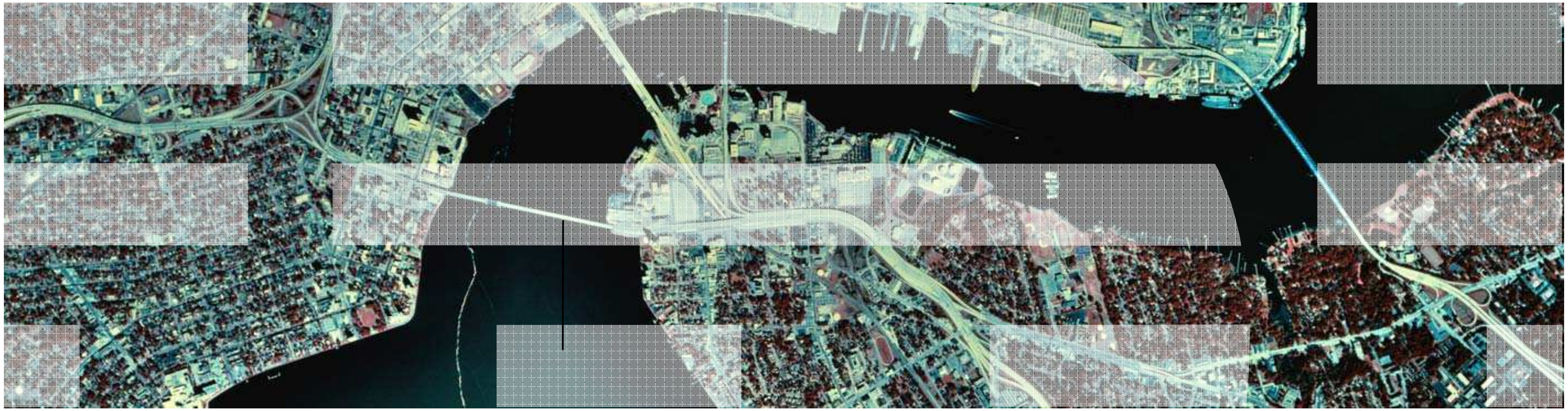
SHARE – March 2012
Session 10319

Planning and Migrating to z/VM Single System Image (SSI)

John Franciscovich
francisj@us.ibm.com

Emily Kate Hugenbruch
ekhugen@us.ibm.com



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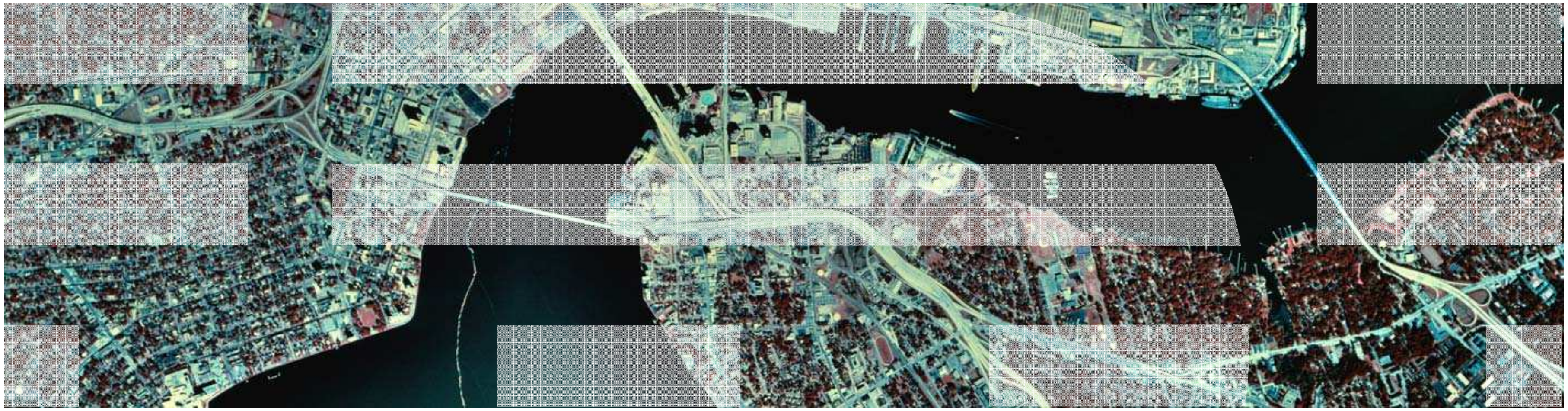
Topics

- z/VM 6.2 Installation Planning
- Planning and Configuring your SSI Cluster
- Migrating to SSI



z/VM 6.2
Installation Planning

New MAINT Userids

MAINT	**PMAINT**	**MAINT620**
Multi Configuration Virtual Machine	Single Configuration Virtual Machine	Single Configuration Virtual Machine
Owns CF1, CF3 parm disks, 190, 193, 19D, 19E, 401, 402, 990 CMS disks	Owns CF0 parm disk, 2CC, 550, 551 disks	Owns the service disks (e.g., 490, 493, 49D) and the CF2 parm disk
Use for work on a particular member, such as attaching devices, or relocating guests	Use for updating the system config, or for SSI-wide work, e.g., defining relocation domains	Use for applying 6.2.0 service. The CF2 parm disk contains 6.2.0 CPLOAD modules.

Minidisks for New MAINT Userids

Parm Disks *(Owner)*

- **CF0** ***(PMAINT)***
  - Common system configuration file
- **CF1** ***(MAINT)***
  - Production CPLOAD MODULE
- **CF2** ***(MAINT620)***
  - Used by SERVICE to hold test CPLOAD MODULE
- **CF3** ***(MAINT)***
  - Backup of CF1

Full Pack Minidisks

- **MAINT**

122	M01S01
123	M01RES
124	M01W01

- **MAINT620**

131	620RL1
132	620RL2
133	620RL3

- **PMAINT**

141	VMCOM1
142	VMCOM2

Minidisks for New MAINT Userids (by volume)

Cluster-Wide Volume (VMCOM1)

- PMAINT
  - **CF0** - Common system configuration file
  - **2CC** - Single source directory
  - **41D** - VMSES/E production inventory disk
  - **551** - SSI cluster common disk - contains utilities that must be at the highest level for all members of the SSI cluster, including

CPFMTXA, DIRECTXA, DIRMAP, DISKMAP

Release Volumes (620RLn)

- MAINT620
  - **490** - Test CMS system disk
  - **493** - Test system tools disk
  - **51D** - VMSES/E software inventory disk
  - **CF2** – Test parm disk

Which Type of Installation Should I Choose?

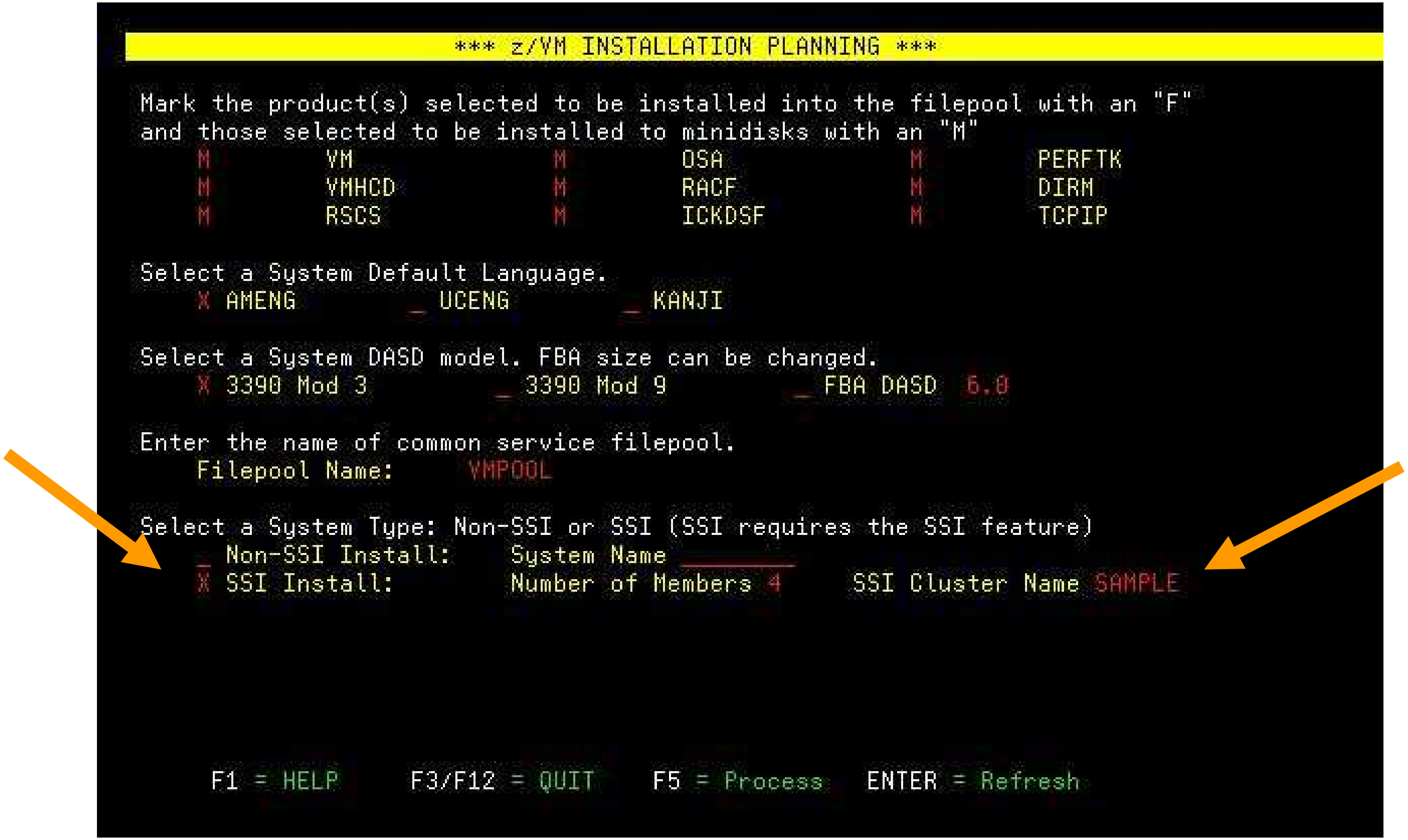
- **SSI Installation**
  - Single installation for multiple z/VM images
    - Can also install a single system configured as an SSI member
  - Installed and configured as an SSI cluster
    - Single source directory
    - Shared system configuration file
    - Creates Persistent Data Record (PDR) on 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

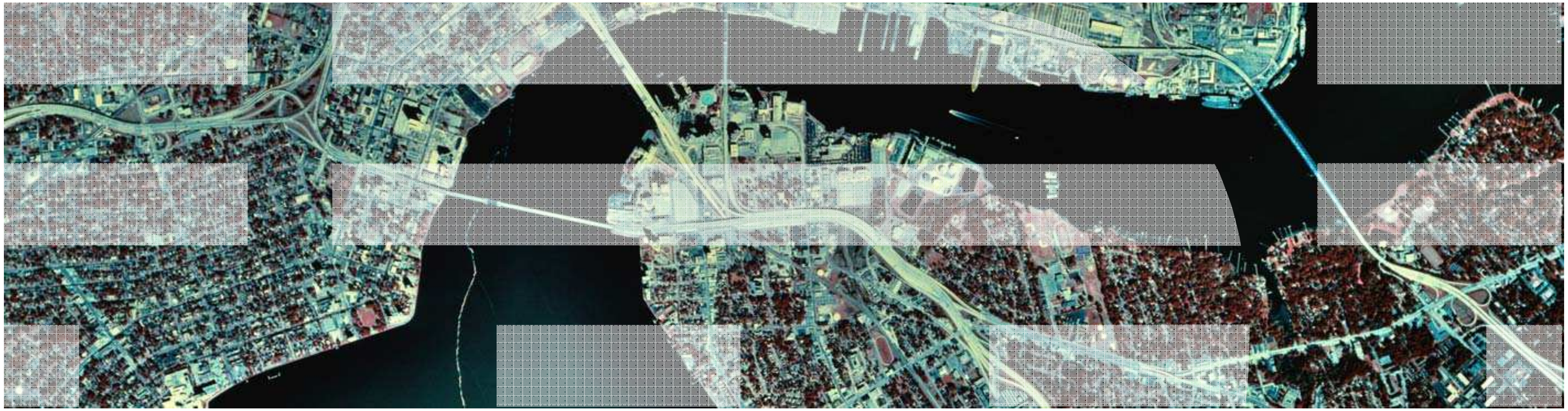
- Both types of installation are different from previous releases of z/VM
  - Userids
  - Disks
  - Directory
  - System configuration file

