Enabling z/VM V6.2 for Ensemble Management
Session 12463

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Agenda

- Hardware components of an ensemble
- z/VM Ensemble Components
- Virtual Switch Controllers
- DIRMAINT authorizations
- Enable SMAPI Servers
- Validating the Enablement
- Linux Ensemble Considerations
What is a 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 zEnterprise Ensembles

- Supported SLES and RHEL distributions
  - Optional - Guest Platform Management Provider (GPMP)
  - IEDN/INMN (OSX/OSM) NIC support
  - Legacy NIC connection to IEDN or INMN via virtual switch ok
    via OSDSIM support in VSWITCH

- z/VM V6
  - z/VM Management Guest to forward Linux GPMP data to
    Unified Resource Manager
  - 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 zEnterprise Ensembles

- INMN and IEDN access provided via new z/VM virtual switch types
  - Uplink is the z/VM Management Guest
  - Automatic connection to INMN
  - Ensemble membership sets ensemble-defined MAC for each IEDN NIC

- SMAPI updates SYSTEM CONFIG

- z/VM is authoritative source of virtual machine state
  - State automatically reflected in Unified Resource Manager
z/VM System Management API Infrastructure Changes

- New SMAPI servers:
  - Support for IPv6 (INMN is IPv6)
  - Resiliency and error recovery (aka “guard” functions)
  - Management Guest, instantiated by the Unified Resource Manager

- New Systems Management APIs
z/VM SMAPI Family

- **VSMGUARD**  
  Is responsible for starting and monitoring other SMAPI servers and platform management guest.

- **VSMPROXY**  
  Speaks to the Support Element and HMC

- **VSMREQIN**  
  Requests from IPv4 clients

- **VSMREQIU**  
  Requests from other guests using AF_IUCV sockets

- **VSMREQIM**  
  Requests from IPv6 management networks

- **VSMREQI6**  
  Requests from IPv6 clients

- **VSMEVSRV**  
  Gathers data from *VMEVENT and *LOGREC system services

- **ZVMLXAPP**  
  z/VM Unified Resource Manager platform management guest
**z/VM SMAPI Family**

- **VSMWORK1**  Request server for short transactions
- **VSMWORK2**  Request server for long-running transactions
- **VSMWORK3**  Request server for long-running transactions
- **LOHCOST**   Caching server for Query-type operations
- **DTCSMAPI**  Private TCP/IP stack for SMAPI components that require IP connectivity
- **PERSMAPI**  Performance monitor used if managing z/VM exclusively by Unified Resource Manager

6.2
z/VM Ensemble INMN Infrastructure
z/VM Ensemble IEDN Infrastructure

Linux Guest 1
NIC 100
MAC 025000000006

Linux Guest 2
NIC 200
MAC 025000000005

Linux Guest 3
NIC 100
MAC 02500000001

Linux Guest 4
NIC 200
MAC 02500000002

Linux Guest 5
NIC 400
MAC 025000000004

Virtual Switch IEDNV100
Port 1
Port 2
Port 55
dev 500 P00

Virtual Switch IEDNV100
Port 1
Port 2
Port 55
dev 500 P00

OSA-E
OSX

Primary
TRUNK
Backup
TRUNK

ISOLATE = Optional

Complete your sessions evaluation online at SHARE.org/SFEval
Preparation for Enablement

- **Software**
  - z/VM 6.2 at Service Level 1101 or higher
  - Get the latest APAR information from

- **Hardware**
  - System z firmware bundle 41z or higher
  - OSX and OSM CHPIDs configured and cabled
    - If not cabled, you will see error codes E080
    - Proper ports, please!
Preparation for Enablement

- Books
  - CP Planning and Administration Guide, Chapter 15
    - April 2012
  - z/VM Systems Management Application Programming, Chapter 4
    - April 2012
  - zEnterprise Ensemble Planning and Configuration
    - -04a from Resource Link (March 2012)
**Validate OSX/OSM devices are available**

Q OSA TYPE ENSEMBLE

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Validate OSX/OSM devices are available

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<td>OSM</td>
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<td></td>
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Configure DIRMAINT Authorizations

- Command permission
- Surrogate permission
DIRMAINT Authorization

- Give SMAPI worker virtual machines permission to issue privileged DIRMAINT commands

- Update AUTHFOR CONTROL file:
  
  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
DIRMAINT CONFIGxx DATADVH Additions

- Allow SMAPI worker virtual machines to issue requests on behalf of already-authenticated SMAPI clients

- Update CONFIGxx DATADVH file:
  
  ```
  ALLOW_ASUSER_NOPASS_FROM= VSMWORK1 *
  ALLOW_ASUSER_NOPASS_FROM= VSMWORK2 *
  ALLOW_ASUSER_NOPASS_FROM= VSMWORK3 *
  ALLOW_ASUSER_NOPASS_FROM= VSMGUARD *
  ```
Authorize the Management Guest

VM65083 – PTF UM33623

VSMWORK1 AUTHLIST
in
VMSYS:VSMWORK1.

Note column numbers: 1, 66, 130
SFS Administrator Authority for VMSYS

- 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  * * *
How to Operate This New Infrastructure?

