IBM zEnterprise Unified Resource Manager: What’s in it for z/VM?

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Agenda

- Brief overview of the IBM zEnterprise Unified Resource Manager
- How to use it to configure some features of interest even to well-established z/VM environments
  - Selecting existing z/VM virtual servers for management
  - Connecting z/VM virtual servers to the new intra-ensemble data network and its associated virtual networks
  - Configuring zManager for goal-oriented performance management of selected z/VM virtual servers
    - Basic monitoring for achievement of performance objectives
    - Active processor performance management
    - Different levels of granularity and instrumentation
- Note: we won’t cover configuring z/VM itself to participate in the ensemble. That was covered by Richard Young’s session 9879 earlier today
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A system of systems that unifies IT for predictable service delivery

Unified management for a smarter system:
**zEnterprise Unified Resource Manager**

- Unifies management of resources, extending IBM System z® qualities of service end-to-end across workloads
- Provides platform, hardware and workload management

Scale out to a trillion instructions per second:
**IBM zEnterprise BladeCenter® Extension (zBX)**

- High performance optimizers and appliances to accelerate time to insight and reduce cost
- Selected IBM POWER7® blades and IBM System x® Blades for tens of thousands of AIX® and Linux applications
- Dedicated high performance private network

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- Ideal for large scale data and transaction serving and mission critical applications
- Most efficient platform for Large-scale Linux® consolidation
- Leveraging a large portfolio of z/OS® and Linux on System z applications
- Capable of massive scale up, over 50 Billion Instructions per Second (BIPS)
zEnterprise Unified Resource Manager and Ensembles

- **Ensemble:**
  - A zEnterprise Ensemble is a collection of zEnterprise nodes managed as a single virtualized pool of server resources
    - Native LPAR and z/VM Virtual Images
    - PowerVM virtual images
    - IBM Smart Analytics Optimizer for DB2
    - IBM DataPower Appliance
  - A zEnterprise node can be a member of at most one Ensemble
  - New, private networks

- **zEnterprise Unified Resource Manager (zManager):**
  - HMC is management console
    - One primary/alternate pair per ensemble
  - Ensemble-Wide scope of responsibility
  - Hardware configuration and operational control
  - Virtual server life cycle management
  - Virtual network and storage provisioning
  - Energy Management
  - Goal-oriented performance management

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Synergy with z/VM and Linux on System z

- **What does zEnterprise and Unified Resource Manager offer to z/VM users?**
  - Server and application consolidation on System z using Linux and z/VM is the industry leader in large-scale, cost-efficient virtual server hosting
  - Create and perform lifecycle management on z/VM virtual machines
    - Wizard-driven creation of new virtual machines
    - Management of existing virtual machines, selected on an individual basis
    - Consistent interface across technologies
    - Reduces skill-level requirements
  - Leverage the secure physical network connections between z/VM, zBX, and/or other System z servers in the ensemble for data and management
    - Fast 10 Gb Ethernet connection to the data
    - Less latency – fewer ‘hops’ to get to the data and no need for encryption / firewall
    - Traffic on user networks not affected
    - Secure, isolated management network: no interference with/from data traffic
  - Perform virtual network management
    - Define and manage virtual networks on the IEDN, including access control
    - Manage and control communication between virtual server operating systems and the hypervisor
  - Workload awareness and platform performance management
    - Wizard-driven management of resource in accordance with specified business service level objectives
    - Monitor resource use within the context of a business workload
    - Define workloads and associated business policies
    - Plus integrated blades on zBX offer added dimension for workload optimization
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Some zManager Use Cases for Existing z/VM Environments

- **Select existing z/VM virtual servers to manage**

- **Connect a z/VM virtual server to the IEDN for interoperation with zBX (and/or with other System z Servers in the ensemble)**
  - Define a virtual network on the IEDN
  - Create a new IEDN VSWITCH
  - Connect the virtual server to the virtual network via the IEDN VSWITCH