- Review documented migration scenarios before deciding whether to do SSI or non-SSI install
    - CP Planning and Administration
  - SSI installation primarily for new or "from scratch" installs

INSTPLAN - Select Installation Type



```
                        *** z/VM INSTALLATION PLANNING ***

 Mark the product(s) selected to be installed into the filepool with an "F"
 and those selected to be installed to minidisks with an "M"
     M        VM                 M        OSA                M        PERFTK
     M        VMHCD              M        RACF               M        DIRM
     M        RSCS               M        ICKDSF             M        TCPIP

 Select a System Default Language.
     X AMENG            _ UCENG            _ KANJI

 Select a System DASD model. FBA size can be changed.
     X 3390 Mod 3                _ 3390 Mod 9                _ FBA DASD  6.0

 Enter the name of common service filepool.
     Filepool Name:      VMPOOL

 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 SAMPLE




      F1 = HELP      F3/F12 = QUIT      F5 = Process      ENTER = Refresh
```



Planning and Configuring your SSI Cluster

SSI Cluster Requirements

- Servers must be IBM System z10 or later (z/VM Version 6)
- Shared and non-shared DASD
  - 3390 volume required for the PDR
  - All volumes should be cabled to all members
    - Makes non-shared disks accessible to other members to fix configuration problems
- LPARs
  - 1-16 FICON CTC devices between LPARs
    - Provide direct ISFC links from each member to all other members
  - FICON channels to shared DASD
  - OSA access to the same LAN segments
  - FCP access to same storage area networks (SANs) with same storage access rights
- Shared system configuration file for all members
- Shared source directory containing user definitions for all members
- Capacity planning for each member of the SSI cluster
  - Ensure sufficient resources are available to contain shifting workload
    - Guests that will relocate
    - Guests that logon to different members

SSI Cluster Topography

1. How many members in your cluster?

2. Production configuration
   - How many CECs?
   - How many LPARS/CEC?

     - *Suggested 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 “home" member?
   - Where can each guest be relocated?

   - *Distribute workload so each member has capacity to receive relocated guests*
     - CPU
     - Memory

SSI Planning Worksheet

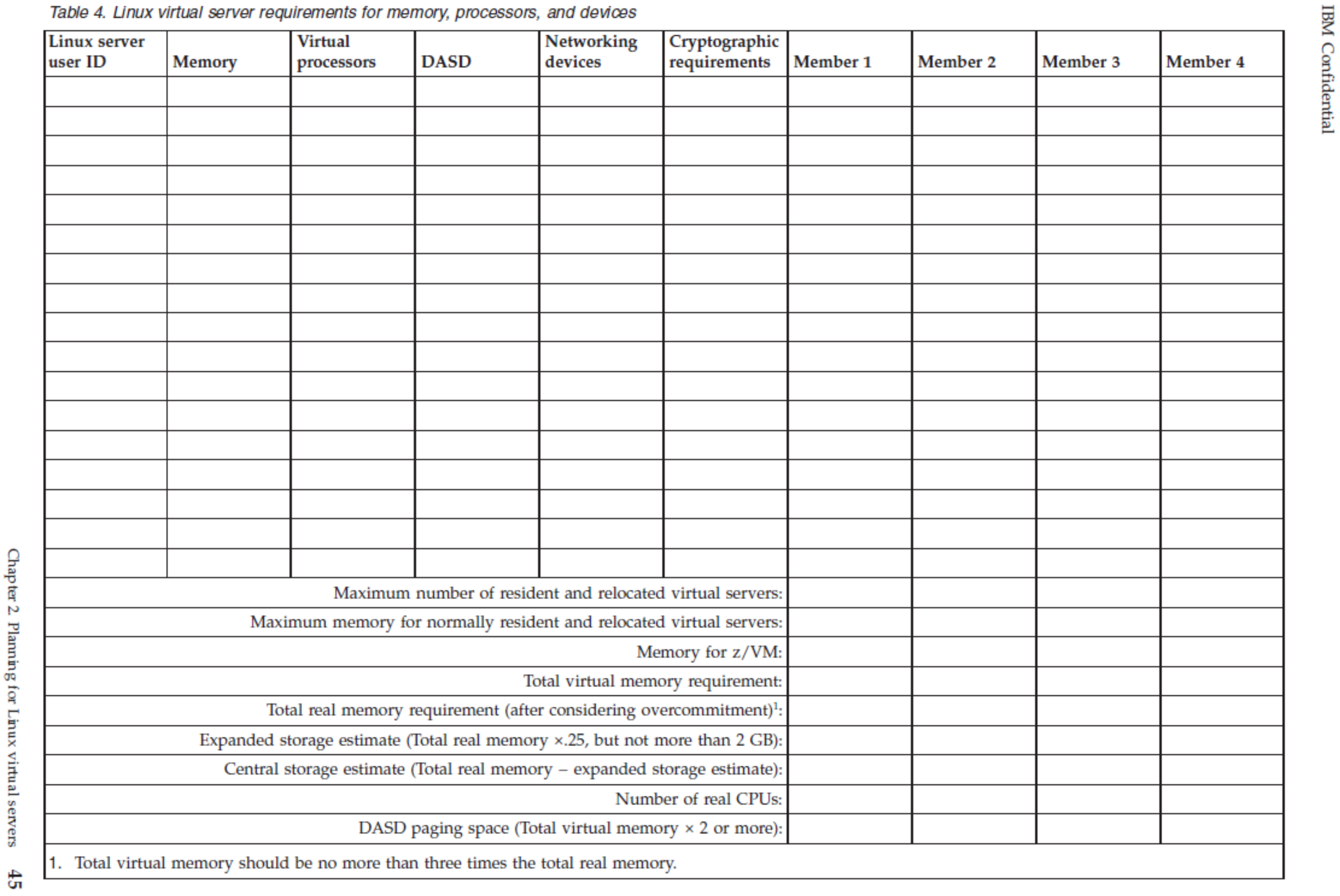


Table 4. Linux virtual server requirements for memory, processors, and devices

Linux server user ID	Memory	Virtual processors	DASD	Networking devices	Cryptographic requirements	Member 1	Member 2	Member 3	Member 4
Maximum number of resident and relocated virtual servers:									
Maximum memory for normally resident and relocated virtual servers:									
Memory for z/VM:									
Total virtual memory requirement:									
Total real memory requirement (after considering overcommitment)[1]:									
Expanded storage estimate (Total real memory ×.25, but not more than 2 GB):									
Central storage estimate (Total real memory – expanded storage estimate):									
Number of real CPUs:									
DASD paging space (Total virtual memory × 2 or more):									

1. Total virtual memory should be no more than three times the total real memory.

Chapter 2. Planning for Linux virtual servers 45

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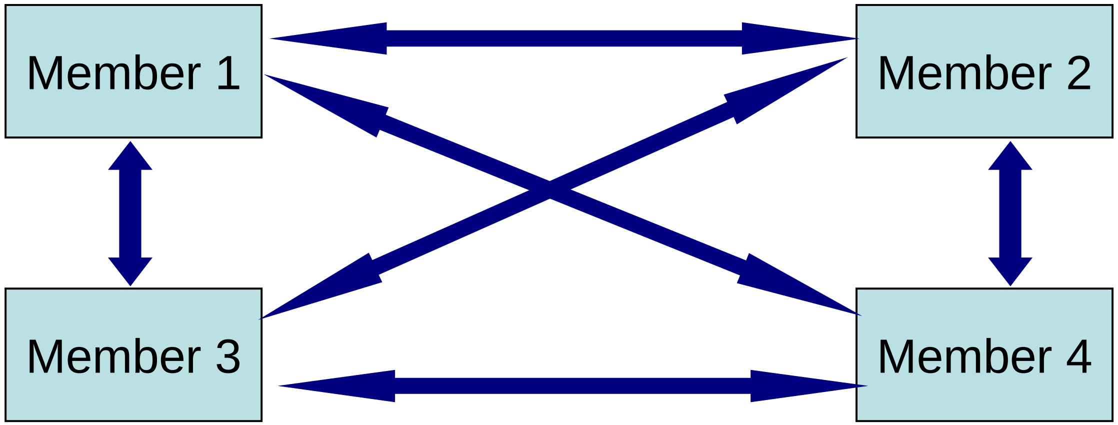
SSI Cluster Planning

- CTC connections
- DASD
- Networks
- Cluster and member configuration
- Shared Source Directory

CTC Connections

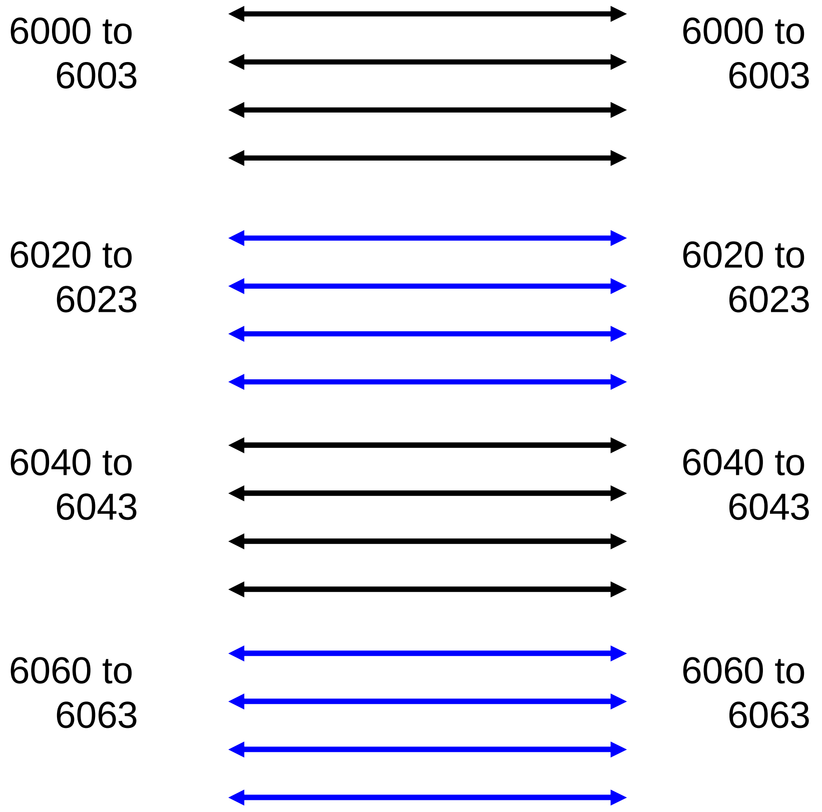
- Each member of an SSI cluster must have a direct ISFC connection to every other member (logical link)
- Logical links are composed of 1-16 CTC connections
  - FICON channel paths
  - May be switched or unswitched
- Use multiple CTCs distributed on multiple FICON channel paths between each pair of members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

