Abstract

In this session representatives from CA Technologies will provide a high level overview of CA solutions in the z/VM and Linux on System z environments. They will then show how specific tools such as zVPS, VM:Operator, VM:Director, and VM:Spool can support and take advantage of the new Single System Image (SSI) environment to improve availability for z/VM based applications. Finally, they will discuss how UPSTREAM for Linux on System z can be used to backup and protect data in this environment.
— z/VM V6.2 implements multisystem virtualization using a z/VM single system image (SSI) cluster composed of up to four z/VM systems. This multisystem virtualization technology for the mainframe extends the z/VM virtualization technology to a new level, allowing members of the cluster to share resources and synchronize with other nodes, together presenting the appearance of a single system.

— Members of a z/VM SSI cluster are part of the same Inter-System Facility for Communications (ISFC) collection and use ISFC channel connections to communicate. All members of a cluster also share DASD for virtual machines and selected z/VM data, as well as LAN segments and IP subnets. The concept of a global virtual switch provides identical network connectivity across all active members within a cluster.

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Simplified z/VM systems management is realized when z/VM instances are members of an SSI cluster and can be serviced and administered as one system. Sharing of resources used by both CP and virtual machines is coordinated among all members. This allows Linux guests to access the same devices and networks regardless of which member they are logged on or relocated to. Shared resources include:

- User directory
- Minidisks
- Spool files
- Network device MAC addresses

Each member of a z/VM SSI cluster is able to communicate with all other active members. When a z/VM system is configured as a member of a cluster, it automatically joins the other members during system startup. Coordination of members joining and leaving the cluster, maintaining a common view of member and resource states, and negotiating access to shared cluster resources are all done seamlessly.
Single System Image (SSI)

- Connect up to 4 z/VM systems together as one
- Share resources for systems as well as their virtual machines
- Guests can be run same or other systems
- Share DASD for common files
  - Disk protection
- Why is this useful?
  - One user directory
  - Manager members from across systems
  - Make Maintance easier
  - Commands form one member to move to another system
Live Guest Relocation (LGR)

— Live guest relocation (LGR) provides the capability for a running Linux virtual machine to be moved without disruption from one z/VM system to another within a z/VM SSI cluster.

— Live guest relocation provides continuity for virtual server workloads over planned z/VM and machine outages, such as service and hardware upgrades. LGR allows applications to remain available over such outages with less impact to the application and less setup required. Verification that needed resources and machine features are available on the destination system prior to the relocation is provided. This verification may also be performed on request to assess a guest's eligibility for relocation. In an SSI cluster comprising different machine models, the architecture level presented to each guest is tailored to the set of machine features common to the member systems to which the guest may be relocated.
Live Guest Relocation (LGR)

— Restrictions (something to think about)
  
  – Make sure whatever system you move the guest to has access to all the correct DASD (file, database)
  – Cards (OSA, Crypto, Etc)
  – Make sure you have enough capacity for the guest on the destination system.
  – Make sure you have enough power to handle the guest on the destination system.
  – Devices should be connected to the same LAN segment or SAN fabric
  – Try to use the same device number
  – Make sure the same VSWITCH is defined on the destination system and the OSAs have been set up.
— Time (something to think about)
  
  — Remember that moving a guest from one system to another might be quick but it still takes time.
    
    ▪ Relocation Time
    ▪ Quiesce Time
— Scenario one

– Your systems programmer gets a ping from Velocity zVPS that VM1 is starting to consume too much CPU.
– Your systems programmer needs to push workload to another system.
– How?
– What does the system look like.
Products Needed

The following products would be required to help move a guest from one system to another:

- CA VM:Operator
- Velocity zVPS —
  - Through partnership CA is now able to offer our customers the ZVPS Performance Suite
Manually moving the guest

— Once you notice that your VM1 is running too slow.

— You notice your having a problem with VM1.
  
  – Velocity’s zVPS sends you the performance data from VM 1.
  
  – VM:Operator is posting messages.
  
  – Systems programmer can check the status of VM 2 to see if there is less of a load.
  