- **Perform Goal-oriented performance management**
  - Define a workload resource group and associated performance policy and service classes. Monitor and get reporting data.
  - Enable dynamic, hypervisor-based processor management for selected virtual servers. Monitor and get reporting data
  - Install and enable the Guest Platform Management Provider (GPMP) in select virtual servers for more granular management and reporting
  - Enable ARM instrumentation in middleware for even more granular reporting, including transaction hops between virtual servers
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Selecting Existing z/VM Virtual Servers to Manage

- Click on the “+” next to VML1 to see all of its managed VS’s
  - Use an HMC userid with authority to the Virtual Server Administrator role and the z/VM Virtual Machine Objects role. We’ll use ENSADMIN (a new default userid)
Selecting Existing z/VM Virtual Servers to Manage

- I have a virtual server called GSSP26 running under z/VM
- Notice it is not shown as being ensemble-managed on the HMC
Selecting Existing z/VM Virtual Servers to Manage

- For VML1, we click on “Choose z/VM Virtual Servers to Manage”
- Then find GSSP26 in the list, check it, and click OK...

Retrieve list of existing virtual servers from z/VM

Filter on virtual servers named GSSP*
Selecting Existing z/VM Virtual Servers to Manage

- Now GSSP26 shows up as being managed by zManager…
Some zManager Use Cases for Existing z/VM Environments

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Connecting a z/VM Virtual Server to the IEDN

- The Intra-Ensemble Data Network (IEDN) is a 10Gb, private, secure network over which all ensemble-managed virtual servers can communicate
  - Single physical network, one or more virtual networks
- z/VM virtual servers connect to the IEDN through new OSX OSA CHPIDs
  - OSX is a standard OSA-Express3 10GbE adapter configured as CHPID type OSX
  - Virtual servers can connect directly to an OSX, or through the new TYPE IEDN VSWITCH
- An updated qeth driver provides Linux support for OSX
  - Connect to IEDN VSWITCH with TYPE IEDN NIC
- For older Linux distributions, z/VM provides OSD to OSX simulation vNICs (OSDSIM on SET VSWITCH) that allows them to connect to an IEDN VSWITCH with a TYPE QDIO NIC
Connecting a z/VM Virtual Server to the IEDN

- Let’s connect GSSP26 to the IEDN
- We’ll assume we first want to define a new virtual network on the IEDN for it to connect to
Connecting a z/VM Virtual Server to the IEDN

- Next, create an IEDN VSWITCH via zManager
  - This can only be done from zManager (it writes out configuration data to the OSX)
  - Also can only directly attach a Linux or z/OS guest to a real OSX using zManager
Connecting a z/VM Virtual Server to the IEDN

- Fill in VSWITCH name, layer mode, and OSX information. Click OK…
Connecting a z/VM Virtual Server to the IEDN

- This creates the VSWITCH definition in zManager

VSWITCH not actually defined in z/VM until OK is clicked
Connecting a z/VM Virtual Server to the IEDN

- Here’s the resulting IEDN VSWITCH from zVM’s point of view
- Note the new controller machines for ensemble use.

```
q vswitch iedn27
VSWITCH SYSTEM IEDN27 Type: IEDN Connected: 14 Maxconn: INFINITE
   PERSISTENT RESTRICTED ETHERNET
Accounting: OFF
   VLAN Aware Default VLAN: NONE Default Porttype: Access
GVRP: Enabled
   Native VLAN: NONE VLAN Counters: OFF
   MAC address: 02-0E-09-00-00-07 MAC Protection: ON
State: Ready
   IPTTimeout: 5 QueueStorage: 8
   Isolation Status: OFF
Uplink Port:
   RDEV: 0270.P00 VDEV: 0270 Controller: DTCENS2
   RDEV: 0264.P00 VDEV: 0264 Controller: DTCENS1 BACKUP
Ready; T=0.01/0.01 09:33:33
```
Connecting a z/VM Virtual Server to the IEDN

- Now connect GSSP26 to the virtual network via the IEDN VSWITCH
  - Going to use an OSDSIM connection in this example
- Select virtual server details for GSSP26 and select the Network tab
  - zManager works with z/VM to gather the current state of GSSP26
- Click on “Add” to add a network adapter to this virtual server