Logical links between members



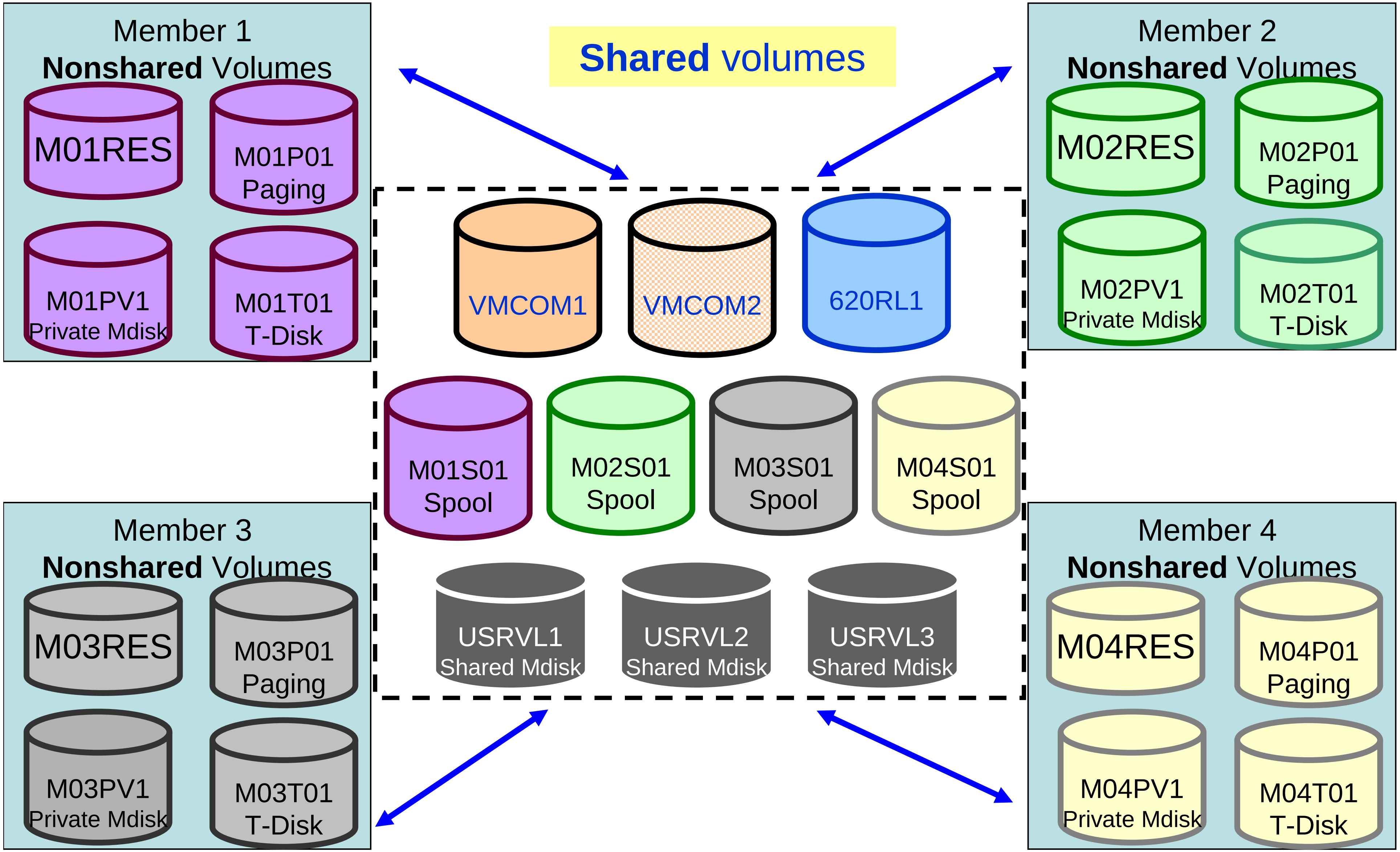
CTC Connections – How Many Do I Need?

- 4 CTC devices per per FICON chpid
  - provides most efficient ISFC data transfer
- For large guests, relocation and quiesce times improve with more chpids
  - Up to 4 chpid paths, with 4 CTCs each
    - *Additional factors affect relocation and quiesce times*



6000 to 6003
6000 to 6003
6020 to 6023
6020 to 6023
6040 to 6043
6040 to 6043
6060 to 6063
6060 to 6063

DASD Planning – Non-Shared and Shared System Volumes


Member 1
Nonshared Volumes
M01RES
M01P01
Paging
M01PV1
Private Mdisk
M01T01
T-Disk
Shared volumes
VMCOM1
VMCOM2
620RL1
M01S01
Spool
M02S01
Spool
M03S01
Spool
M04S01
Spool
USRVL1
Shared Mdisk
USRVL2
Shared Mdisk
USRVL3
Shared Mdisk
Member 2
Nonshared Volumes
M02RES
M02P01
Paging
M02PV1
Private Mdisk
M02T01
T-Disk
Member 3
Nonshared Volumes
M03RES
M03P01
Paging
M03PV1
Private Mdisk
M03T01
T-Disk
Member 4
Nonshared Volumes
M04RES
M04P01
Paging
M04PV1
Private Mdisk
M04T01
T-Disk

DASD Planning

- Decide which DASD volumes will be used for
  - Cluster-wide volume(s)
  - Release volumes
  - System volumes
    - Shared
    - Non-shared
  - User data (minidisks)
    - Shared
    - Non-shared
- Decide which member owns each CP-Owned volume

DASD Planning - CP Volume Ownership

- Link the full pack overlay for each CP-Owned volume
- Use **CPFMTXA** to add ownership information to each CP-Owned volume
  - Cluster name
  - System name of owning member

Volume	***Full Pack Overlay***	***Owner*** ***(CLUSTER.MEMBER)***
M01RES	**MAINT 123**	**MYCLUSTER.MEMBER1**
VMCOM1	**PMAINT 141**	**MYCLUSTER.NOSYS**
M01S01	**MAINT 122**	**MYCLUSTER.MEMBER1**
M01P01	**$PAGE$ A01**	**MYCLUSTER.MEMBER1**

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

DASD Planning – CP_OWNED List

Non-SSI

```
/***********************************************************************/
/*                     CP_Owned Volume Statements                     */
/***********************************************************************/
/*                                                SYSRES  VOLUME      */
/***********************************************************************/

          CP_Owned   Slot   1  M01RES

/***********************************************************************/
/*                                                 COMMON VOLUME      */
/***********************************************************************/

    CP_Owned   Slot   5  VMCOM1

/***********************************************************************/
/*                                           DUMP & SPOOL VOLUMES     */
/***********************************************************************/

    CP_Owned   Slot  10  M01S01

/***********************************************************************/
/*                                           PAGE & TDISK VOLUMES     */
/***********************************************************************/

           CP_Owned   Slot 255  M01P01
```

DASD Planning – CP_OWNED List

SSI

```
/**********************************************************************/
/*                     CP_Owned Volume Statements                     */
/**********************************************************************/
/*                                                SYSRES  VOLUME      */
/**********************************************************************/

MEMBER1:   CP_Owned   Slot   1  M01RES

/**********************************************************************/
/*                                                 COMMON VOLUME      */
/**********************************************************************/

    CP_Owned   Slot   5  VMCOM1

/**********************************************************************/
/*                                           DUMP & SPOOL VOLUMES     */
/**********************************************************************/

    CP_Owned   Slot  10  M01S01

/**********************************************************************/
/*                                           PAGE & TDISK VOLUMES     */
/**********************************************************************/

MEMBER1:   CP_Owned   Slot 255  M01P01
```

DASD Planning – USER_VOLUME_LIST

Non-SSI

```
/**********************************************************************/
/*                          User_Volume_List                          */
/**********************************************************************/
/* These volumes contain the minidisks for your guests, as well as    */
/* the product disks for z/VM. Volumes that are not intended to hold  */
/* "local" minidisks, i.e., minidisks that would be unique to a       */
/* single system, should be kept on separate volumes.                 */

/**********************************************************************/
/* Shared User Volumes                                                */
/**********************************************************************/
           User_Volume_List  620RL1 620RL2 USRVL1

/**********************************************************************/
/* User volumes for local minidisks                                   */
/**********************************************************************/

           User_Volume_List  M01W01
```

DASD Planning – USER_VOLUME_LIST

SSI

```
/**********************************************************************/
/*                          User_Volume_List                          */
/**********************************************************************/
/* These volumes contain the minidisks for your guests, as well as    */
/* the product disks for z/VM. Volumes that are not intended to hold  */
/* "local" minidisks, i.e., minidisks that would be unique to a       */
/* single system, should be kept on separate volumes.                 */

/**********************************************************************/
/* Shared User Volumes                                                */
/**********************************************************************/
           User_Volume_List  620RL1 620RL2 USRVL1

/**********************************************************************/
/* User volumes for local minidisks                                   */
/**********************************************************************/

MEMBER1:   User_Volume_List  M01W01 M01PV1
```

Networks in an SSI

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

- Assign equivalence identifiers (EQIDs) to all network devices
  - Devices assigned same EQID on each member must be
    - same type
    - have the same capabilities
    - have connectivity to the same destinations

- Updates to the main TCPIP stack configuration
  - *PROFILE TCPIP* now can have member-specific names like
    - *MEMBER1 TCPIP*
    - *MEMBER2 TCPIP*
  - *TCPIP DATA* file can be shared among SSI members, so you can add system qualifiers to statements like **HOSTNAME**

Networks in an SSI – Virtual Switches

- Define virtual switches with same name 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 mode)
  - Source and destination virtual switches must be equivalent
    - Name and type
    - VLAN settings
    - Operational UPLINK port with matching EQID
    - Device and port numbers need not match, but connectivity to the same LAN segment is required

Networks in an SSI – 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 (e.g., 02-00-01 for member 1)
  - 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
    - Because MAC assignment is coordinated among members
  - 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
```

Cluster and Member Configuration – SYSTEM_IDENTIFIER Statement

Non-SSI

```
/**********************************************************************/
/*             SYSTEM CONFIG FILE                                     */
/**********************************************************************/
/*                                                                    */
/*  Refer to CP Planning and Administration for SYSTEM CONFIG rules   */
/*                                                                    */
/*  Warning - Always run CPSYNTAX after updating the SYSTEM CONFIG    */
/*                                                                    */
/**********************************************************************/

/**********************************************************************/
/*                   System_Identifier Information                    */
/**********************************************************************/

System_Identifier  *     *   MEMBER1
```

Cluster and Member Configuration – SYSTEM_IDENTIFIER Statement

SSI

```
/**********************************************************************/
/*             SYSTEM CONFIG FILE                                     */
/**********************************************************************/
/*                                                                    */
/*  Refer to CP Planning and Administration for SYSTEM CONFIG rules   */
/*                                                                    */
/*  Warning - Always run CPSYNTAX after updating the SYSTEM CONFIG    */
/*                                                                    */
/**********************************************************************/

/**********************************************************************/
/*                   System_Identifier Information                    */
/**********************************************************************/

System_Identifier LPAR LP01 MEMBER1
```

Cluster and Member Configuration – SSI Statement

```
/**********************************************************************/
/*                   SSI Statement                                    */
/**********************************************************************/

SSI MYCLUSTR PDR_Volume VMCOM1 ,
Slot 1 MEMBER1

```

Cluster and Member Configuration – SYSTEM_RESIDENCE Statement

Non-SSI

```
/**********************************************************************/
/*                Checkpoint and Warmstart Information                */
/**********************************************************************/

System_Residence,
    Checkpoint  Volid M01RES    From CYL 21  For 9 ,
    Warmstart   Volid M01RES    From CYL 30  For 9

```

Cluster and Member Configuration – SYSTEM_RESIDENCE Statement

SSI

```
/**********************************************************************/
/*                Checkpoint and Warmstart Information                */
/**********************************************************************/

