Preparing for 8-Member SSI (Preview)

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Celebrating 50 years of VM

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Objectives

This presentation will help you to understand:

- The differences between 4- and 8-member capable SSI clusters

- How to chart your migration path from a 4- to an 8- member SSI cluster

- Steps required to add new members to your SSI cluster
  - Define and prepare resources for new members
  - Set up connectivity among cluster members

- Which system files need to be updated to expand your SSI cluster
  - System configuration file
  - Directory
  - Networking
  - etc.

Agenda

- SSI Overview/Refresher

- Orientation: key terms and concepts (Driver education)

- Migration paths to become "SSI-8 Capable" (Planning your route and starting your journey)

- Adding/Cloning new members into slots 5-8 (Continuing your journey - the next leg)

- Going live – joining the new members to the SSI cluster (Arriving at your destination)

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SSI Overview / Refresher

z/VM Single System Image (SSI)

- Multiple z/VM instances (members) may be included in a single system image (SSI) cluster
  - Same or different CECs

- Resources are shared among member z/VM systems and their guests
  - Managed as a single resource pool

- ***Live Guest Relocation*** provides virtual server mobility
  - Move Linux guests non-disruptively from one member of the cluster to another
  - Flexibility for planned outages for service and migration

- Simplified system management of a multi-z/VM environment
  - Concurrent installation of multiple-system cluster
  - Single maintenance stream
  - Reliable sharing of resources and data, managed by z/VM

- Allows growth of z/VM workloads
  - Distribution and balancing of resources and workloads
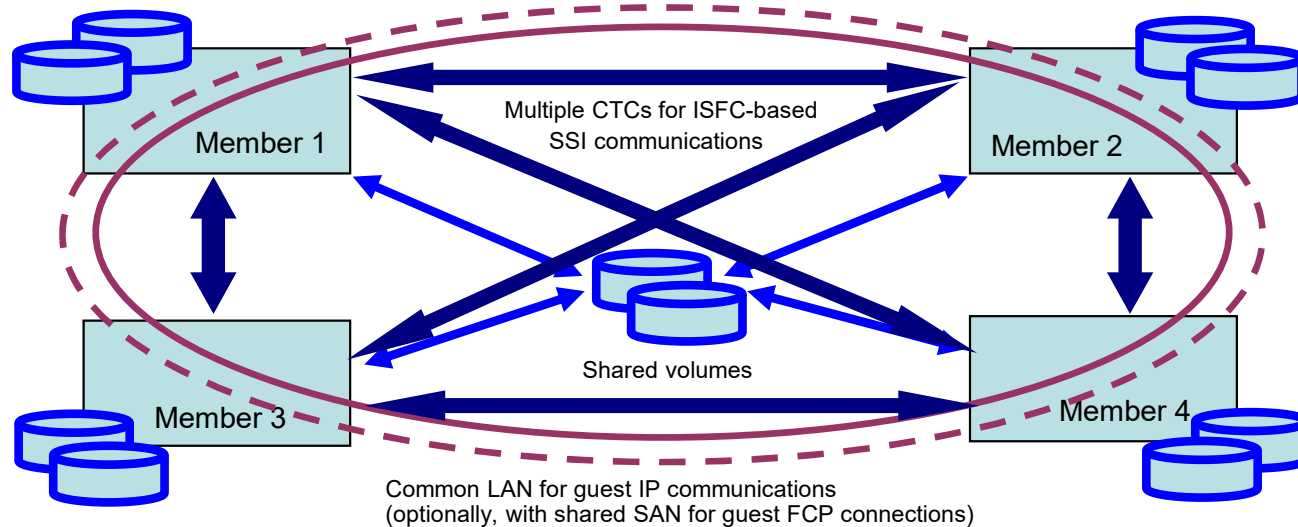 - Move workload to where the resources are

SSI Cluster Considerations

- ECKD DASD is required
  - Installation
  - RACF database
  - Common volume which contains information about cluster configuration and status

- Physical systems must be close enough to allow…
  - FICON CTC connections
  - Shared DASD
  - Common network and disk fabric connections

- Installation to SCSI devices is not supported
  - Guests may use SCSI devices

- Live Guest Relocation is supported only for Linux on IBM zSystems guests

These have not changed for 8-member clusters

z/VM SSI Evolution

- z/VM 6.2
  - Introduced as a priced feature
  - Up to 4 member systems per SSI cluster