  ▪ Again using Velocity’s zVPS
### Velocity – zVPS

#### ESAMAIN - System Overview

<table>
<thead>
<tr>
<th>Component</th>
<th>Time</th>
<th>CPU%</th>
<th>Memory</th>
<th>Storage</th>
<th>Swap</th>
<th>Network</th>
<th>CPU</th>
<th>Memory</th>
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<tr>
<td>zVIEW</td>
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</tbody>
</table>

#### System Overview – Mozilla Firefox

- Display and manage system resources
- Monitor CPU, memory, storage, and network usage
- Analyze system performance

### zVIEW - Velocity Software, Inc

- Monitor system performance
- Analyze CPU, memory, storage, and network usage
- Configure and manage system settings

### Welcome

- Login and access system resources
- Configure system settings
- Monitor system performance in real-time

### CLI and Interface

- Use CLI commands for system management
- Access interface for detailed system analysis

### Features

- Real-time monitoring
- Detailed analysis
- System configuration
- Resource allocation

### Benefits

- Improved system performance
- Enhanced resource utilization
- Reduced downtime
- Efficient system management
ZVPS ALERT to VM:Operator

SYSTEM 003% 31 Users VM:Operator Friday 03Aug12 13:40

q n
LINUX122 - DSC, LINUX121 - DSC, ZWEB05 - DSC, ZWEB04 - DSC
ZWEB03 - DSC, ZWEB02 - DSC, ZWEB01 - DSC, ZWEBLOG - DSC
LINUX120 - DSC, ZADMIN - DSC, ZWRITE - DSC, ZTCP - DSC
ZSERVE - DSC, RSCS - DSC, VMX$0002 - DSC, VMX$0001 - DSC
RSCSDNS - DSC, FTPSERVE - DSC, SNMPD - DSC, VMSPool - DSC
VMSCHED - DSC, VMSERVU - DSC, VMSERVS - DSC, VMSERVVR - DSC
VMSECURE - DSC, TCP/IP - DSC, GCS - DSC, LINUX123 - DSC
ZALERT - DSC, MAINT -L0009, OPERATOR -L0003
VSM - TCP/IP
VMYINI0006I 0.000 Ready;
13:24:07 VPSE XACF PROCESS UTILIZATION AT 13.0%
13:34:06 VPSE XACF PROCESS UTILIZATION AT 18.3%
------------------------------ SYSTEM Window ------------------------------
1= ViewNext  2= Review  3= ViewPrev  4= RemvLine  5= Remv All  6= Retrieve
7=          8=        9= Repeat  10= Print  11= Expand  12= Remv Top
====> MAINOPER
Manually moving the guest

— At this point the systems programmer see’s they have cycles on VM 2.

  – They sign on to VM 1 and issue:
    - VMYIAMOP – To access the operator console.
    - VMRELOCATE TEST LINUX123 TO VM2
    - VMRELOCATE MOVE LINUX123 TO VM2
### VMRELOCATE MOVE

Using CA Tools in a z/VM Single System Image Environment to Achieve High Availability

- **SYSTEM 0068 31 Users VM: Operator Friday 03Aug12 14:00**

- **VMYINI00061 0.000 Ready**

- **13:53:04 VPSE XACP PROCESS UTILIZATION AT 12.6%**

- **13:55:05 VPSE XACP PROCESS UTILIZATION AT 12.2%**

### System Window

- **1= ViewNext 2= Review 3= ViewPrev 4= RemvLine 5= Remv All 6= Retrieve**
- **7= 8= 9= Repeat 10= Print 11= Expand 12= Remv Top**

---

**VMRELOCATE MOVE LINUX123 to VM2**
/* REXX */
/* This is an exec to TEST a LINUX Guest Move from VM1 to VM2. If the TEST is successful, the exec will then issue the command to actually move the guest from VM1 to VM2 */
VMRELOCATE TEST LINUX123 to VM2
If rc = 0
then do
  say 'NOW MOVING LINUX123 to VM2'
  'PIPE CP SPOOL CONSOLE * RDR'
  VMRELOCATE MOVE LINUX123 to VM2
If rc = 0
then do
  say 'MOVEIT: LINUX123 was successfully moved to VM2'
  'PIPE CP SPOOL CONSOLE * RDR'
  'cp smsg ztcp stop LINUX123'
  REMOTE VM2 cp smsg ztcp READ LINUX123
  REMOTE VM2 cp smsg ztcp start LINUX123
end
else do
  say 'MOVE of the linux guest has failed'
  'CMS PIPE CP SPOOL CONSOLE * RDR'
  'cp smsg ztcp start LINUX123'
end
end
else do
  say 'TEST of the linux guest move has failed'
  'CMS PIPE CP SPOOL CONSOLE * RDR'
end
Velocity zVPS™ Alert Definition

```plaintext
extract
Parms CPU TOTAL

cpu_serial | serial
util | sytprp.cpuutil
syspgrt | sytsyp.plspiopw + sytsyp.plspiopr
inqueue | sytusr.inqueue
spool_use | (sytag.calslti2*100)/sytag.calslta2

alert util xacp
limit 3 1
level ## yellow action cp msg op VPSW XACP PROCESS UTILIZATION AT &UTIL%
level ## red action cp msg op VPSE XACP PROCESS UTILIZATION AT &UTIL%
text Processor utilization at &util%
```
SYSTEM LOGTABLE – entry for XACP alert to initiate relocation automation Script, MOVEIT