MEMBER1:   System_Residence,
    Checkpoint  Volid M01RES    From CYL 21  For 9 ,
    Warmstart   Volid M01RES    From CYL 30  For 9

```

Cluster and Member Configuration – Additional Steps

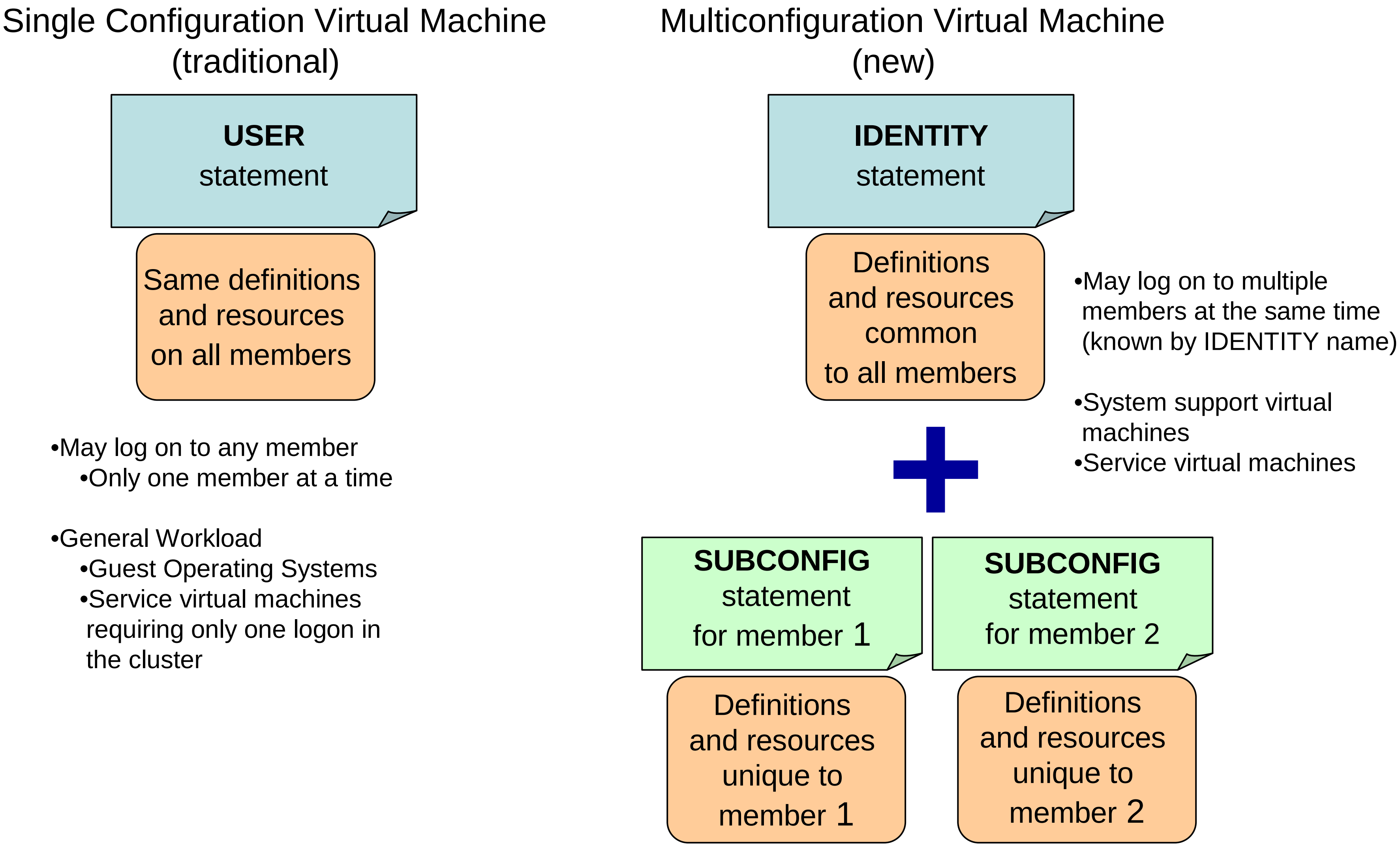
- Enable the SSI feature

- If you're migrating from non-SSI to SSI, you'll want to enable the **PROMPT_AFTER_SHUTDOWN_REIPL** feature before you reIPL, so you can do a cold start

- Run CPSYNTAX

```
cpsyntax sysnew config (system member1
CONFIGURATION FILE PROCESSING COMPLETE -- NO ERRORS ENCOUNTERED.
```

Shared Source Directory – Virtual Machine Definition Types



Single Configuration Virtual Machine (traditional)

USER
statement

Same definitions and resources on all members

- 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

Multiconfiguration Virtual Machine (new)

IDENTITY
statement

Definitions and resources common to all members

- May log on to multiple members at the same time (known by IDENTITY name)

- System support virtual machines
- Service virtual machines

SUBCONFIG
statement
for member 1

Definitions and resources unique to member 1

SUBCONFIG
statement
for member 2

Definitions and resources unique to member 2

Shared Source Directory – Global and Local disks

- For each guest you're turning into a multiconfiguration virtual machine, decide which disks should be global and which should be local
  - You may want to split existing disks into global and local.

Global	Local
•All instances have access	•Only one instance has access
•Usually R/O	•Usually R/W
•EXECs	•Log files
•Control files	•Work files

Shared Source Directory - New Layout

- IBM-supplied directory will be significantly different than in 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 defined as multiconfiguration virtual machines

- Determine if any of your guests 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

Shared Source Directory - Multiconfiguration Virtual Machine Definition

```
  IDENTITY MAINT    MAINTPAS     128M 1000M ABCDEFG

  BUILD ON SSIMEMB1 USING SUBCONFIG MAINT-1
  BUILD ON SSIMEMB2 USING SUBCONFIG MAINT-2
  BUILD ON SSIMEMB3 USING SUBCONFIG MAINT-3
  BUILD ON SSIMEMB4 USING SUBCONFIG MAINT-4

  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

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

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

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

 SUBCONFIG MAINT-4
  MDISK 0191 3390 1000 20 MNTVL4 WR
  MDISK CF1  3390 100  20 M04RES RR
 * END OF MAINT-4
```

These statements apply to all instances of MAINT on all members

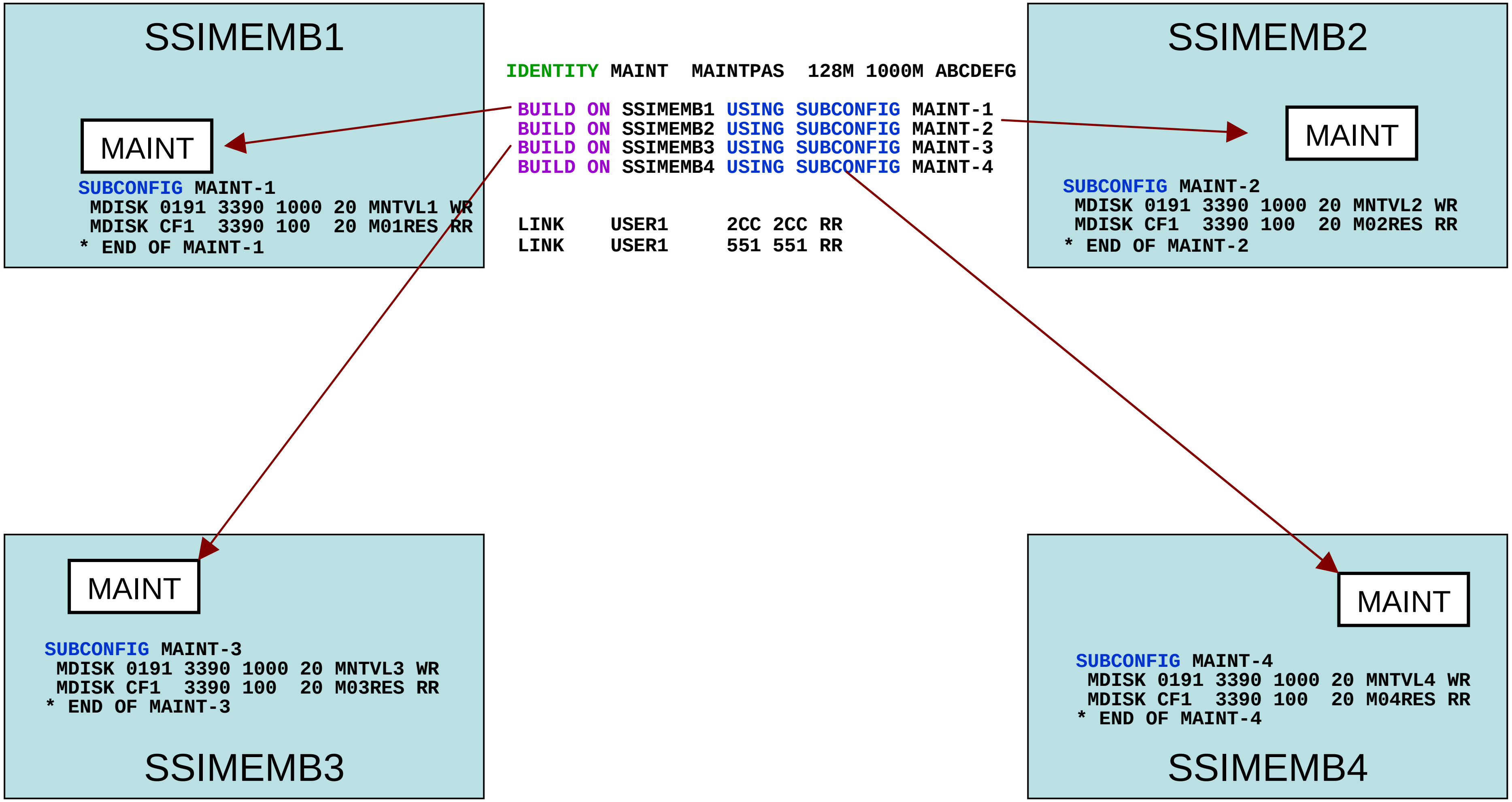
These statements only apply to MAINT on member SSIMEMB1

These statements only apply to MAINT on member SSIMEMB2

These statements only apply to MAINT on member SSIMEMB3

These statements only apply to MAINT on member SSIMEMB4

Shared Source Directory – Multiconfiguration Virtual Machines



SSIMEMB1

MAINT

```
SUBCONFIG MAINT-1
 MDISK 0191 3390 1000 20 MNTVL1 WR
 MDISK CF1  3390 100  20 M01RES RR
* END OF MAINT-1
```

```
IDENTITY MAINT  MAINTPAS  128M 1000M ABCDEFG
 BUILD ON SSIMEMB1 USING SUBCONFIG MAINT-1
 BUILD ON SSIMEMB2 USING SUBCONFIG MAINT-2
 BUILD ON SSIMEMB3 USING SUBCONFIG MAINT-3
 BUILD ON SSIMEMB4 USING SUBCONFIG MAINT-4