- z/VM 7.1
  - Included at no extra cost

- z/VM 7.3
  - Support is extended to allow SSI clusters with up to 8 members
    - Growth of existing clusters to allow for more workload
    - Increases flexibility for Live Guest Relocation and workload balancing

Member 1
Member 2
Member 3
Member 4

Multiple CTCs for ISFC-based
SSI communications

Shared volumes

Common LAN for guest IP communications
(optionally, with shared SAN for guest FCP connections)

Orientation: Key Terms and Concepts
(Driver Education)

SSI Cluster Configurations

- **SSI-4 capable**
  - All SSI clusters in z/VM 6.2 - z/VM 7.2
  - Up to 4 members
  - Members are defined on SSI configuration statement, in any or all of slots 1-4
  - May continue to configure **SSI-4 capable** clusters in z/VM 7.3

- **SSI-8 capable**
  - Beginning with z/VM 7.3
  - Up to 8 members
    - New **SSI_CONTROLS** configuration statement (**SPOOL_MEMBERS 8**)
  - Members are defined on SSI configuration statement, in any or all of slots 1-8
  - Must be configured as **SSI-8 capable** to define members in any of slots 5-8
    - Regardless of how many members are defined

SSI Spool File Sharing and Limits
Things you should know

- USERs
  - Full sharing of all spool files across cluster members
  - Allowed half the number of spool files created on each member of an SSI-8 capable cluster as an SSI-4 capable cluster
  - If a USER has too many files on a given member, excess files will be deleted during IPL
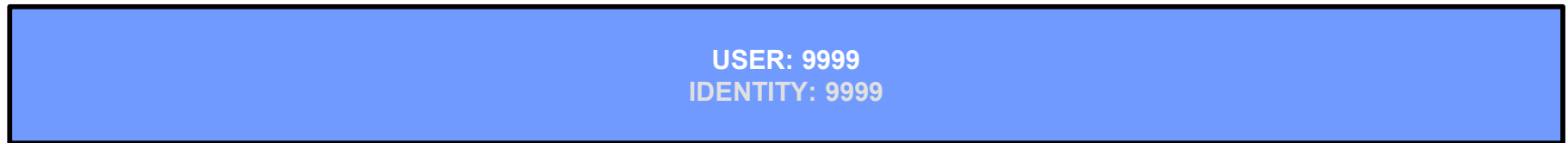   - SFCOUNTR utility available to identify these users and process excess files ahead of time

- IDENTITYs
  - No sharing of spool files across cluster members
  - Allowed the same number of spool files in created on each member of an SSI-8 capable cluster as an SSI-4 capable cluster
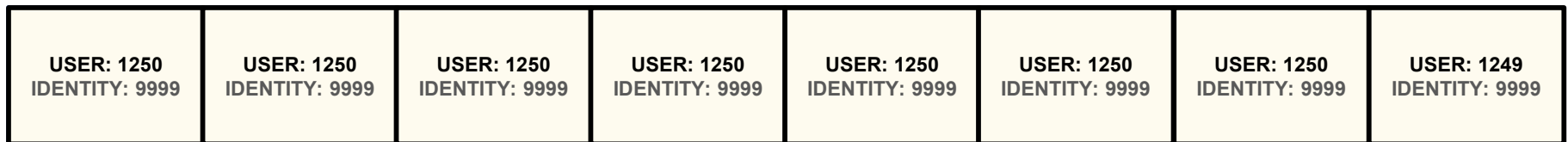
SSI Spool File Sharing and Limits
The numbers

Non-SSI

USER: 9999 **IDENTITY: 9999**

SSI-4

USER: 2500 IDENTITY: 9999	USER: 2500 IDENTITY: 9999	USER: 2500 IDENTITY: 9999	USER: 2499 IDENTITY: 9999

SSI-8

USER: 1250 IDENTITY: 9999	USER: 1250 IDENTITY: 9999	USER: 1250 IDENTITY: 9999	USER: 1250 IDENTITY: 9999	USER: 1250 IDENTITY: 9999	USER: 1250 IDENTITY: 9999	USER: 1250 IDENTITY: 9999	USER: 1249 IDENTITY: 9999