Add a virtual NIC to GSSP26

Ask z/VM for the current state of GSSP26
Connecting a z/VM Virtual Server to the IEDN

- Fill in the Add Adapter panel. Enter a virtual NIC address and select our virtual network.
- For an OSDSIM connection, select Type “OSD” and Interface type “Virtual IEDN.”
  - Interface type is a zManager construct, it doesn’t translate to any particular definition in the z/VM directory.
  - We need to select Virtual IEDN for it to bring up a list of IEDN VSWITCHes to choose from.
- Click OK…

Choose OSD to create an OSDSIM vNIC. If your Linux version supports OSX, you can choose OSX here

Could choose Physical IEDN to connect directly via an OSX CHPID, rather than an IEDN VSWITCH

Select virtual network
Connecting a zVM Virtual Server to the IEDN

- Note the 1700 NIC has been added. Click Apply to actually make the change to z/VM
- Then if we click Edit to view it...

... we see the Type is still OSD, but the Interface Type is now Virtual QDIO. This is what an OSDSIM connection looks like

- If we had created a type OSX vNIC, the Interface type here would show as Virtual IEDN
Connecting a z/VM Virtual Server to the IEDN

- Checking virtual networks, we see GSSP26 is now listed on our virtual network!
Connecting a z/VM Virtual Server to the IEDN

- Here’s what the directory entry looks like

```
USER GSSP26 XXXXXXXX 4096M 6144M GZ 0
  CPU 0 BASE
  CRYPTO APVIRT
  IPL CMS PARM AUTOCHR
  IUCV ALLOW
  OPTION APPLMON
CONSOLE 0009 3215 T OPMGRM
NICDEF 0600 TYPE QDIO LAN SYSTEM DT70TAG
NICDEF 0700 TYPE QDIO LAN SYSTEM TEN208
NICDEF 1700 TYPE QDIO LAN SYSTEM IEDN27 DEVICES 3
SPOOL 000C 2540 READER
SPOOL 000D 2540 PUNCH
```

- GRANTs to the VSWITCH are persisted internally by z/VM and will be reapplied when z/VM is re-IPLed.
  - Backup your z/VM Shared File System!
    - SET VSWITCH IEDN27 GRANT GSSP26 OSDSIM ON
    - SET VSWITCH IEDN27 GRANT GSSP26 VLAN 227
Connecting a z/VM Virtual Server to the IEDN

Notes:

- OSX support available with:
  - SLES 10 SP4, SLES 11 SP1 and up
  - RHEL 5.6, RHEL 6.0 and up

- If you try to connect a Linux guest directly to an OSX chpid (or to a TYPE IEDN vNIC) and don’t have the updated qeth driver, Linux will not allow the device to come online.
  - Prevents you from getting the wrong device by mistake

- z/OS guest connection to the IEDN is only supported via a direct OSX attachment, not via VSWITCH
Some zManager Use Cases for Existing z/VM Environments

- Select existing z/VM virtual servers to manage

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  - Define a virtual network on the IEDN
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Goal-oriented Performance Management

- Allow critical workloads to receive resources and priority based on goal-oriented policies established by business requirements
- Smart business adjustments based on workload insight
- Wizard-driven management of resources in accordance with specified business service level objectives
- Monitor resource use within the context of a business workload
- HMC provides a single consolidated and consistent view of resources
  - Define workloads and associated performance policies
Managing Resources across z/VM Virtual Machines

- Manage processor resources across z/VM virtual machines
  - Detect that a virtual machine that is part of Workload is not achieving goals
  - Determine that the virtual machine performance can be improved with additional resources
  - Project impact on all affected Workloads of moving resources to virtual machine
  - If good trade-off based on policy, redistribute processor resources

Diagram:
- HMC
- Virtual Machine
- z/VM Mgmt VM
- z/VM
- PRSM
- Z CPU, Memory and IO
- SE
- MM
- Blade Center
- Hypervisor
- Virtual Machine
Goal-oriented Performance Management for z/VM