* Process ZVPS Alerts
SPAWN MOVEIT MSG ZALERT *1 1 VPSE XACP

SYSTEM SYSTABLE – entry to control display of ZVPS alert
*** ZVPS ERROR ALERT Display Control
SERVER ROLL NOTIME RED MSG ZALERT *1 1 VPSE
Using CA Tools in a z/VM Single System Image Environment to Achieve High Availability

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Swap ZVPS Monitoring VM1 to VM2

- Stop ZVPS SNMPD Data Collection on VM1 prior to Server Move
  - SMSG ZTCP STOP <linux guest>

OR

- SMSG ZTCP Delete <linux guest>

- Should be included in relocation automation script
  - Include logic to restart SNMPD collection on VM1 if relocation fails

- Failure to stop means VM1 performance data will only have SNMPD data from server...NO VM related data
ZVPS on VM1

TCPIP
SNMP/MIB II

LINUX123
SNMP/Host Mibs

VM CP Monitor

zTCP

zWrite

PDB

zMON

zMAP
ZVPS on VM2
Swap ZVPS Monitoring VM1 to VM2

- Start ZVPS SNMPD Data Collection on VM2 after Server Move completes
  - SMSG ZTCP ADDNODE nodename IP_Address community
  - SMSG ZTCP ADDVMID node virtmachine

  OR

  - SMSG ZTCP READ <nodefile>
    - NODEFILE must exist on VM2 ZVPS SFS or Config disk

- Utilize Remote VM:Operator Support (RVS) capabilities between VM1 and VM2
  - Node Start command can be included in relocation automation script or set up through VM2 VM:OPER automation

- Failure to define and start node on VM2 means performance data will only have guest level data BUT no Linux level data from SNMPD
ZVPS on VM2

TCPIP
SNMP/MIB II

LINUX123
SNMP/Host Mibs

VM CP Monitor

zTCP

zWrite

PDB

zMON

zMAP
Other CA VM Products and SSI
CA VM:Secure / CA VM:Director maintains a consistent view of system administration definitions across members of a complex

— CP Object Directory virtual machine definitions
  — You get the same virtual machine wherever you log on

— Security Manager Rules definitions
  — You have the same authorizations and access to resources

— Directory Management or ESM Administration Interfaces
  — You enter VMSECURE commands the same way wherever you log on
New release of CA VM:Spool - 1.8

- Install as IDENTITY user for each system that requires its function
- Spool files from other systems can be accessed as long as the owning user is logged on to the requesting system
- For backup and accounting CA VM:Spool only works with spool files originating on the system where the service machine runs
— New release of CA VM:Spool V/SEG Plus Feature – 1.7

- Install as Identity user for each system that requires its function
- Spool files from other systems can be accessed as long as the owning user is logged on to the requesting system
- If Linux guest uses DCSSs and is to be relocated to another member of the SSI complex the same DCSS must exist on the other member
  - Use SPDISK utility to back up DCSS and restore it on another system
— Informational solution for release 3.5 - RI37867

- Describes how to set up and use VM:Backup in an SSI environment
  - Set up separate VM:Backup service virtual machines
    - USER entries vs. IDENTITY
      - Minidisks need to be on shared volumes
    - Set up one for backing up all minidisks on shared volumes
      - Can run on any member since captures shared volume minidisks
    - Set up additional server on each system to back up the minidisks that exist on volumes that are available to only one system
      - Must always run on the system the volumes being backed up exist on
  - All done with inclusion/exclusion features
Informational solution for release 2.8 – RI38224

- Describes how to set up and use CA VM:Backup HiDRO in an SSI environment
- Same set up as CA VM:Backup
  - Multiple server sets (HIDRO, SYBMON and SYBCOM) vs. 1 server
  - Also normal USER entries with minidisk on shared dasd
  - One set to back up minidisks on shared volumes
  - Other sets to back up minidisks on volumes available to only one system
  - Also done with HiDRO flavor of inclusion/exclusion features
Informational solution for release 3.1 – RI37868