SSI Spool File Sharing and Limits
SFCOUNTR Utility

- **Run the SFCOUNTR utility on all existing members to identify users with too many spool files for an SSI-8 capable cluster**
  - Included in z/VM 7.3 (PMAINT 551 disk)
    - Also available in the z/VM Download Library
  - User must have privilege class D and (C or E) to run SFCOUNTR
  - IDENTITYs in the SFCOUNTR output that have more than the file limit can be ignored

Sample Output:

```
SFCOUNTR data collected by OPERATOR AT VM1
TIME IS 11:32:58 EDT FRIDAY 07/02/21
Threshold was set to 1124 files.

USER              FILES
====              =====
USERABC           2304
USERXYZ           1518
WHOEVER1          1125
```

Road Trip Check-in (1)

ARE YOU READY TO LEAVE? Before you can grow your cluster to more than 4 members, you need to have an SSI-8 capable cluster. There are a few routes to arriving at SSI-8 capable, so the first thing is to chart your path and set up your navigation.

STARTING YOUR JOURNEY: Once you've charted your path to SSI-8 capable, you are ready do your preparation and then follow the appropriate Upgrade or SSI Traditional Installation procedure in the *Installation Guide.*

YOU ARE HERE

SSI-4 capable cluster

SSI-8 capable cluster

Greater than 4 member cluster
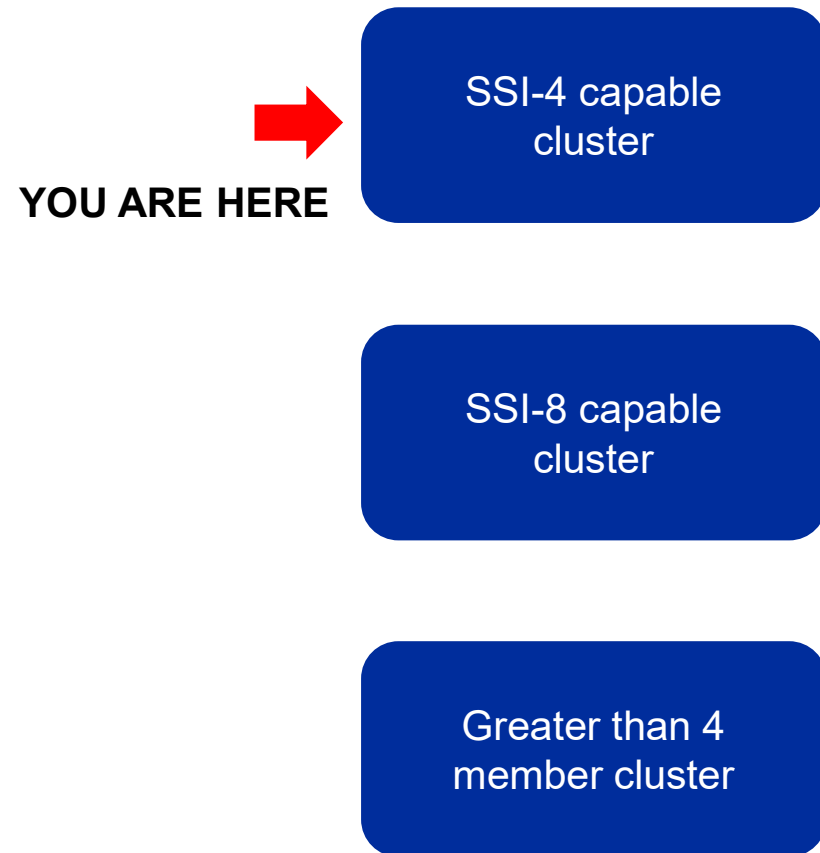
Migration Paths to Become SSI-8 Capable
(Planning your route and starting your journey)

Charting your path

Start here: z/VM
7.1 or 7.2 members

Fresh install:
z/VM 7.3

SSI-4 capable cluster

Make each member SSI-8 capable one at a time (1 IPL per member)

Make the cluster SSI-8 capable all at once (2 IPLs per member)
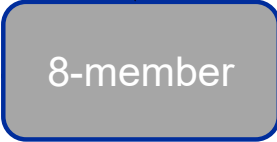
Up to 4 members

