Getting Ready for z/VM Single System Image (SSI)

John Franciscovich
francisj@us.ibm.com
Trademarks

The following are trademarks of the International Business Machines Corporation in the United States, other countries, or both.

z/VM®  z10™  z/Architecture®  zEnterprise™

Not all common law marks used by IBM are listed on this page. Failure of a mark to appear does not mean that IBM does not use the mark nor does it mean that the product is not actively marketed or is not significant within its relevant market.

Those trademarks followed by ® are registered trademarks of IBM in the United States; all others are trademarks or common law marks of IBM in the United States.

For a complete list of IBM Trademarks, see www.ibm.com/legal/copytrade.shtml:

The following are trademarks or registered trademarks of other companies.

Adobe, the Adobe logo, PostScript, and the PostScript logo are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, and/or other countries.
Cell Broadband Engine is a trademark of Sony Computer Entertainment, Inc. in the United States, other countries, or both and is used under license therefrom.
Java and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.
Microsoft, Windows, Windows NT, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.
Intel, Intel logo, Intel Inside, Intel Inside logo, Intel Centrino, Intel Centrino logo, Celeron, Intel Xeon, Intel SpeedStep, Itanium, and Pentium are trademarks or registered trademarks of Intel Corporation or its subsidiaries in the United States and other countries.
UNIX is a registered trademark of The Open Group in the United States and other countries.
Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.
ITIL is a registered trademark, and a registered community trademark of the Office of Government Commerce, and is registered in the U.S. Patent and Trademark Office.
IT Infrastructure Library is a registered trademark of the Central Computer and Telecommunications Agency, which is now part of the Office of Government Commerce.

* All other products may be trademarks or registered trademarks of their respective companies.

Notes:
Performance is in Internal Throughput Rate (ITR) ratio based on measurements and projections using standard IBM benchmarks in a controlled environment. The actual throughput that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed. Therefore, no assurance can be given that an individual user will achieve throughput improvements equivalent to the performance ratios stated here.
IBM hardware products are manufactured from new parts, or new and serviceable used parts. Regardless, our warranty terms apply.
All customer examples cited or described in this presentation are presented as illustrations of the manner in which some customers have used IBM products and the results they may have achieved. Actual environmental costs and performance characteristics will vary depending on individual customer configurations and conditions.
This publication was produced in the United States. IBM may not offer the products, services or features discussed in this document in other countries, and the information may be subject to change without notice. Consult your local IBM business contact for information on the product or services available in your area.
All statements regarding IBM's future direction and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
Information about non-IBM products is obtained from the manufacturers of those products or their published announcements. IBM has not tested those products and cannot confirm the performance, compatibility, or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.
Prices subject to change without notice. Contact your IBM representative or Business Partner for the most current pricing in your geography.
The information contained in this document has not been submitted to any formal IBM test and is distributed on an "AS IS" basis without any warranty either express or implied. The use of this information or the implementation of any of these techniques is a customer responsibility and depends on the customer's ability to evaluate and integrate them into the operational environment. While each item may have been reviewed by IBM for accuracy in a specific situation, there is no guarantee that the same or similar results will be obtained elsewhere. Customers attempting to adapt these techniques to their own environments do so at their own risk.

In this document, any references made to an IBM licensed program are not intended to state or imply that only IBM's licensed program may be used; any functionally equivalent program may be used instead.

Any performance data contained in this document was determined in a controlled environment and, therefore, the results which may be obtained in other operating environments may vary significantly. Users of this document should verify the applicable data for their specific environments.

All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only. This is not a commitment to deliver the functions described herein.
IBM Statement of Direction – July 22, 2010

- **z/VM Single System Image with Live Guest Relocation**

IBM intends to provide capabilities that permit multiple z/VM systems to collaborate in a manner that presents a single system image to virtual servers. An integrated set of functions will enable multiple z/VM systems to share system resources across the single system image cluster. Among those functions will be Live Guest Relocation, the ability to move a running Linux virtual machine from one member of the cluster to another. This virtual server mobility technology is intended to enhance workload balancing across a set of z/VM systems and to help clients avoid planned outages for virtual servers when performing z/VM or hardware maintenance.