- To start the SMAPI servers, XAUTOLOG VSMGUARD
  - Add it to the PROFILE EXEC of AUTOLOG1 or AUTOLOG2

- VSMGUARD will start the SMAPI servers and the Management Guest will start automatically.

- ZVMLXAPP can be restarted via the Unified Resource Manager as a task of the z/VM Hypervisor
Validating the configuration

```bash
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 INMN 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
IPTimeout: 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 SW2 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 DTCENSx controllers

<table>
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<tr>
<th>Controller</th>
<th>Available</th>
<th>VDEV Range</th>
<th>Level</th>
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<td>DTCVSW2</td>
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<td>*</td>
<td>610</td>
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<tr>
<td>DTCVS1</td>
<td>YES</td>
<td>*</td>
<td>610</td>
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<tr>
<td>DTCENS1</td>
<td>YES</td>
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<tr>
<td>DTCENS2</td>
<td>YES</td>
<td>*</td>
<td>610</td>
</tr>
</tbody>
</table>

Controllers:

- **DTCVSW2**
  - IP
  - ETHERNET
  - VLAN_ARP
  - GVRP
  - LINKAGG
  - ISOLATION
  - NO_ENSEMBLE
  - NO_INMN

- **DTCVS1**
  - IP
  - ETHERNET
  - VLAN_ARP
  - GVRP
  - LINKAGG
  - ISOLATION
  - ENSEMBLE
  - INMN

- **DTCENS1**
  - IP
  - ETHERNET
  - VLAN_ARP
  - GVRP
  - LINKAGG
  - ISOLATION
  - ENSEMBLE
  - NO_INMN

- **DTCENS2**
  - IP
  - ETHERNET
  - VLAN_ARP
  - GVRP
  - LINKAGG
  - ISOLATION
  - ENSEMBLE
  - NO_INMN
Validating your SFS configuration

```bash
q auth vmsys:vsmwork1.
Grantee   R  W  NR  NW  
MAINT     X  X  X  X  
VSMWORK1  X  X  X  X  
VSMGUARD  X  X  X  X  
VSMPROXY  X  -  X  -  
VSMREQIM  X  -  X  -  
VSMREQIN  X  -  X  -  
VSMREQIU  X  -  X  -  
VSMREQI6  X  -  X  -  
VSMWORK2  X  -  X  -  
VSMWORK3  X  -  X  -  
```
Validating your SFS configuration

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 SMAP configuration

```
netstat
VM TCP/IP Netstat Level 610       TCP/IP Server Name: TCPIP

Active IPv4 Transmission Blocks:

<table>
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<th>User Id</th>
<th>Conn</th>
<th>Local Socket</th>
<th>Foreign Socket</th>
<th>State</th>
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</thead>
<tbody>
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<td>*..TELNET</td>
<td><em>..</em></td>
<td>9.76.158.39.50358</td>
<td>Established</td>
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<td>INTCLIEN 1007</td>
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<td><em>..</em></td>
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<tr>
<td>VSMREQIN 1002</td>
<td>*..44444</td>
<td><em>..</em></td>
<td><em>..</em></td>
<td>Listen</td>
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<tr>
<td>VSMPROXY 1003</td>
<td>*..55555</td>
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</tbody>
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Active IPv6 Transmission Blocks:

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<th>Conn</th>
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<td>VSMREQI6 1001</td>
<td>Listen</td>
<td></td>
</tr>
</tbody>
</table>

Local Socket: *..44445
Foreign Socket: *..*
```
Validating your configuration
Validating your configuration

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

- Access to the IEDN and OSX connections must be configured using Unified Resource Manager
  - Ensemble will reject “out-of-band” connection attempts

- VMSYS filepool needs to be backed up with the rest of your system!
  - This is where access rights and status are kept
  - If you lose it, you will start over

- No miracles. Unified Resource Manager doesn’t solve connectivity problems.
  - E.g. 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.
  - But don’t believe everything you see
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.

- Unified Resource Manager is not a RACF security administration application.
  - Enable DIRMAINT-RACF Connector (USE_RACF=YES)
  - VSWITCH and RDEV authorizations must be handled manually.

- If ZVMLXAPP does not start, the other SMAPI service machines will not be started.

- Depending on the size and volume of the virtual server directories to be managed, you may find that the SMAPI servers will run out of memory.
  - The default is 128MB. You can increase up to 512MB.
Next Steps: Use Unified Resource Manager

- Create IEDN Virtual Switches and give guests access to the IEDN

- Define disk storage resources
  - System and user

- Define virtual server containers for Linux guests or migrate existing guest

- Manage guest resources
Managing guest priorities from zManager

- “Too many cooks spoil the broth.”
  - Only one resource manager at a time
  - If you are managing a guest with VMRM don’t add it to a managed workload in zManager
References

- z/VM CP Planning and Administration Guide
- z/VM System Management Application Programming Reference
- z/VM CP Commands and Utilities Reference
- z/VM Directory Maintenance Facility Commands Reference

- IBM zEnterprise Ensemble Performance Management Guide
- IBM zEnterprise Ensemble Planning and Configuration Guide
- IBM zEnterprise Unified Resource Manager Redbook
Questions?
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Senior Managing IT Consultant
IBM STG Lab Services
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