Fresh install: z/VM 7.3

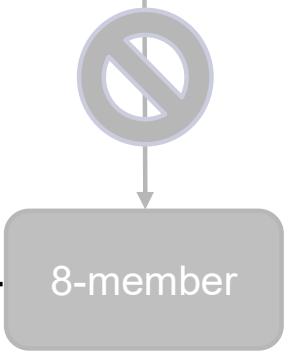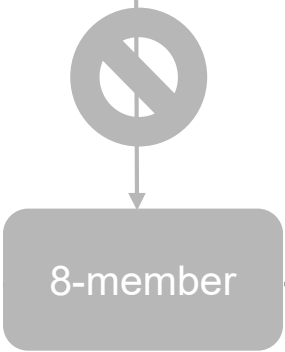Merge two z/VM 7.3 4-member clusters

Continue on: z/VM
7.3 members

SSI-8 capable cluster

SSI-8 capable cluster

Add members 5-8

Reach your destination:
SSI-8 enabled cluster

8-member

8-member

8-member

Making all members SSI-8 Capable "at the end"
Upgrading an existing cluster

Start here: z/VM
7.1 or 7.2 members

Fresh install:
z/VM 7.3

Make each
member SSI-8
capable one at
a time (1 IPL
per member)

**SSI-4
capable
cluster**

Make the
cluster SSI-8
capable all at
once (2 IPLs
per member)

Up to 4
members

Fresh install:
z/VM 7.3

Merge two
z/VM 7.3
4-member
clusters

Continue on: z/VM
7.3 members

**SSI-8
capable
cluster**

**SSI-8
capable
cluster**

Add members 5-8

Reach your destination:
SSI-8 enabled cluster

8-member

8-member

8-member

18

Making all members SSI-8 Capable "at the end"
Things you should know

- This is the recommended upgrade path for an SSI cluster currently on z/VM 7.1 and/or 7.2

- Upgrade installation steps are documented in the *z/VM Installation Guide*

- Each member will be IPL'd twice
    1. IPL of z/VM 7.3 as part of the upgrade
    2. IPL to change each member to be SSI-8 capable

- After completing this upgrade, your cluster will:
    - Be SSI-8 capable
    - Still have only members 1-4 configured (as they were before)

Making all members SSI-8 Capable "at the end"
Upgrade steps

1. Run the **SFCOUNTR** utility with the default limit on all members
   − Process/prune spool files as needed

2. Follow the documented procedure to do an upgrade installation of **each member** to z/VM 7.3
   − IPL z/VM 7.3 as each member is upgraded

   At this point, the cluster remains SSI-4 capable

3. When all members have been upgraded:
   a) Add new **SSI_CONTROLS** statement to the (shared) system config file

   SSI_CONTROLS SPOOL_MEMBERS 8

   b) IPL each member

   The cluster is now SSI-8 capable; new members may be now be added in slots 5-8

Making all members SSI-8 Capable "at the end"
Upgrading an existing cluster

Start here: z/VM
7.1 or 7.2 members

Fresh install:
z/VM 7.3

SSI-4 capable cluster

Make each member SSI-8 capable one at a time (1 IPL per member)

Make the cluster SSI-8 capable all at once (2 IPLs per member)

Up to 4 members

Fresh install: z/VM 7.3

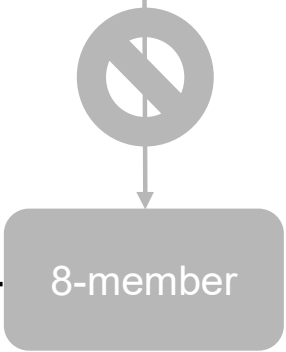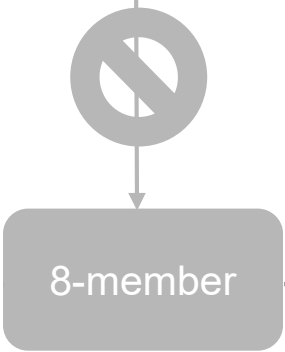Merge two z/VM 7.3 4-member clusters

Continue on: z/VM
7.3 members

SSI-8 capable cluster

SSI-8 capable cluster

Add members 5-8

Reach your destination:
SSI-8 enabled cluster

8-member

8-member

8-member

Becoming SSI-8 Capable "As-you-go"
Things you should know

- This is an alternate upgrade path for an SSI cluster currently on z/VM 7.1 and/or 7.2

- Upgrade installation steps are documented in the *z/VM Installation Guide* (7.3)

- The PTF for compatibility APAR VM66462 must be applied to all z/VM 7.1 and 7.2 members before any z/VM 7.3 member is IPL'd with **SPOOL_MEMBERS 8**