Note: All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice, and represent goals and objectives only.
Getting Ready for z/VM Single System Image

Topics

- Resource and Capacity Planning for SSI
- Installation Planning - Getting to SSI
- Updating your Directory for SSI
- Planning for Live Guest Relocation
Resource and Capacity Planning for SSI
Cluster Topography

1. How many members in your cluster?

2. Production configuration
   - How many CECs?
   - How many LPARS/CEC?
     - Preferred configuration for 4-member cluster is 2 LPARs on each of 2 CECs

3. Test configuration
   - VM guests?
   - LPARs?
   - Mixed?

4. Virtual server (guest) distribution
   - Each guest’s “resident” member?
   - Where will each guest be relocated to?
     - Distribute workload so each member has capacity to receive relocated guests
       - CPU
       - Memory
Getting Ready for z/VM Single System Image

Memory Requirements for Live Guest Relocation

- A relocating guest's current memory size **must** fit in available space on destination member
  - **Current memory size** assumes virtual memory is fully populated, including:
    - Private V-disks
    - Estimated size of supporting CP structures
  - **Available space** includes the sum of available memory:
    - Central
    - Expanded
    - Paging disk

- Additional memory checks
  - Does the guest's current memory size exceed the paging capacity on the destination?
  - Does the guest's maximum memory size exceed available space on the destination?
  - Does the guest's maximum memory size exceed paging capacity on the destination?
    - **These checks may be overridden if you are certain that they are not applicable to your environment**
Memory Requirements for Live Guest Relocation…

- Include standby and reserved storage settings when calculating maximum memory size for a guest

- Relocations may increase paging demand
  - Available paging space should be at least 2x total virtual memory of all guests
    - Including guests to be relocated to this member
  - Avoid allocating more than 50% of available paging space
    - If size of guests to be relocated increase in-use amount to > 50%, system performance could be impacted

```
q alloc page

<table>
<thead>
<tr>
<th>VOLID</th>
<th>RDEV</th>
<th>EXTENT</th>
<th>EXTENT</th>
<th>TOTAL</th>
<th>PAGES</th>
<th>HIGH</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>L24B66</td>
<td>4B66</td>
<td>0</td>
<td>3338</td>
<td>601020</td>
<td>252428</td>
<td>252428</td>
<td>42%</td>
</tr>
</tbody>
</table>
```
DASD Planning

- Determine which DASD volumes will be used for
  - Cluster-wide volume
  - Release volumes
  - System volumes
    - Shared
    - Nonshared
  - User data (minidisks)
    - Shared
    - Nonshared

- Determine which member owns each CP-Owned volume
DASD Planning – Non-Shared and Shared System Volumes

Member 1
Nonshared Volumes
- M01RES
- M01P01 Paging
- M01T01 T-Disk

Member 2
Nonshared Volumes
- M02RES
- M02P01 Paging
- M02T01 T-Disk

Member 3
Nonshared Volumes
- M03RES
- M03P01 Paging
- M03T01 T-Disk

Member 4
Nonshared Volumes
- M04RES
- M04P01 Paging
- M04T01 T-Disk

Shared volumes
- VMCOM1
- vrmRL1

Nonshared volumes
- M01S01 Spool
- M02S01 Spool
- M03S01 Spool
- M04S01 Spool
DASD Planning – CP Volume Ownership

- CP-Owned volumes are marked with ownership information (CPFMTXA)
  - Cluster name
  - System name of owning member

<table>
<thead>
<tr>
<th>Cluster Name on Volume</th>
<th>System Name on Volume</th>
<th>SPOL Extents (Owner or Shared)</th>
<th>DRCT, PAGE, and TDSK Extents and Checkpoint and Warm Start Areas (Nonshared)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>None</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>None</td>
<td>Name of this member</td>
<td>Yes (owner, single-member cluster only)</td>
<td>Yes</td>
</tr>
<tr>
<td>None</td>
<td>Not the name of this member</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Name of this cluster</td>
<td>None</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Name of this cluster</td>
<td>Name of this member</td>
<td>Yes (owner)</td>
<td>Yes</td>
</tr>
<tr>
<td>Name of this cluster</td>
<td>Name of another member</td>
<td>Yes (shared)</td>
<td>No</td>
</tr>
<tr>
<td>Name of this cluster</td>
<td>Not the name of a member (probable configuration error)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Not the name of this cluster</td>
<td>Any value</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

- Ownership information may also be used on non-SSI systems
  - System name but no cluster name
  - Default on non-SSI installs
CTC Connections

- Each member of an SSI cluster must have a direct ISFC connection to every other member (logical link)
- Logical links are composed of 1-16 CTC connections
  - FICON channel paths
  - May be switched or unswitched
- Use multiple CTCs distributed on multiple FICON channel paths between each member
  - Avoids write collisions that impact link performance
  - Avoids severing of logical link if one channel path is disconnected or damaged
- Preferred practice: Use same real device number for same CTC on each member
CTC Connections – How Many Do I Need?