- Describes how to set up and use CA VM:Operator in an SSI environment
  - IBM supplies OPERATOR virtual machine definition as an IDENTITY entry
  - Install VM:Operator into that environment
  - Steps given to get product installed and operational in this environment
Informational solution for release 2.0 – RI37869

- Describes how to set up and use CA VM:Tape in an SSI environment
- Allocate the server virtual machine as normal USER with all minidisks on shared dasd
- Then convert directory entry to an IDENTITY adding BUILD and SUBCONFIG information for each member of the complex
  - Steps given to do this
- Information also given for sharing TMCs and tape drives among systems
- Set up information also supplied to enable Linux guests that use the VM:Tape Linux agent to run without interruption if relocated
UPSTREAM for Linux on System z
best-in-class data protection

- Fast, scalable and highly reliable backup and recovery for Linux on System z
- Only solution that will backup up to z/OS
  - Leverage existing z/OS skills and infrastructure for operational efficiency
  - Rely on proven z/OS disaster recovery strengths
UPSTREAM for Linux on System z architecture

System z

z/OS

z/VM
UPSTREAM for Linux on System z architecture

UPSTREAM Linux on System z Clients

UPSTREAM agents run on Linux servers to protect Linux data

System z

z/OS

z/VM

Linux Data
UPSTREAM for Linux on System z architecture

UPSTREAM z/OS Storage Server

UPSTREAM is only data protection solution that provides backup to z/OS storage server

Enabling backup to z/OS tape or disk

For increased reliability and compliance
UPSTREAM exploits HiperSocket Technology

- Takes backup and recovery off corporate network
- Protect very large amounts of data without negatively impacting corporate communications or customer access
UPSTREAM for Linux on System z scalable architecture
UPSTREAM for Linux on System z scalable architecture

UPSTREAM architecture provides scalability to protect your data as your business grows.

UPSTREAM Backups

z/OS

z/VM

HiperSockets

UPSTREAM z/OS Storage Server

UPSTREAM Linux on System z Clients

z/OS Disk

z/OS Tape

Linux Data
UPSTREAM for Linux on System z
scalable architecture

Scalable architecture allows multiple storage servers

UPSTREAM Backups

Linux Data

z/OS

z/VM

HiperSockets

UPSTREAM z/OS Storage Server

UPSTREAM Linux on System z Clients

z/OS Disk

z/OS Tape

Linux Data
UPSTREAM for Linux on System z
scalable architecture

Flexible architecture also enables networking between systems
Flexible management interface provides centralized view and control of Linux on System z backups
UPSTREAM “Director”
save time by simplifying and automating data protection

– Communicate, control and monitor Linux on System z backups
  ▪ Initiate backups and restores
  ▪ Check status of running operations
  ▪ Retrieve log files
  ▪ Perform profile configuration
  ▪ Run pre- and post-processing jobs

– Run from web browser for easy cross platform operations

– Keep storage administrators efficient, aware and advised

User-friendly graphical management interface for centralized single view and control of Linux on System z backups
data reduction technology
reduce overhead and speed up backup/recovery

Advanced Data Reduction Technology Features

- Data Compression
  - 5 levels available

- Synthetic Full Merge Backup
  - Logical file granularity
  - Incremental backup processing
  - Eliminates need to do more than one “traditional” full backup

- Block level segmented backup support

- Exclude/Include

- Migration or disk grooming of inactive data

- Integration with leading mainframe de-duplication hardware appliance makers
synthetic full merge technology minimizes data transmission and reduces backup time
high performance database agents
efficient, reliable protection for large amounts of data

On-line agents for DB2/UDB, ORACLE, LOTUS Notes

Manage large amounts of data within scheduled backup window with “hot backup” technology

Perform backups without bringing down database

Allows continuous customer access
Quick and easy disaster recovery of Linux on System z applications, systems, configurations and data

- Backup the whole system without taking it offline
- Clone a complete machine easily
- Reduces training and administration while saving resources
- Makes recovery more consistently successful
Questions ???
Interested in Seeing More?

Join us at the CA Technologies Booth in the Share Technology Exchange for a closer look!

Also, visit the CA Linux Management for Mainframe web portal at:

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Using CA Tools in a z/VM Single System Image Environment to Achieve High Availability

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