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

SSIMEMB2

MAINT

```
SUBCONFIG MAINT-2
 MDISK 0191 3390 1000 20 MNTVL2 WR
 MDISK CF1  3390 100  20 M02RES RR
* END OF MAINT-2
```

MAINT

```
SUBCONFIG MAINT-3
 MDISK 0191 3390 1000 20 MNTVL3 WR
 MDISK CF1  3390 100  20 M03RES RR
* END OF MAINT-3
```

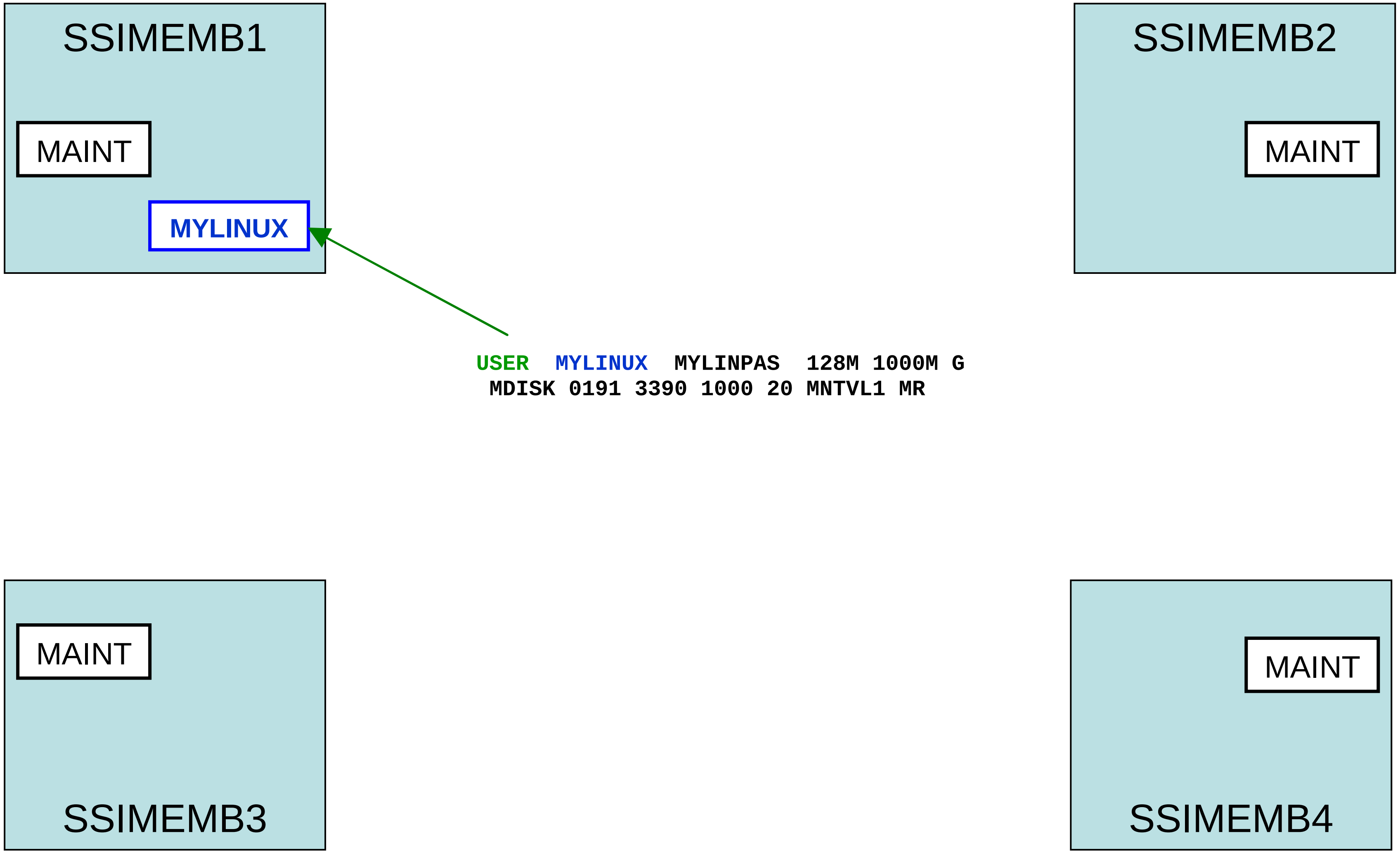
SSIMEMB3

MAINT

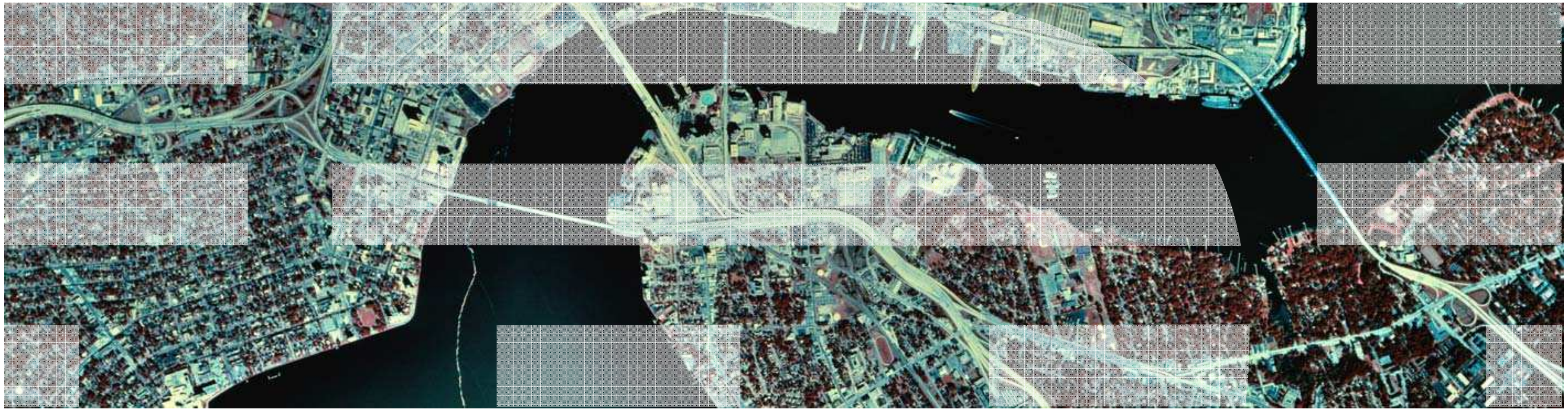
```
SUBCONFIG MAINT-4
 MDISK 0191 3390 1000 20 MNTVL4 WR
 MDISK CF1  3390 100  20 M04RES RR
* END OF MAINT-4
```

SSIMEMB4

Shared Source Directory – Single Configuration Virtual Machines


SSIMEMB1
MAINT
MYLINUX
SSIMEMB2
MAINT
MAINT
SSIMEMB3
MAINT
SSIMEMB4

```
USER  MYLINUX  MYLINPAS  128M 1000M G
 MDISK 0191 3390 1000 20 MNTVL1 MR
```



Migrating to SSI

Use Case Scenarios

- Migration procedures for existing z/VM environments
  - Documented in CP Planning and Administration
    - 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

Migrating from a Non-SSI 6.2.0 system to a Single Member SSI

1. Prepare the New DASD Volumes
2. Update the System Configuration File
3. Update the User Directory
4. Manage the User Spool Files
5. Prepare the CP-Owned Volumes
6. Create the PDR
7. Modify the Startup Parameters for the VMPSFS File Pool
8. Shut Down and Cold Start
9. Load the Spool Files
10. Change the User Directory to SSI-Enabled

"SSI-enable" the Shared Source Directory

Non-SSI

```
***************************************************************
*  z/VM 6.2.0  SYSTEM DIRECTORY                               *
***************************************************************
*                                                             *
*  THE ADDRESSES 123 THROUGH 133 ARE VIRTUAL ADDRESSES.       *
*                                                             *
*  NOTES:                                                     *
*  REMEMBER THESE ARE ONLY VIRTUAL ADDRESSES NOT REAL         *
*  ADDRESSES, SO THERE IS NO NEED TO CHANGE THEM TO MATCH     *
*  YOUR HARDWARE ADDRESSES.                                   *
*                                                             *
*                                                             *
***************************************************************
*                                                             *
*  FOR A DESCRIPTION OF DIRECTORY STATEMENTS SEE:             *
*     VM ENTERPRISE SYSTEM ARCHITECTURE                       *
*     PLANNING AND ADMINISTRATION MANUAL.                     *
*                                                             *
***************************************************************
*
*
*

DIRECTORY 123 3390 M01RES
```

"SSI-enable" the Shared Source Directory

SSI

```
***************************************************************
*  z/VM 6.2.0  SYSTEM DIRECTORY                               *
***************************************************************
*                                                             *
*  THE ADDRESSES 123 THROUGH 133 ARE VIRTUAL ADDRESSES.       *
*                                                             *
*  NOTES:                                                     *
*  REMEMBER THESE ARE ONLY VIRTUAL ADDRESSES NOT REAL         *
*  ADDRESSES, SO THERE IS NO NEED TO CHANGE THEM TO MATCH     *
*  YOUR HARDWARE ADDRESSES.                                   *
*                                                             *
*                                                             *
***************************************************************
*                                                             *
*  FOR A DESCRIPTION OF DIRECTORY STATEMENTS SEE:             *
*     VM ENTERPRISE SYSTEM ARCHITECTURE                       *
*     PLANNING AND ADMINISTRATION MANUAL.                     *
*                                                             *
***************************************************************
*
*
*

DIRECTORY SSI 123 3390 M01RES M02RES M03RES M04RES
```

"SSI-enable" the Shared Source Directory

- Update the **BUILD** statements with the actual member name
  - Multiconfiguration virtual machines will have asterisks instead of machine names
- Run **DIRECTXA** to put the new directory into production

Non-SSI

```
165 IDENTITY MAINT MAINT 128M 1000M ABCDEFG
166  BUILD ON *        USING SUBCONFIG MAINT-1
```

"SSI-enable" the Shared Source Directory

- Update the **BUILD** statements with the actual member name
  - Multiconfiguration virtual machines will have asterisks instead of machine names
- Run **DIRECTXA** to put the new directory into production

SSI

```
165 IDENTITY MAINT MAINT 128M 1000M ABCDEFG
166  BUILD ON MEMBER1 USING SUBCONFIG MAINT-1
```

Create the Persistent Data Record (PDR)

- **LINK** the fullpack overlay of *VMCOM1*, **PMAINT** *141*

```
formssi create 141 myclustr
HCPPDF6613R Device 0141 label is VMCOM1 - continue (Yes/No)?
yes
HCPPDF6614I Persistent Data Record created on device 0141
Ready; T=0.01/0.01 14:35:48

formssi display 141
HCPPDF6618I Persistent Data Record on device 0141 (label VMCOM1) is for MYCLUSTR
HCPPDF6619I PDR                 state: Unlocked
HCPPDF6619I                time stamp: 09/23/11 14:35:48
HCPPDF6619I     cross-system timeouts: Enabled
Ready; T=0.01/0.01 14:35:54
```

Changes to the VMPSYS file pool

- In the *VMSERVP DMSPARMS* file, change the **LOCAL** startup parameter to **SSI**:

Non-SSI

```
00001 ADMIN MAINT MAINT620
AUTOLOG1
00002 NOBACKUP
00003 SAVESEGID CMSFILES
00004 LOCAL
00005 FILEPOOLID SERVPOOL
00006 USERS 100
```

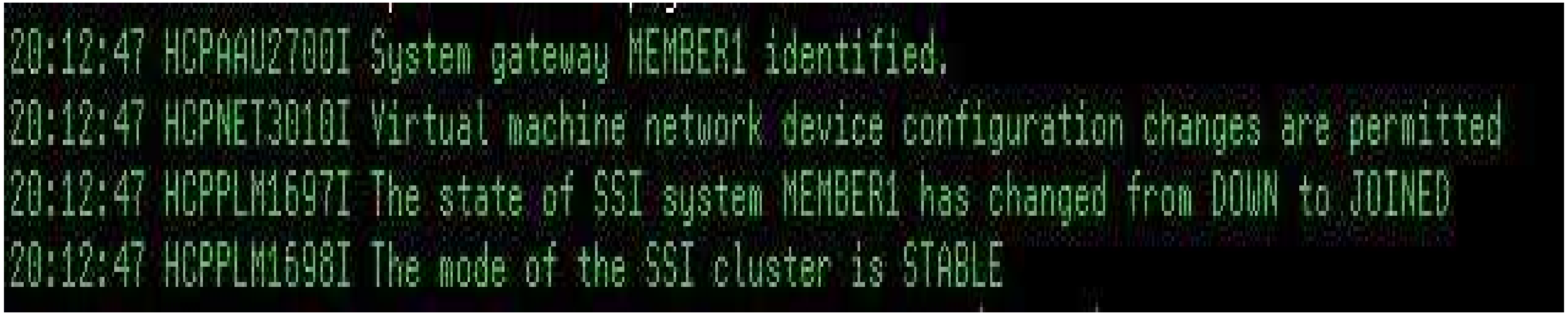
Changes to the VMPSYS file pool

- In the *VMSERVP DMSPARMS* file, change the **LOCAL** startup parameter to **SSI**:

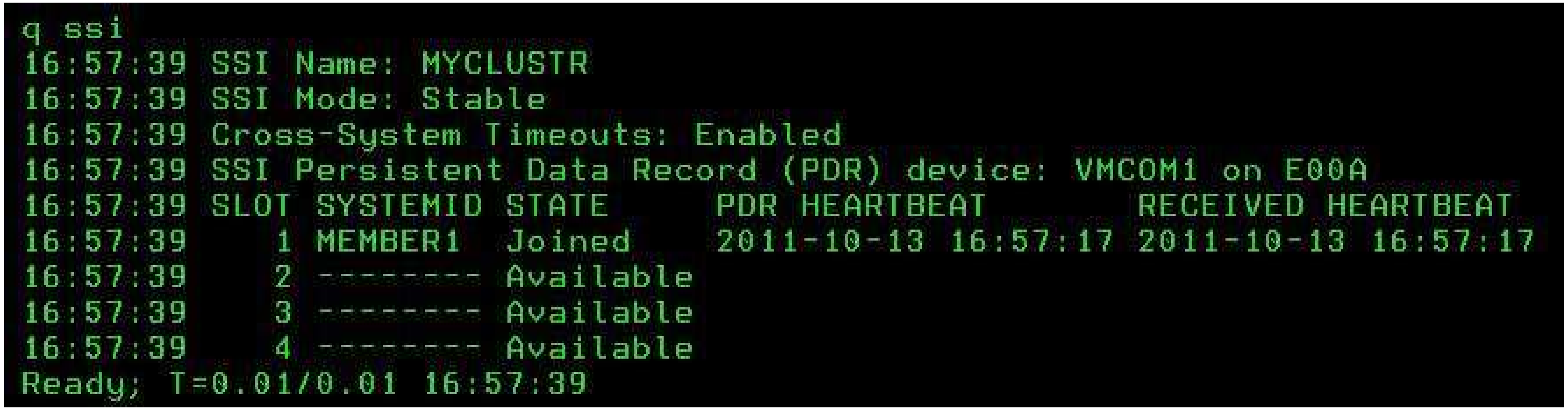
SSI

```
00001 ADMIN MAINT MAINT620
AUTOLOG1
00002 NOBACKUP
00003 SAVESEGID CMSFILES
00004 SSI
00005 FILEPOOLID SERVPOOL
00006 USERS 100
```

IPL the Single (First) Member of your SSI Cluster



```
20:12:47 HCPAAU2700I System gateway MEMBER1 identified.
20:12:47 HCPNET3010I Virtual machine network device configuration changes are permitted
20:12:47 HCPPLM1697I The state of SSI system MEMBER1 has changed from DOWN to JOINED
20:12:47 HCPPLM1698I The mode of the SSI cluster is STABLE
```

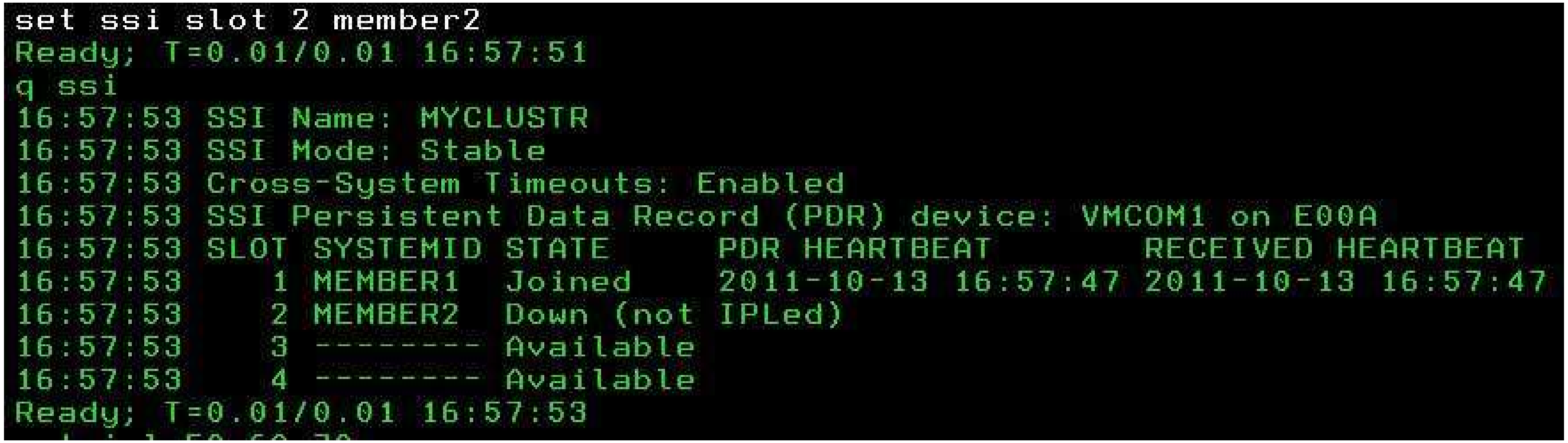


```
q ssi
16:57:39 SSI Name: MYCLUSTR
16:57:39 SSI Mode: Stable
16:57:39 Cross-System Timeouts: Enabled
16:57:39 SSI Persistent Data Record (PDR) device: VMCOM1 on E00A
16:57:39 SLOT SYSTEMID STATE     PDR HEARTBEAT       RECEIVED HEARTBEAT
16:57:39    1 MEMBER1  Joined    2011-10-13 16:57:17 2011-10-13 16:57:17
16:57:39    2 -------- Available
16:57:39    3 -------- Available
16:57:39    4 -------- Available
Ready; T=0.01/0.01 16:57:39
```

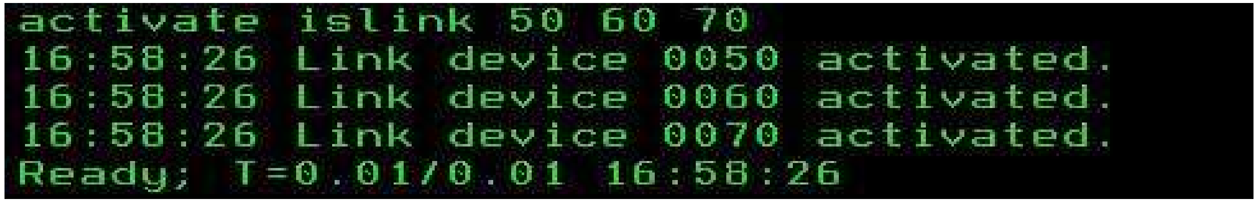
Adding a Second Member to Create a Two-member Cluster

1. Format the new member's volumes
2. Create the new member's services' configurations
3. Copy the member-specific volumes
4. Update the user directory
5. Update the shared system configuration
6. Enable the existing member to access the new member
7. IPL the new member
8. Update the Product Inventory Table
9. Build the saved segments
10. **XAUTOLOG AUTOLOG1** and check MEMBER2

Enable Existing Members to Accept the New Member



```
set ssi slot 2 member2
Ready; T=0.01/0.01 16:57:51
q ssi
16:57:53 SSI Name: MYCLUSTR
16:57:53 SSI Mode: Stable
16:57:53 Cross-System Timeouts: Enabled
16:57:53 SSI Persistent Data Record (PDR) device: VMCOM1 on E00A
16:57:53 SLOT SYSTEMID STATE     PDR HEARTBEAT       RECEIVED HEARTBEAT
16:57:53    1 MEMBER1  Joined    2011-10-13 16:57:47 2011-10-13 16:57:47
16:57:53    2 MEMBER2  Down (not IPLed)
16:57:53    3 -------- Available
16:57:53    4 -------- Available
Ready; T=0.01/0.01 16:57:53
```



```
activate islink 50 60 70
16:58:26 Link device 0050 activated.
16:58:26 Link device 0060 activated.
16:58:26 Link device 0070 activated.
Ready; T=0.01/0.01 16:58:26
```

Summary

- SSI is a 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

More Information

z/VM 6.2 resources

http://www.vm.ibm.com/zvm620/

z/VM Single System Image Overview

http://www.vm.ibm.com/ssi/

Redbook – An Introduction to z/VM SSI and LGR

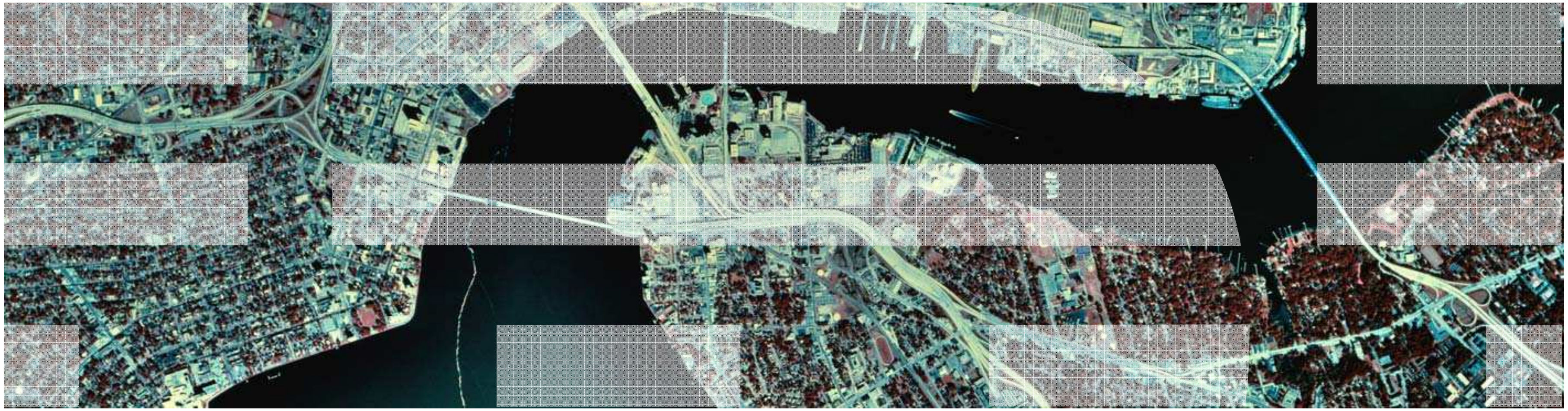
http://publib-b.boulder.ibm.com/redpieces/abstracts/sg248006.html?Open

Thanks!