- 4 CTCs per FICON channel path provides most efficient ISFC data transfer
- For large guests, relocation time and quiesce time can be improved with more channel paths*
  - Up to 4, with 4 CTCs each

* Based on early performance measurements; there are additional factors that affect relocation and quiesce times

Logical link
- 2 channel paths
- 4 CTC devices per path
Network Planning

- All members must have identical network connectivity
  - Connected to same physical LAN segments
  - Connected to same SAN fabric

- Assign equivalency identifiers (EQIDs) to all network devices
  - Devices assigned same EQID on each member must be of same type, have the same capabilities, and have connectivity to the same destinations
Network Planning – Virtual Switches

- Define virtual switches with same names on each member

- For relocating guests:
  - Source and destination virtual switch guest NIC and port configurations must be equivalent
    - Port type
    - Authorizations (access, VLAN, promiscuous)
  - Source and destination virtual switches must be equivalent
    - Name and type
    - VLAN settings
    - Operational UPLINK port with matching EQID
    - Device and port numbers don't need to match, but connectivity to the same LAN segment is required
Network Planning – MAC Addresses

- MAC address assignments are coordinated across an SSI cluster
  - VMLAN statement
    - MACPREFIX must be set to different value for each member
      - Default is 02-xx-xx where xx-xx is "system number" of member
    - USERPREFIX must be set for SSI members
      - Must be identical for all members
      - Must not be equal to any member's MACPREFIX value
      - Default is 02-00-00
  - MACIDRANGE is ignored in an SSI cluster
  - Example:

    VMSYS01: VMLAN MACPREFIX 021111 USERPREFIX 02AAAA
    VMSYS02: VMLAN MACPREFIX 022222 USERPREFIX 02AAAA
    VMSYS03: VMLAN MACPREFIX 023333 USERPREFIX 02AAAA
    VMSYS04: VMLAN MACPREFIX 024444 USERPREFIX 02AAAA
### SSI Planning Worksheet

<table>
<thead>
<tr>
<th>Linux server user ID</th>
<th>Memory</th>
<th>Virtual processors</th>
<th>DASD</th>
<th>Networking devices</th>
<th>Cryptographic requirements</th>
<th>Member 1</th>
<th>Member 2</th>
<th>Member 3</th>
<th>Member 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Maximum number of resident and relocated virtual servers:**

**Maximum memory for normally resident and relocated virtual servers:**

**Memory for z/VM:**

**Total memory requirement:**

- Central storage estimate (Total memory × .75):
- Expanded storage estimate (Total memory × .25):
- Number of real CPUs:
- DASD paging space (Total memory × 2):
Installation

... or ...

How Do I Get to SSI?
Planning Your SSI Installation

What kind of Installation should I select?

- SSI installation
  - Single installation for multiple z/VM images
  - Installed and configured as an SSI cluster
    - Single source directory
    - Shared system configuration file
    - Creates Persistent Data Record (PDR) on Common volume

- Non-SSI installation
  - Single z/VM image
  - Can be converted to initial member of an SSI cluster later
  - Builds DASD layout, directory, and configuration file the same as SSI installation

- Documented migration scenarios require non-SSI installation
  - SSI installation primarily for new or "from scratch" installs
Migrating to SSI

- "Use case" scenarios (CP Planning and Administration)
  - Migration procedures for existing z/VM environments
    - Converting a z/VM System to a Single-Member z/VM SSI Cluster
    - Adding a Member to a z/VM SSI Cluster by Cloning an Existing Member
    - Combining Two Non-SSI z/VM Systems to Create a z/VM SSI Cluster
    - Moving a Second-Level z/VM SSI Cluster to First-Level
    - Converting a CSE Complex to a z/VM SSI Cluster
    - Decommissioning a Member of a z/VM SSI Cluster

- Review documented procedures before deciding whether to do SSI or non-SSI install
Non-SSI Installation

