group ibmlarm

Note: If any of the users you listed have active sessions, they will need to log out and back in for the changes to take effect.
Enabling ARM, WebSphere on Linux for System z

### Application servers

**Application servers > server1 > Process definition > Java Virtual Machine > Custom properties**

Use this page to specify an arbitrary name and value pair. The value that is specified for the name and value pair is a string that can set internal system configuration properties.

<table>
<thead>
<tr>
<th>Name</th>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>com.ibm.security.jgss.debug</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>com.ibm.security.krb5.Krb5Debug</td>
<td>off</td>
<td></td>
</tr>
<tr>
<td>com.ibm.websphere.pmi.regmetrics.PassCorrelatorToDB</td>
<td>true</td>
<td></td>
</tr>
<tr>
<td>ws.ext.dirs</td>
<td>/opt/ibm/gpmp/java</td>
<td></td>
</tr>
</tbody>
</table>

**Total 4**
Enabling ARM, WebSphere on Linux for System z

Request Metrics
Request metrics tracks each individual transaction in WebSphere Application Server, recording the response time of the major components such as time in the Web server or in the Enterprise JavaBeans (EJB) container. Use this page to enable request metrics, select the components that are instrumented by request metrics, set trace levels, enable standard logs, enable Application Response Measurement (ARM), specify the type of ARM agent, and specify the ARM transaction factory implementation class name.

Configuration

General Properties
- Prepare Servers for Request metrics collection
- Components to be instrumented:
  - None
  - All
  - Custom:
    - Async.Beans
    - EJB
    - JCA
    - JDBC
    - JMS
    - JNDI
    - Portlet
    - STB
    - Servlet
    - Servlet Filter
    - WebServices

Request Metrics Destination
- Standard Logs
- Application Response Measurement (ARM) agent
  - Agent Type: ARM40
  - ARM transaction factory implementation class name: com.ibm.wm.marm40SDK.tr;

Trace level
- HOPPER

Request Metrics Destination
- Standard Logs
- Application Response Measurement (ARM) agent
  - Agent Type: ARM40
  - ARM transaction factory implementation class name: com.ibm.wm.marm40SDK.tr;
Enabling ARM on Linux for System z

```
case $PLATFORM in
  AIX)
    WAS_LIBPATH="$WAS_HOME"/bin
    NLSPATH=/usr/lib/nls/msg/$L/$N:/usr/lib/nls/msg/en_US/$N:
    # WAS_BOOTCLASSPATH=
    ;;
  Linux)
    WAS_LIBPATH="$WAS_HOME"/bin:/usr/lib64
    NLSPATH=/usr/lib/locale/$L/LC_MESSAGES/$N:
    JAVA_HIGH_ZIPFDS=200
    # WAS_BOOTCLASSPATH=
    ;;
  SunOS)
```
Enabling ARM, WebSphere on Linux for System z

```
wasg1:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin # ./startServer.sh server1
ADMU0161I: Tool information is being logged in file
    /opt/IBM/WebSphere/AppServer/profiles/AppSrv01/logs/server1/startServer.log
ADMU3100I: Reading configuration for server: server1
ADMU3200I: Server launched. Waiting for initialization status.
ADMU3000I: Server server1 open for e-business; process id is 6240
wasg1:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin # /usr/sbin/lsarm -a
FEW6046I APPL: WebSphere:APPLICATION_SERVER
wasg1:/opt/IBM/WebSphere/AppServer/profiles/AppSrv01/bin #
```
References

z/VM CP Planning and Administration Guide SC24-6178-01
z/VM CP Commands and Utilities Reference SC24-6175-01
z/VM Directory Maintenance Facility Commands Reference SC24-6188-01
zEnterprise Ensemble Performance Management Guide GC27-2607-01
zEnterprise Ensemble Planning and Configuration Guide GC27-2608-01
IBM zEnterprise Unified Resource Manager Redbook SG24-7921
Thank You

多謝
감사합니다

Thank You

多謝
감사합니다
Richard G. Young
Certified I/T Specialist
IBM STG Lab Services
zVM & Linux on z Team Lead

IBM
777 East Wisconsin Ave
Milwaukee, WI 53202
Tel 414 921 4276
Fax 414 921 4276
Mobile 262 893 8662
Email: ryoung1@us.ibm.com