Contact Information:

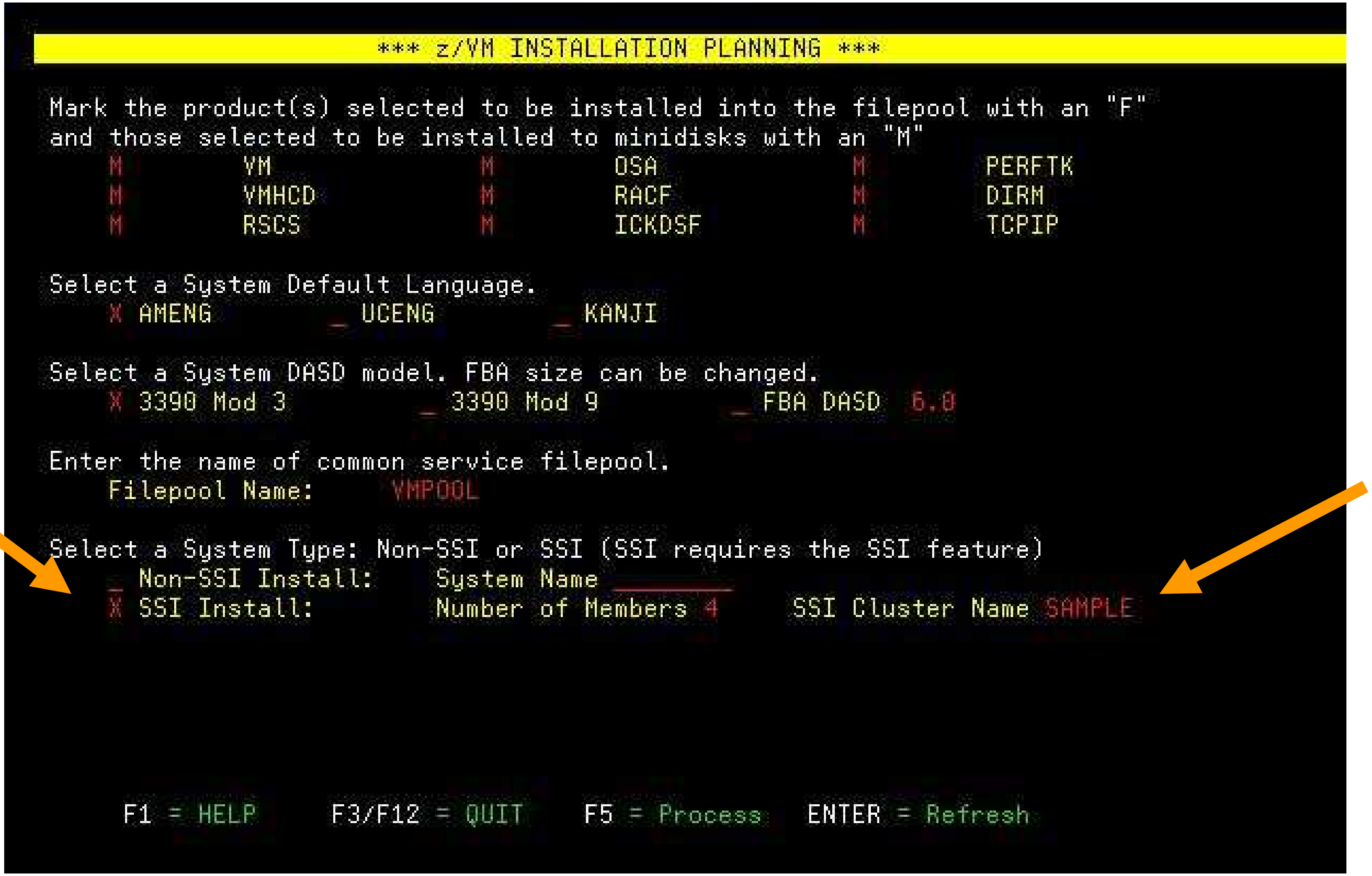
John Franciscovich
IBM
z/VM Development
Endicott, NY

francisj@us.ibm.com



Additional Information

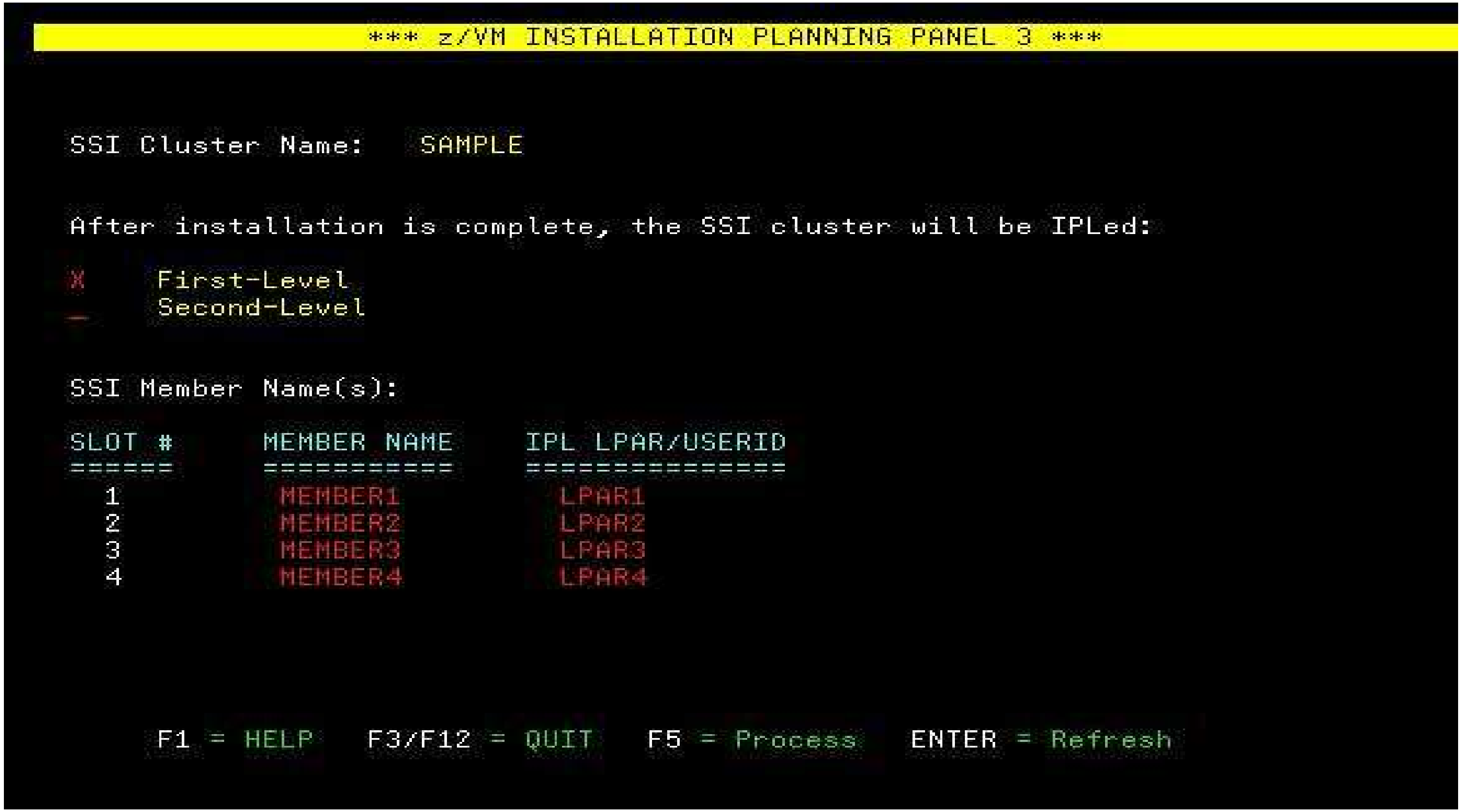
INSTPLAN - Select Installation Type



```
                       *** z/VM INSTALLATION PLANNING ***

 Mark the product(s) selected to be installed into the filepool with an "F"
 and those selected to be installed to minidisks with an "M"
     M        VM                 M        OSA                M        PERFTK
     M        VMHCD              M        RACF               M        DIRM
     M        RSCS               M        ICKDSF             M        TCPIP

 Select a System Default Language.
     X AMENG           _ UCENG           _ KANJI

 Select a System DASD model. FBA size can be changed.
     X 3390 Mod 3           _ 3390 Mod 9          _ FBA DASD  6.0

 Enter the name of common service filepool.
     Filepool Name:     VMPOOL

 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 SAMPLE




      F1 = HELP     F3/F12 = QUIT     F5 = Process     ENTER = Refresh
```

INSTPLAN - SSI Installation

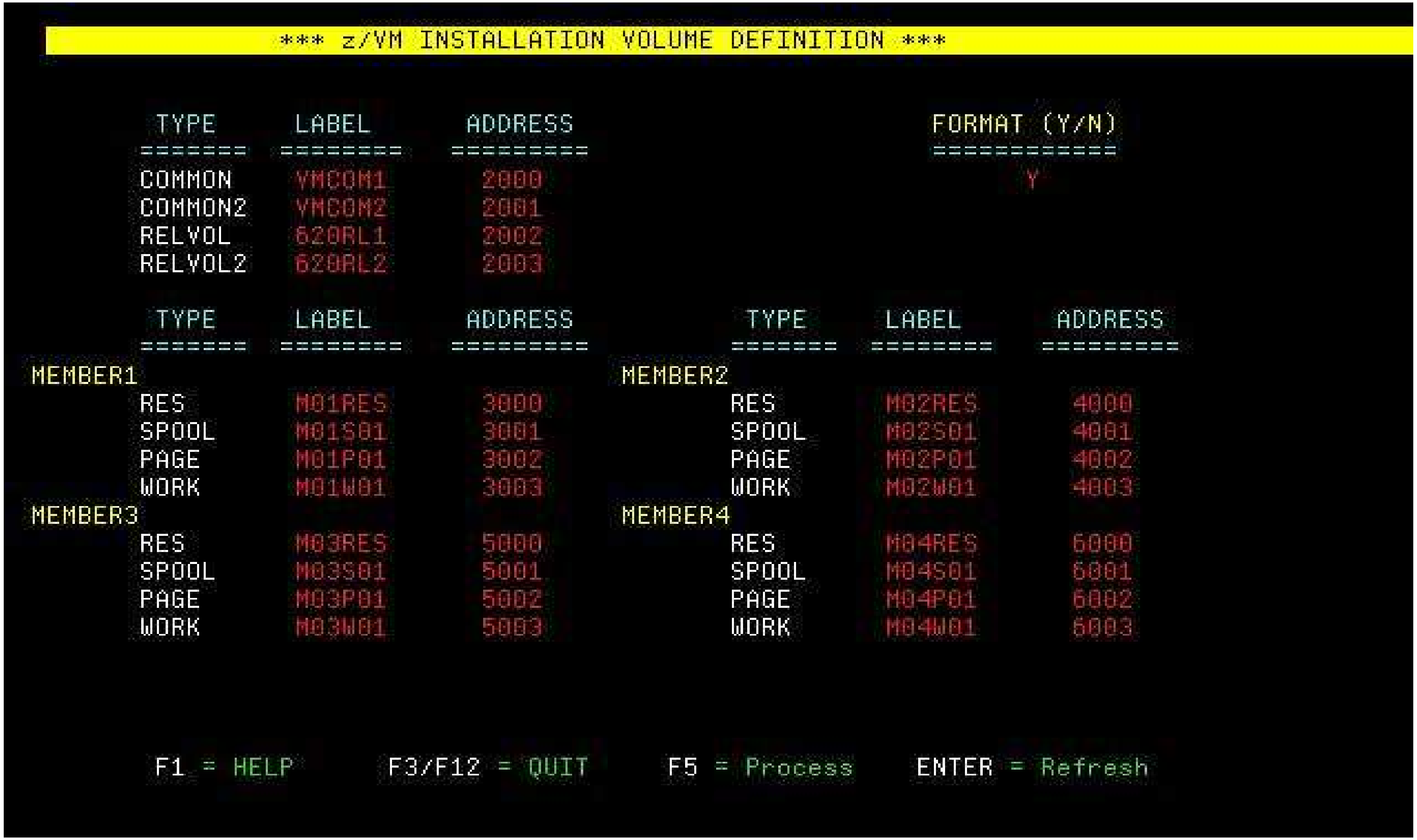
Select first or second level and identify SSI member systems



```
                   *** z/VM INSTALLATION PLANNING PANEL 3 ***


  SSI Cluster Name:   SAMPLE


  After installation is complete, the SSI cluster will be IPLed:

  X    First-Level
  _    Second-Level


  SSI Member Name(s):

  SLOT #      MEMBER NAME     IPL LPAR/USERID
  ======      ===========     ===============
    1          MEMBER1          LPAR1
    2          MEMBER2          LPAR2
    3          MEMBER3          LPAR3
    4          MEMBER4          LPAR4



       F1 = HELP   F3/F12 = QUIT   F5 = Process   ENTER = Refresh
```

INSTPLAN - SSI Installation (cont.)