Select installation type

Select a System Type: Non-SSI or SSI (SSI requires the SSI feature)

X Non-SSI Install: System Name SYSTEM1
SSI Install: Number of Members ______ SSI Cluster Name

Identify CP-Owned and Release volumes

<table>
<thead>
<tr>
<th>VOLUME TYPE</th>
<th>DASD LABEL</th>
<th>DASD ADDRESS</th>
<th>FORMAT DASD</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMON</td>
<td>VMC0M1</td>
<td>0111</td>
<td>N</td>
</tr>
<tr>
<td>RELVOL</td>
<td>620RL1</td>
<td>0222</td>
<td></td>
</tr>
<tr>
<td>RELVOL2</td>
<td>620RL2</td>
<td>0333</td>
<td></td>
</tr>
<tr>
<td>SYSTEM1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RES</td>
<td>M01RES</td>
<td>0444</td>
<td></td>
</tr>
<tr>
<td>SPOOL</td>
<td>M01S01</td>
<td>0666</td>
<td></td>
</tr>
<tr>
<td>PAGE</td>
<td>M01P01</td>
<td>0888</td>
<td></td>
</tr>
<tr>
<td>WORK</td>
<td>M01W01</td>
<td>AAAA</td>
<td></td>
</tr>
</tbody>
</table>
SSI Installation

Select installation type

```
Select a System Type: Non-SSI or SSI (SSI requires the SSI feature)
    Non-SSI Install: System Name _________
X  SSI Install:   Number of Members 4  SSI Cluster Name SSICLUST
```

Identify SSI member systems

```
SSI Member Name(s):

<table>
<thead>
<tr>
<th>SLOT #</th>
<th>MEMBER NAME</th>
<th>IPL LPAR/USERID</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MEM1</td>
<td>LPAR1</td>
</tr>
<tr>
<td>2</td>
<td>MEM2</td>
<td>LPAR2</td>
</tr>
<tr>
<td>3</td>
<td>MEM3</td>
<td>LPAR3</td>
</tr>
<tr>
<td>4</td>
<td>MEM4</td>
<td>LPAR4</td>
</tr>
</tbody>
</table>
```
Define CP-Owned and Release volumes for all members

<table>
<thead>
<tr>
<th>VOLUME TYPE</th>
<th>DASD LABEL</th>
<th>DASD ADDRESS</th>
<th>FORMAT</th>
<th>DASD Y/N</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMON</td>
<td>VMCOM1</td>
<td>0111</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>RELVOL</td>
<td>620RL1</td>
<td>0222</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RELVOL2</td>
<td>620RL2</td>
<td>0333</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VOLUME TYPE</th>
<th>DASD LABEL</th>
<th>DASD ADDRESS</th>
<th>VOLUME TYPE</th>
<th>DASD LABEL</th>
<th>DASD ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEM1 RES</td>
<td>M01RES</td>
<td>0444</td>
<td>MEM2 RES</td>
<td>M02RES</td>
<td>0995</td>
</tr>
<tr>
<td>MEM1 SPOOL</td>
<td>M01S01</td>
<td>0666</td>
<td>MEM2 SPOOL</td>
<td>M02S01</td>
<td>3945</td>
</tr>
<tr>
<td>MEM1 PAGE</td>
<td>M01P01</td>
<td>0888</td>
<td>MEM2 PAGE</td>
<td>M02P01</td>
<td>A345</td>
</tr>
<tr>
<td>MEM1 WORK</td>
<td>M01W01</td>
<td>AAAA</td>
<td>MEM2 WORK</td>
<td>M02W01</td>
<td>3345</td>
</tr>
<tr>
<td>MEM3 RES</td>
<td>M03RES</td>
<td>2224</td>
<td>MEM4 RES</td>
<td>M04RES</td>
<td>4556</td>
</tr>
<tr>
<td>MEM3 SPOOL</td>
<td>M03S01</td>
<td>1345</td>
<td>MEM4 SPOOL</td>
<td>M04S01</td>
<td>0234</td>
</tr>
<tr>
<td>MEM3 PAGE</td>
<td>M03P01</td>
<td>0ACF</td>
<td>MEM4 PAGE</td>
<td>M04P01</td>
<td>0FCD</td>
</tr>
<tr>
<td>MEM3 WORK</td>
<td>M03W01</td>
<td>033D</td>
<td>MEM4 WORK</td>
<td>M04W01</td>
<td>0DD3</td>
</tr>
</tbody>
</table>
### Define Common Volume and CTC Device addresses