Component	APAR	PTF	Available	RSU
CP	VM66462	z/VM 7.2 UM35787 z/VM 7.1 UM35786	March 30, 2021 June 29, 2021	2101

- Each member will be IPL'd once as part of its upgrade to z/VM 7.3

- After completing this upgrade, your cluster will:
  - Be SSI-8 capable
  - Still have only members 1-4 configured (as they were before)

Becoming SSI-8 Capable "As-you-go"
## *Upgrade steps*

1. Ensure that the PTF for compatibility APAR VM66462 is applied to all z/VM 7.1 and 7.2 members
   - If not, the member being upgraded will not IPL

2. Run the **SFCOUNTR** utility with the default limit on all members
   - Process/prune spool files as needed

3. Follow the documented procedure to do an upgrade installation of the first member to z/VM 7.3
   - Add new **SSI_CONTROLS** statement to the (shared) system config file
     » Add a record qualifier for the member being upgraded
        MEMBER1: SSI_CONTROLS SPOOL_MEMBERS 8
   - IPL z/VM 7.3

4. Repeat Step 3 for each additional member
   - Add a record qualifier to the **SSI_CONTROLS** statement for each member being upgraded

   The cluster is SSI-8 capable when completed for all members; new members may be added in slots 5-8

Note: After this process is completed for all members, the record qualifiers may be removed from the **SSI_CONTROLS** statement

Creating a new SSI-8 Capable cluster

Start here: z/VM
7.1 or 7.2 members
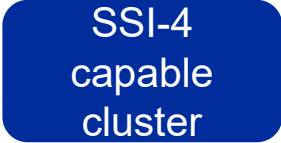
Fresh install:
z/VM 7.3

SSI-4 capable cluster

Make each member SSI-8 capable one at a time (1 IPL per member)

Make the cluster SSI-8 capable all at once (2 IPLs per member)

Up to 4 members

Continue on: z/VM
7.3 members

SSI-8 capable cluster

SSI-8 capable cluster
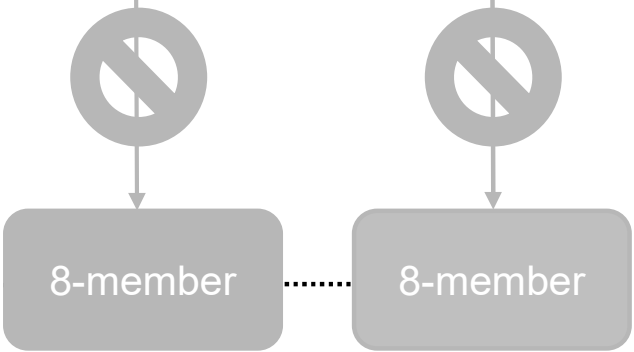
Fresh install: z/VM 7.3

Merge two z/VM 7.3 4-member clusters

Add members 5-8

Reach your destination:
SSI-8 enabled cluster

8-member

8-member

8-member

Creating a new SSI-8 Capable cluster
z/VM 7.3 SSI Installation (Fresh Install)

- Up to 4 members may be installed (in slots 1-4)

- Follow the procedure in the *z/VM Installation Guide*
  - "SSI Traditional Installation Method" chapter

- Installed SSI cluster will be *SSI-8 capable*
  - Install process will add an **SSI_CONTROLS SPOOL_MEMBERS 8** statement to the system config file

Road Trip Check-in (2)

ARE YOU THERE YET? Whether you got here from a fresh install, or from an upgrade of an existing cluster, you are now SSI-8 capable. All members of your cluster should be running z/VM 7.3 or later.

HOW MUCH FURTHER? Now the real fun can begin! The next step is to break out *CP Planning and Administration,* and follow the steps to clone a new member into slots 5-8
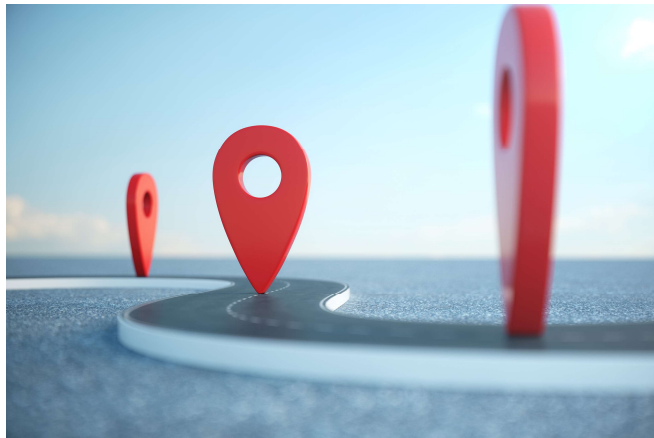
SSI-4 capable cluster

YOU ARE HERE

SSI-8 capable cluster

Greater than 4 member cluster

Adding/Cloning New Members into Slots 5-8
(Continuing your journey - the next leg)

Adding Members 5-8 (n-8?)