- **zManager works with z/VM to adjust the relative processor SHARE of virtual servers in order to meet goals**
  - Multiple layers of performance management support
    - Ensemble, node, hypervisor
  - Does not require agents running within the virtual servers
    - Will optionally leverage the Guest Platform Management Provider (GPMP), if installed and operating. We’ll look at that later.
  - Does leverage CP Monitor sampling
  - Only for guests using relative share, not absolute share
    - and not maximum share option LIMITHARD – LIMITSOFT is okay
  - Distinct from VMRM. Should not be used in conjunction with VMRM (choose one or the other)
Workload Resource Group

- A “workload” is a grouping of virtual servers
  - Conceptually, a collection of virtual servers contributing to the end-to-end execution of a particular business function

- Provides a “management view” and context for workload management
  - Performance policies are associated to a workload

- Can contain any type of ensemble-managed virtual server
  - A virtual server can be in multiple workloads
  - zManager can also perform processor performance management for PowerVM virtual servers
  - zManager only monitors z/OS and provides reports. It defers to z/OS WLM for resource balancing.

- Can be defined by an administrator
  - Requires the “Automate” suite
  - New HMC roles for controlling access to performance management tasks
Performance Policies and Service Classes

- **Policy: describes workload performance objectives**
  - Conceptually similar to a z/OS WLM policy
  - Has an overall business importance level for the workload
  - Can define multiple per workload, but one active at a time per workload
    - Can dynamically change policies (via UI or scheduled)

- **Service classes: set priority for and classify resources within a policy**
  - A service class assigns a performance goal and an importance
  - Multiple per policy. Some virtual servers in a workload may have higher priority and/or need a higher velocity than others, this is how you specify that
  - Have classification rules that map virtual servers in the workload to a given service class
Goal-oriented Performance Management

- First let’s just put GSSP26 in a “workload,” configure a performance policy for it, and monitor to see if it’s achieving the goals we define.
- We won’t do any active management of GSSP26 yet

1. Define virtual server(s) to a workload or workloads
2. Create performance policy and service classes that include the workload, and specifically include GSSP26. Activate the performance policy.
3. Monitor and get reporting data
Goal-oriented Performance Management

- First, define a workload (“Scott workload”) and add GSSP26 to it
  - We’ll also add z/VM virtual servers SCOTT50 and SCOTT60 (not shown)
Goal-oriented Performance Management

- Define a performance policy ("Scott policy") for Scott Workload with an associated business importance.

What is the relative importance of this business function to other business functions?
Goal-oriented Performance Management

- Then define a service class ("Scott service class") with an associated performance goal and business importance.
Goal-oriented Performance Management

- Create a classification rule in Scott service class that associates GSSP26 to it
  - Let’s also add a classification rule for SCOTT.* virtual servers in the workload

![Classification Rule](image)
Goal-oriented Performance Management

- Activate “Scott policy” for workload “Scott workload”
Goal-oriented Performance Management

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Goal-oriented Performance Management

- **Workload report**
  - Display high level view of “performance health” of each Workload
    - Indication if a workload contains service class missing goals
  - Graphs available for visual view, including workload’s overall load and service class goal achievement
  - Can drill down to workload’s service class report

![Workloads Report - hydra](image)

- Click to expand for graphical chart
- Workload health overview
- The active performance policy
Goal-oriented Performance Management

- **Service class report**
  - High-level view of each service class in Workload’s performance policy
    - Goal and importance
    - Actual performance
    - Indication if monitoring event is established for service class and event is triggered (not shown)
    - Graph available of service class performance index
    - Can drill down to virtual server report for the workload

---

**Performance Index**

- \( PI < 1.0 \): velocity goal being overachieved
- \( PI = 1.0 \): velocity goal achieved
- \( PI > 1.0 \): velocity goal not being achieved
Goal-oriented Performance Management

- **Virtual servers report**
  - List of virtual servers associated with the workload
    - Virtual server Service class PI
    - Resource usage
    - Hypervisor CPU delay percentage
  - Graph of CPU Utilization trend for the selected interval