**Real addresses for the common volume on each member LPAR:**

<table>
<thead>
<tr>
<th>VOLUME TYPE</th>
<th>DASD LABEL</th>
<th>MEM1 ADDRESS</th>
<th>MEM2 ADDRESS</th>
<th>MEM3 ADDRESS</th>
<th>MEM4 ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMMON</td>
<td>YMCOM1</td>
<td>0111</td>
<td>0212</td>
<td>0122</td>
<td>0111</td>
</tr>
</tbody>
</table>

**CTC device addresses:**

- **From: MEM1**
  - To: MEM1  N/A
  - To: MEM2  0993 0032
  - To: MEM3  0335 0992
  - To: MEM4  0944 ___

- **From: MEM2**
  - To: MEM1  003D 000D
  - To: MEM2  N/A
  - To: MEM3  0223 ___
  - To: MEM4  DDF1 FFF3

- **From: MEM3**
  - To: MEM1  AAAA DFE7
  - To: MEM2  AAFD ___
  - To: MEM3  N/A
  - To: MEM4  DDDD AAF2

- **From: MEM4**
  - To: MEM1  0334 ___
  - To: MEM2  3334 DFA7
  - To: MEM3  DDDD AAF2
  - To: MEM4  N/A
Updating Your Directory For SSI
Getting Ready for z/VM Single System Image

Shared Source Directory – Virtual Machine Definition Types

**Traditional Definition**

**USER**

- May log on to any member
  - Only one member at a time
- General Workload
  - Guest Operating Systems
  - Service virtual machines requiring only one logon in the cluster

**Single configuration virtual machine**

**New Definition**

**Identity**

- May log on to multiple members at the same time (known by IDENTITY name)
- System support virtual machines
- Service virtual machines

**Subconfig 1**

**Subconfig 2**

**Multi-configuration virtual machine**
New Directory Layout

- IBM-supplied directory will be significantly different than previous releases
  - Both SSI and non-SSI installations
  - Directory for non-SSI installations will be in "SSI-ready" format
    - Facilitate future SSI deployment

- Many of the IBM-supplied userids will be multiconfiguration virtual machines

- Determine if any of your users should be defined as multiconfiguration virtual machines
  - Most will be single-configuration virtual machines
  - Userids defined on SYSTEM_USERIDS statements will usually be multiconfiguration virtual machines

- Merge your user definitions into the IBM-supplied directory
Multiconfiguration Virtual Machine Definition

<identity> MAINT MAINTPAS 128M 1000M ABCDEFG
<use> MAINT-1 <when on> SSIMEMB1
<use> MAINT-2 <when on> SSIMEMB2
<use> MAINT-3 <when on> SSIMEMB3
<use> MAINT-4 <when on> SSIMEMB4

CONSOLE 009 3215 T
SPOOL 00C 2540 READER *
SPOOL 00D 2540 PUNCH A
SPOOL 00E 1403 A
LINK USER1 2CC 2CC RR
LINK USER1 551 551 RR
These statements apply to all instances of MAINT on all members

<Entry> MAINT-1
MDISK 0191 3390 1000 20 MNTVL1 WR
MDISK CF1 3390 100 20 M01RES RR
* END OF MAINT-1
These statements only apply to MAINT on member SSIMEMB1

<Entry> MAINT-2
MDISK 0191 3390 1000 20 MNTVL2 WR
MDISK CF1 3390 100 20 M02RES RR
* END OF MAINT-2
These statements only apply to MAINT on member SSIMEMB2

<Entry> MAINT-3
MDISK 0191 3390 1000 20 MNTVL3 WR
MDISK CF1 3390 100 20 M03RES RR
* END OF MAINT-3
These statements only apply to MAINT on member SSIMEMB3

<Entry> MAINT-4
MDISK 0191 3390 1000 20 MNTVL4 WR
MDISK CF1 3390 100 20 M04RES RR
* END OF MAINT-4
These statements only apply to MAINT on member SSIMEMB4
Getting Ready for z/VM Single System Image

Multiconfiguration Virtual Machines

SSIMEMB1

<identity> MAINT MAINTPAS 128M 1000M ABCDEFG

<u> MAINT-1 <when on> SSIMEMB1
<u> MAINT-2 <when on> SSIMEMB2
<u> MAINT-3 <when on> SSIMEMB3
<u> MAINT-4 <when on> SSIMEMB4