Start here: z/VM
7.1 or 7.2 members

SSI-4 capable cluster

Make each member SSI-8 capable one at a time (1 IPL per member)

Make the cluster SSI-8 capable all at once (2 IPLs per member)

Fresh install:
z/VM 7.3

Continue on: z/VM
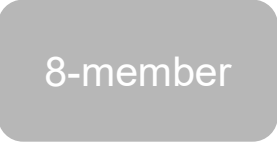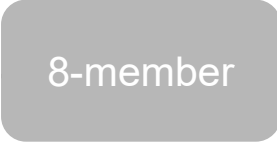7.3 members

SSI-8 capable cluster

SSI-8 capable cluster

Up to 4 members

Fresh install:
z/VM 7.3

Merge two z/VM 7.3 4-member clusters

Add members 5-8

Reach your destination:
SSI-8 enabled cluster

8-member

8-member

8-member

What Tasks to be Mindful of With SSI-8?

➡ Task 1: Prepare the CP-Owned Volumes for the Target Member

➡ Task 2: Create the TCP/IP Configuration for the Target Member

➡ Task 3: Update the Configuration Files for Other Service Virtual Machines and Servers

➡ Task 4: Customize the System Startup Virtual Machine

➡ Task 5: Copy the Source Volumes to the Target Volumes

➡ Task 6: Update the User Directory, or Task 6A: Update the User Directory Using DirMaint

➡ Task 7: Update the System Configuration File

➡ Task 8: Enable the Existing Members to Access the Target Member

➡ Task 9: IPL the Target Member

➡ Task 10: Start the ESM Service Virtual Machine

➡ Task 11: Update the VMSES/E System-Level Product Inventory Table

➡ Task 12: Update the CRR Server LU Name

➡ Task 13: Build the Saved Segments and Named Saved Systems

➡ Task 14: Start the Service Virtual Machines

➡ Task 15: Test and Verify

Legend	
➡	Business As Usual
➡	Handle With Caution (changes scale linearly with SSI-8)
➡	Handle With Care (considerable changes for SSI-8)

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Legend

➡ Business As Usual

➡ Handle With Caution (changes scale linearly with SSI-8)

➡ Handle With Care (considerable changes for SSI-8)

Business-As-Usual (cheat sheet) ➡

Task	Task Description	What Changes	Where it lives
1	Prepare CP-Owned Volumes of Target	CPFMTXA of System Page and Spool volumes	Task performed on MAINTvrm ID
5	Copy Source Volumes to Target	Flashcopy or DDR of System Page and Spool volumes	Task performed on MAINTvrm ID
9	IPL Target	N/A	Performed at HMC
10	Start the ESM Service Machine	Applicable ESM machine	N/A
11	Update VMSES/E Product Inventory Table	VM SYSPINV VM SYSSUF	Task performed on MAINTvrm ID
12	Update CRR Server LU Name	VMSERVR DMSPARMS	Task performed on VMSERVR ID
15	Test and Verify	N/A	N/A

* This is not a replacement for following the steps in CP Planning and Administration: "Adding a Member to a z/VM SSI Cluster by Cloning an Existing Member"

Preparation Makes the Ride Go Smoother

- Gather configuration information
- Complete your worksheets
- Think about naming/numbering conventions
- Use spreadsheet for easier reviewing / changes

Figure 1: Worksheets from Chapter 2 of *z/VM Installation*

Default Label	New Label	Address		Volumes accessible to all members:		
VMCOM1				Mega V LCU 4E		
720RL5				CED6-CED8 (3 mod 54's) SAD		
720RL3				CED9-CEDC (4 mod 54's) Processing Dumps		

Default Label	New Label	Address	Mega VI LCU 8
M01RES	C13A14	3A14	mod 9
M01S01	C13A15	3A15	mod 9
M01P01	C13A16	3A16	mod 9
	C13A17	3A17	mod 9
	C13A18	3A18	Alias
	C13A19	3A19	Alias
	C13A1A	3A1A	Alias
	C13A1B	3A1B	Alias
	C13A1C	3A1C	Alias
	C13A1D	3A1D	Alias