- We’ll look at this one again a bit later, and see more data

Click to expand for graphical chart
Goal-oriented Performance Management

- Now let’s enable processor performance management for GSSP26
  1. Define virtual server(s) to a workload or workloads
  2. Create performance policy and service classes that include the workload, and specifically include GSSP26. Activate the performance policy.
  3. Monitor and get reporting data
  4. Enable processor management for z/VM
  5. Enable processor management for GSSP26
  6. Look at some more reports
Goal-oriented Performance Management

- First we ensure z/VM is enabled for processor performance management at the ensemble level
Goal-oriented Performance Management

- Then we enable it for our GSSP26 virtual server

![Virtual Server Details - GSSP26](image)

- For new virtual servers created by Unified Resource Manager, processor management is enabled by default. For existing virtual servers that have selected for management, it must be explicitly enabled like this.

- That’s it! We have now enabled processor performance management for GSSP26
  - No GPMP running yet in GSSP26. It is optional.
Goal-oriented Performance Management

- **Hypervisor Report**
  - Shows that processor management for our GSSP26 virtual server is now *Active*
  - If it wasn’t, the reason field would show why

---

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<th>Processor Management Status</th>
<th>Processor Management Reason</th>
<th>Virtual Processors</th>
<th>Consumed Processors</th>
<th>Hypervisor Processing Unit Delay (%)</th>
<th>Share Mode</th>
<th>Share Limit</th>
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</tbody>
</table>
Goal-oriented Performance Management

- **Resource adjustment report**
  - Lists successful and failed resource adjustments for a workload or service class over a given interval
Goal-oriented Performance Management

- Now let’s start a GPMP in GSSP26
  1. Define virtual server(s) to a workload or workloads
  2. Create performance policy and service classes that include the workload, and specifically include GSSP26. Activate the performance policy.
  3. Monitor and get reporting data
  4. Enable zManager processor management for z/VM
  5. Enable processor management for GSSP26 (default after creation of new VS is “enabled” – but not for “imported” vs?)
  6. Look at some more reports
  7. Enable for GPMP
  8. Install GPMP in GSSP26 and start it
  9. See new info in virtual server report
Goal-oriented Performance Management for z/VM

- Guest Platform Management Provider (GPMP) collects OS-level performance data and feeds it to zManager
  - It is optional

- Supported with Linux for System z, z/OS, AIX, and Linux for System x virtual servers

- For z/VM virtual servers, the GPMP feeds data to the z/VM Management guest through a TYPE INMN VSWITCH named SW2
  - Private, point-to-point IPv6 connection
Goal-oriented Performance Management

- From virtual server details, click on box indicating you want to enable this virtual server for GPMP
  - This then pops up a window asking the vNIC address for the VSWITCH network connection from the virtual server to the management guest...
Goal-oriented Performance Management

- And here we see the RMC device
- The change won’t be made to z/VM until you click Apply. Then you’ll also see the message on z/VM for the added vNIC.
Goal-oriented Performance Management

- And here is the resulting vNIC definition on z/VM (in this example, an OSDSIM connection)

**NICDEF 1200 TYPE QDIO DEV 3 LAN SYSTEM SW2**

```plaintext
Q OSA
OSA 1200 ON NIC 1200 UNIT 000 SUBCHANNEL = 000A
    1200 DEVTYPE OSA CHPID 0D OSD
    1200 MAC 02-0E-09-00-00-69 CURRENT
    1200 QDIO-ELIGIBLE QIOASSIST-ELIGIBLE
OSA 1201 ON NIC 1200 UNIT 001 SUBCHANNEL = 000B
    1201 DEVTYPE OSA CHPID 0D OSD
    1201 QDIO-ELIGIBLE QIOASSIST-ELIGIBLE
OSA 1202 ON NIC 1200 UNIT 002 SUBCHANNEL = 000C
    1202 DEVTYPE OSA CHPID 0D OSD
    1202 QDIO ACTIVE QIOASSIST-ELIGIBLE
```
Goal-oriented Performance Management