LINK USER1 2CC 2CC RR
LINK USER1 551 551 RR

<Entry> MAINT-1
MDISK 0191 3390 1000 20 MNTVL1 WR
MDISK CF1 3390 100 20 M01RES RR
* END OF MAINT-1

<Entry> MAINT-2
MDISK 0191 3390 1000 20 MNTVL2 WR
MDISK CF1 3390 100 20 M02RES RR
* END OF MAINT-2

<Entry> MAINT-3
MDISK 0191 3390 1000 20 MNTVL3 WR
MDISK CF1 3390 100 20 M03RES RR
* END OF MAINT-3

<Entry> MAINT-4
MDISK 0191 3390 1000 20 MNTVL4 WR
MDISK CF1 3390 100 20 M04RES RR
* END OF MAINT-4

SSIMEMB2

SSIMEMB3

SSIMEMB4
Single Configuration Virtual Machines

SSIMEMB1
MAINT

SSIMEMB2
MAINT

SSIMEMB3
MAINT

SSIMEMB4
MYLINUX

USER MYLINUX MYLINPAS 128M 1000M G
MDISK 0191 3390 1000 20 MNTVL1 MR
Planning for Live Guest Relocation
In order to be eligible to relocate, a Linux guest must be:

- Defined as a single configuration virtual machine
- Running in an ESA or XA virtual machine running ESA/390 or z/Appliance mode
- Logged on but disconnected
- Running only type CP or type IFL virtual processors
- IPLed from either a
  - Device
  - Named saved system (NSS)

If a guest is using a DCSS or NSS:

- Identical NSS or DCSS must be available on the destination member
- It cannot have the following types of page ranges
  - SW (shared write)
  - SC (shared with CP)
  - SN (shared with no data)
Guest Configuration for Live Guest Relocation (cont.)

- A guest can relocate if it has any of the following:
  - Dedicated devices
    - Equivalent devices and access must be available on destination member
  - Private v-disks
  - No open spool files other than console files
  - VSWITCHes
    - Equivalent VSWITCH and network connectivity must be available on destination

- A relocating guest can be using any of the following facilities:
  - Cryptographic adapter
    - Crypto cards for shared domains on source and destination must be same AP type
  - Virtual machine time bomb (Diag x‘288’)
  - IUCV connections to *MSG and *MSGALL CP system services
  - Application monitor record collection
    - If guest buffer is not in a shared DCSS
  - Single Console Image Facility
  - Collaborative Memory Management Assit (CMMA)
Getting Ready for z/VM Single System Image

Relocation Domains

Default domains:
- SSI
  - includes all members
- SSIMEMB1
- SSIMEMB2
- SSIMEMB3
- SSIMEMB4

"Customized" domains
- DOLPHIN includes members
  - SSIMEMB1
  - SSIMEMB2
- SWAN includes members
  - SSIMEMB2
  - SSIMEMB4
Relocation Domains (cont.)

- Set of members among which guests can relocate freely
  - Destination member does not need to support architecture or CP facilities that are available on the source member
  - "Maximal Common Subset"
    - Each domain is assigned a "virtual architecture" based on the least capable system in the domain
    - Guests have facilities available in their domain's "virtual architecture"
    - Guests can relocate to any system in their domain without losing capabilities

- Relocation domains are defined in the system configuration file or dynamically
  - Default (built-in) domains:
    - SSI (includes all members)
    - Single-member domains for each member

- Single-configuration virtual machines
  - Assigned to a relocation domain in directory or dynamically
  - Default domain is entire cluster

- Multiconfiguration virtual machines
  - Permanently assigned to single member domain for each member it can log on to
Summary

- New way to deploy z/VM images and resources
  - Benefit from clustering and virtual server mobility

- Planning and thought required
  - Capacity and equipment
  - Resource sharing
  - Virtual networks
  - Installation
    - SSI cluster configuration
    - Migrating from your current z/VM environment
  - User directory
    - Virtual machine (guest) definition and distribution
  - Live Guest Relocation

- New documentation to assist with
  - SSI Planning
  - Migrating to an SSI cluster
Thanks!

Contact Information:
John Franciscovich
IBM
z/VM Development
Endicott, NY

francisj@us.ibm.com