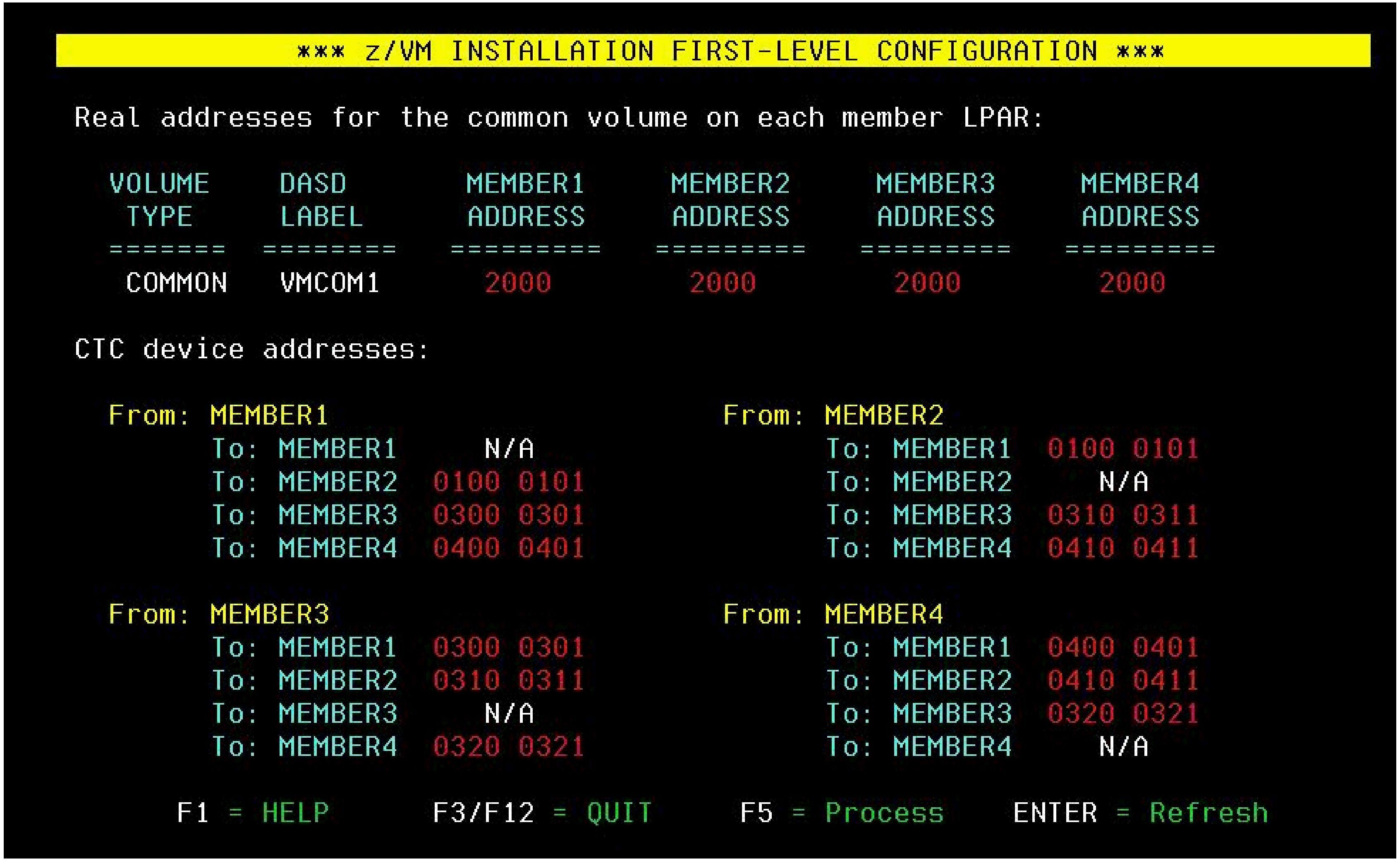
Define CP-Owned and Release volumes for all members



```
                  *** z/VM INSTALLATION VOLUME DEFINITION ***


       TYPE      LABEL       ADDRESS                      FORMAT (Y/N)
      =======   ========   =========                      ============
      COMMON     VMCOM1       2000                             Y
      COMMON2    VMCOM2       2001
      RELVOL     620RL1       2002
      RELVOL2    620RL2       2003

       TYPE      LABEL       ADDRESS          TYPE      LABEL      ADDRESS
      =======   ========   =========         =======   ========   =========
MEMBER1                               MEMBER2
      RES        M01RES       3000           RES        M02RES      4000
      SPOOL      M01S01       3001           SPOOL      M02S01      4001
      PAGE       M01P01       3002           PAGE       M02P01      4002
      WORK       M01W01       3003           WORK       M02W01      4003
MEMBER3                               MEMBER4
      RES        M03RES       5000           RES        M04RES      6000
      SPOOL      M03S01       5001           SPOOL      M04S01      6001
      PAGE       M03P01       5002           PAGE       M04P01      6002
      WORK       M03W01       5003           WORK       M04W01      6003



       F1 = HELP      F3/F12 = QUIT      F5 = Process      ENTER = Refresh
```

INSTPLAN - SSI Installation (cont.)

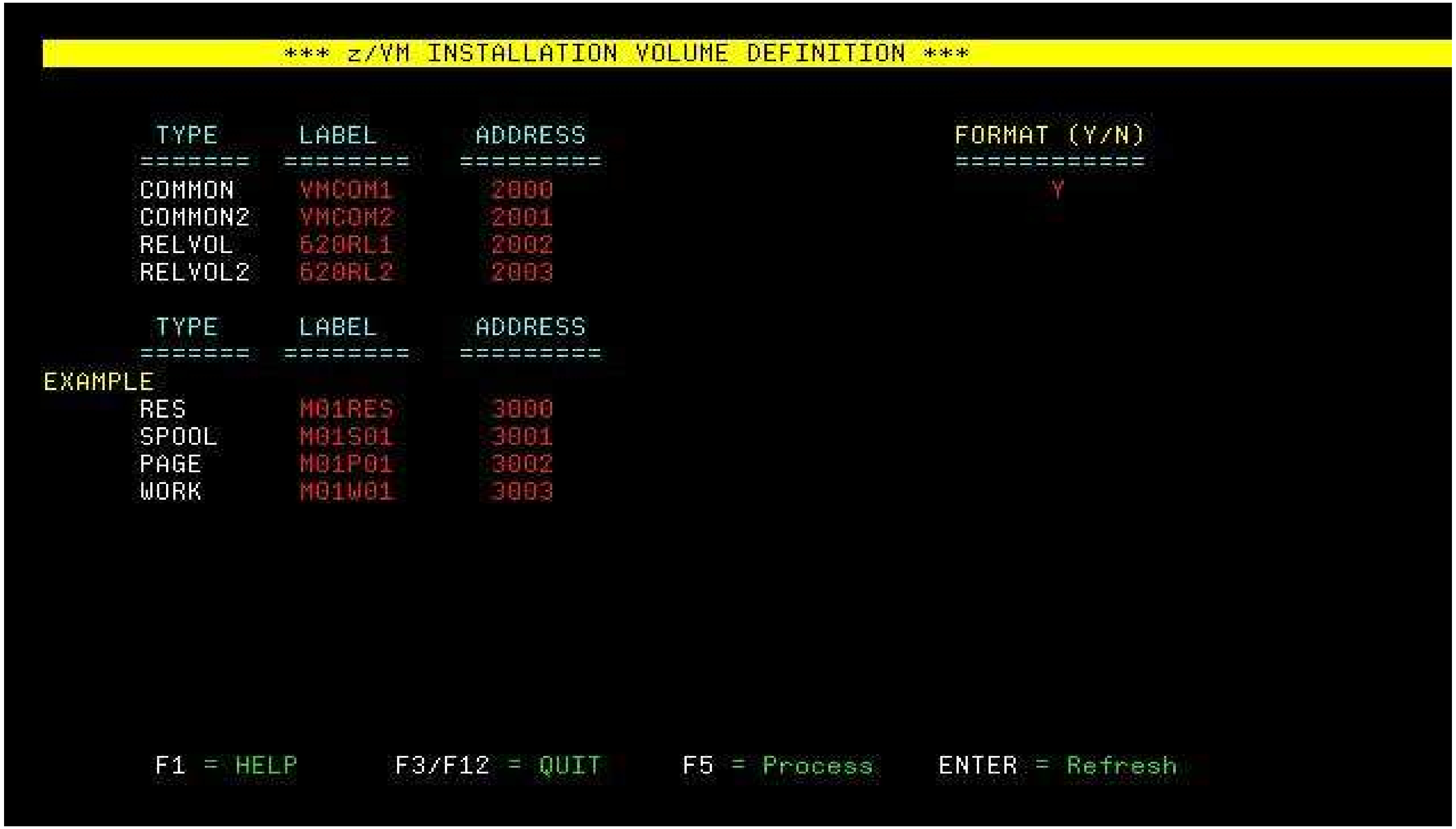
Define Common Volume and CTC Device addresses



```
                *** z/VM INSTALLATION FIRST-LEVEL CONFIGURATION ***

 Real addresses for the common volume on each member LPAR:

   VOLUME    DASD       MEMBER1     MEMBER2     MEMBER3     MEMBER4
    TYPE     LABEL      ADDRESS     ADDRESS     ADDRESS     ADDRESS
   =======  ========   =========   =========   =========   =========
    COMMON   VMCOM1       2000        2000        2000        2000

 CTC device addresses:

   From:  MEMBER1                          From:  MEMBER2
          To:  MEMBER1      N/A                   To:  MEMBER1  0100 0101
          To:  MEMBER2  0100 0101                 To:  MEMBER2      N/A
          To:  MEMBER3  0300 0301                 To:  MEMBER3  0310 0311
          To:  MEMBER4  0400 0401                 To:  MEMBER4  0410 0411

   From:  MEMBER3                          From:  MEMBER4
          To:  MEMBER1  0300 0301                 To:  MEMBER1  0400 0401
          To:  MEMBER2  0310 0311                 To:  MEMBER2  0410 0411
          To:  MEMBER3      N/A                   To:  MEMBER3  0320 0321
          To:  MEMBER4  0320 0321                 To:  MEMBER4      N/A

      F1 = HELP      F3/F12 = QUIT      F5 = Process     ENTER = Refresh
```

INSTPLAN - Non-SSI Installation

Identify CP-Owned and Release volumes



```
               *** z/VM INSTALLATION VOLUME DEFINITION ***

      TYPE      LABEL      ADDRESS                       FORMAT (Y/N)
     =======   ========   =========                      ============
     COMMON    VMCOM1       2000                               Y
     COMMON2   VMCOM2       2001
     RELVOL    620RL1       2002
     RELVOL2   620RL2       2003

      TYPE      LABEL      ADDRESS
     =======   ========   =========
EXAMPLE
     RES       M01RES       3000
     SPOOL     M01S01       3001
     PAGE      M01P01       3002
     WORK      M01W01       3003



      F1 = HELP      F3/F12 = QUIT      F5 = Process     ENTER = Refresh
```

CTC Connections – Defining in the IOCP

```
*
CHPID PATH=(CSS(0,1),4A),PCHID=222,TYPE=FC,SHARED  SX*FC4 11/LG04/D3
CHPID PATH=(CSS(0,1),4E),PCHID=282,TYPE=FC,SHARED  SX*FC4 16/LG02/D3
*****************************************************
*** CHPID 4A SX FICON CTC                         ***
*****************************************************
*
 CNTLUNIT CUNUMBR=0C00,PATH=((CSS(0),4A)),UNIT=FCTC,                   *
               UNITADD=((00,8)),CUADD=7
 IODEVICE ADDRESS=(0C00,8),CUNUMBR=(0C00),UNIT=FCTC,UNITADD=00,        *
               PART=((CSS(0),TEST7,TESTC))
*
*****************************************************
*** CHPID 4E SX FICON CTC                         ***
*****************************************************
*
 CNTLUNIT CUNUMBR=0D00,PATH=((CSS(0),4E)),UNIT=FCTC,                   *
               UNITADD=((00,8)),CUADD=C
 IODEVICE ADDRESS=(0D00,8),CUNUMBR=(0D00),UNIT=FCTC,UNITADD=00,        *
               PART=((CSS(0),TEST7,TESTC))
```