- Now configure that RMC vNIC from the Linux virtual server (IPv6). Here’s what it looks like...

```
ifconfig
eth0    Link encap:Ethernet  HWaddr 02:00:00:00:00:FE
        inet addr:10.20.8.236  Bcast:10.20.8.255  Mask:255.255.255.0
        inet6 addr: fd55:faaf:elab:a08:0:ff:fe00:fe/64 Scope:Global
        inet6 addr: fe80::ff:fe00:fe00:fe/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1492  Metric:1
        RX packets:108 errors:0 dropped:0 overruns:0 frame:0
        TX packets:42 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:10256 (10.0 KiB)  TX bytes:6230 (6.0 KiB)

eth1    Link encap:Ethernet  HWaddr 02:0E:09:00:00:69
        inet6 addr: fe80::e:9ff:fe00:69/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST  MTU:1492  Metric:1
        RX packets:0 errors:0 dropped:0 overruns:0 frame:0
        TX packets:16 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:0 (0.0 b)  TX bytes:3310 (3.2 KiB)
```
Goal-oriented Performance Management

- ...and the Linux lsqeth view

```
lsqeth
Device name : eth1

---------------------------------------------
| card_type       | GuestLAN QDIO    |
| cdev0           | 0.0.1200         |
| cdev1           | 0.0.1201         |
| cdev2           | 0.0.1202         |
| chpid           | 0D               |
| online          | 1                |
| portname        | AGN_NW           |
| portno          | 0                |
| checksumming    | sw checksumming  |
| state           | UP (LAN ONLINE)  |
| priority_queueing| always queue 2   |
| buffer_count    | 16               |
| add_hhlen       | 0                |
| layer2          | 1                |
| large_send      | no               |
```
Goal-oriented Performance Management

- Now that GSSP26 is enabled for GPMP, let’s install the actual GPMP on Linux.
  - The rpm is shipped as firmware and loaded into the z/VM management guest
- First, find the IPv6 address of the z/VM mgmt guest...
Goal-oriented Performance Management

- Make sure we can ping the management guest from GSSP26...

```
ping6 -I eth1 fe80:0:0:0:e:9ff:fe00:5
PING fe80:0:0:0:e:9ff:fe00:5(fe80::e:9ff:fe00:5) from fe80::e:9ff:fe00:69 eth1:
56 data bytes
64 bytes from fe80::e:9ff:fe00:5: icmp_seq=0 ttl=64 time=0.112 ms
64 bytes from fe80::e:9ff:fe00:5: icmp_seq=1 ttl=64 time=0.066 ms
64 bytes from fe80::e:9ff:fe00:5: icmp_seq=2 ttl=64 time=0.072 ms
```

- Then, install the GPMP rpm from the management guest onto GSSP26 (command shown is for a RHEL 5.5 system)

```
[root@GSSP26 ~]# rpm -ivh http://[fe80:0:0:0:e:9ff:fe00:5%eth1]:80/gpmp.s390x.rpm
```

Retrieving http://[fe80:0:0:0:e:9ff:fe00:5%eth1]:80/gpmp.s390x.rpm
Preparing... #.................................................. [100%]
```
1:gpmp #.................................................. [100%]
```
Making group ibmlarm
Creating user ibmlarm with default group ibmlarm and home directory /var/opt/ibm/arm/
Making group ibmgpmp
Creating user ibmgpmp with default group ibmgpmp and home directory /var/opt/ibm/gpmp
Adding user ibmgpmp to group ibmlarm
Running ldconfig to set up ARM libraries... Done with ldconfig.
Fixing permissions

... 

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.
Goal-oriented Performance Management

- Now, start the GPMP ...

[root@GSSP26 ~]# cd /opt/ibm/gpmp
[root@GSSP26 gpmp]# su ibmgpmp
bash-3.2$
bash-3.2$ ./gpmp start
FEW6101I The guest platform management provider is starting.
bash-3.2$

- z/OS Notes:
  - z/OS guests use a NICDEF TYPE INMN for the RMC device
  - For GPMP on a z/OS guest under z/VM to connect to the z/VM management guest over the INMN, need fix for z/OS CommServer APAR PM38225
Goal-oriented Performance Management

- Here’s what the virtual servers report now shows

- Notice GSSP26 is now showing the Linux distribution and level, along with various OS-level performance data
Goal-oriented Performance Management

- Finally, let’s enable ARM in middleware running on the Linux virtual server and see the additional information we get
  1. Define virtual server(s) to a workload or workloads
  2. Create performance policy and service classes that include the workload, and specifically include GSSP26. Activate the performance policy.
  3. Monitor and get reporting data
  4. Enable zManager processor management for z/VM
  5. Enable processor management for GSSP26 (default after creation of new VS is “enabled” – but not for “imported” vs?)
  6. See new reports
  7. Enable GSSP26 for GPMP. Define INMN VSWITCH and vNIC.
  8. Enable for GPMP (which defines vNIC and does the GRANT to vswitch SW2)
  9. Install GPMP in GSSP26 and start it
  10. See new info in virtual server report
  12. See Hops report and virtual server topology report and view statistics report
Application Response Measurement (ARM)

- Enables tracking a transaction as it flows between virtual servers
- Provides detailed view of resources consumed by instrumented applications
- Based on Open Group ARM standard instrumentation

- Middleware instrumented to ARM APIs
  - Must be explicitly enabled for each
  - GPMP collects the statistics
Goal-oriented Performance Management

- HOPs report shows the transactional flow of work
  - Provides info for each hop involved in handling a specific service class within a specific workload
  - Requires operating GPMP and ARM-instrumented middleware
Goal-oriented Performance Management

- **Virtual server topology report**
  - Provides graphical view of relationships between running virtual servers in a workload
  - Requires operating GPMP and ARM-instrumented middleware

Drag mouse over a server to get usage statistics for it.
Summary

- IBM zEnterprise Unified Resource Manager offers a variety of capabilities for z/VM administrators
  - Create and perform lifecycle management on z/VM virtual machines
  - Leverage secure physical network connections between z/VM, zBX, and/or other System z servers in the ensemble for data and management
  - Perform virtual network management
  - Workload awareness and goal-oriented platform performance management
    - Allow critical workloads to receive resources and priority
    - Monitor for goal achievement via variety of reports
- Granular selection of z/VM virtual servers for management
- Can start simple and expand usage as desired
For Hands-on experiences….

- Thursday -- Sessions 9711 and 9818
  - IBM zEnterprise Unified Resource Manager Hands-on Lab
    - Parts 1 and 2
Backup
For more information…

- zEnterprise System Introduction to Ensembles, GS27-2609
- zEnterprise System Ensemble Planning and Configuration Guide, GC27-2608
- zEnterprise System Ensemble Performance Management Guide, GC27-2607
- IBM zEnterprise Unified Resource Manager Redbook (draft), SG24-7921
Summary of Available Performance Reports

- Workloads report
  - High level performance status and goal achievement for all workloads defined for the ensemble
  - From here you can select the hypervisor, virtual server, or service class reports

- Service classes report
  - List of all service classes defined for a workload and for each it shows details and performance data. If there are problems, from here can drill down to individual virtual server reports for more details

- Virtual servers report
  - Performance data for virtual servers associated with a workload or a service class

- Hypervisor report
  - Details about virtual servers running in a hypervisor and how they are competing for shared resources. Includes any adjustments made for the virtual servers running in the hypervisor

- Resource adjustments report
  - Lists successful and failed resource adjustments for a workload or service class over a given interval

- Virtual server topology report
  - Graphical view of relationships between running virtual servers in a workload (requires GPMP and ARM-instrumented applications)

- View statistics
  - OS processes and statistics for a virtual server topology report node (requires GPMP and ARM-instrumented applications)

- Hops report
  - Info for each hop involved in handling a specific service class within a specific workload. Requires GPMP and ARM-instrumented applications