Default Label	New Label	Address	Mega VI LCU 8
M02RES	C23AC0	3AC0	mod 9
M02S01	C23AC1	3AC1	mod 9
M02P01	C23AC2	3AC2	mod 9
	C23AC3	3AC3	mod 9
	C23AC4	3AC4	mod 9
	C23AC5	3AC5	mod 9
	C23AC6	3AC6	mod 9
	C23ACA	3ACA	Alias
	C23ACB	3ACB	Alias
	C23ACC	3ACC	Alias
	C23ACD	3ACD	Alias
	C23ACE	3ACE	Alias
	C23ACF	3ACF	Alias

Default Label	New Label	Address	Mega V LCU 4F
M03RES	C30370	D370	mod 9
M03S01	C30371	D371	mod 9
M03P01	C30372	D372	mod 9
	C30373	D373	mod 9
	C30374	D374	mod 9
	C30375	D375	mod 9
	C30376	D376	mod 9
	C30377	D377	Alias
	C30378	D378	Alias
	C30379	D379	Alias
	C3037A	D37A	Alias
	C3037B	D37B	Alias
	C3037C	D37C	Alias

Trad Install Worksheet1 | Table 4 | Table 5 3390 SSI Slots | Tble 6 Worksheet 6 Vols Labels | Table 7 CT

Table 1. Traditional installation worksheet 1

Installation method (first-level or second-level): _____

In the **Install To** column, record an **M** if you will load the product to a minidisk or an **F** if you will load the product to the VMPSFS file pool.

Install To	Product	Install To	Product	Install To	Product
	VM		DIRM		ICKDSF
	PERFTK		RACF*		RSCS
	TCPIP		VMHCD		

Default system language: _____
DASD type: _____
Volume size: _____
Common service file pool name: _____

Installation Type:

Table 4. Traditional installation worksheet 4

IP address or host name:
User ID and password of FTP server:
Path name of DVD drive, USB flash drive, or F
VM user ID and address of VM minidisk to upl

Table 5. Traditional installation worksheet 5 (3390 SSI Only)

After installation is complete, SSI will be IPLed:
__ First-Level
__ Second-Level

SSI Member Name(s) / IPL LPAR Name(s) or User ID Name(s):

Slot Number	Member Name*		IPL LPAR/User ID
1			
2			
3			

Table 6. Traditional installation worksheet 6 (3390 SSI Only)

Volume Type	Default Label	New Label	Address
COMMON	VMCOM1		
RELVOL	720RL1		
RELVOL2*	720RL2		

Volume Type	Default Label	New Label	Address	Volume Type	Default Label	New Label
Member 1:				**Member 2:**		
RES	M01RES			RES	M02RES	
SPOOL	M01S01			SPOOL	M02S01	
PAGE	M01P01			PAGE	M02P01	
Member 3:				**Member 4:**		
RES	M03RES			RES	M04RES	
SPOOL	M03S01			SPOOL	M04S01	
PAGE	M03P01			PAGE	M04P01	

* Depending on your planning choices, you might or might not need this volume.

Note: You must *not* use any of IBM's default volume labels for a volume other than the volume for which it is originally defined.

Table 7. Traditional installation worksheet 7 (SSI First-Level Configuration Only)

Real addresses for the COMMON volume on each member LPAR:

Member 1 Address	Member 2 Address	Member 3 Address	Member 4 Address

CTC device addresses:

From: Member 1		From: Member 2	
To: Member 1	N/A	To: Member 1	
To: Member 2		To: Member 2	N/A
To: Member 3		To: Member 3	
To: Member 4		To: Member 4	

From: Member 3		From: Member 4	
To: Member 1		To: Member 1	
To: Member 2		To: Member 2	
To: Member 3	N/A	To: Member 3	
To: Member 4		To: Member 4	N/A

What Tasks to be Mindful of With SSI-8?

➡ Task 1: Prepare the CP-Owned Volumes for the Target Member

➡ Task 2: Create the TCP/IP Configuration for the Target Member

➡ Task 3: Update the Configuration Files for Other Service Virtual Machines and Servers

➡ Task 4: Customize the System Startup Virtual Machine

➡ Task 5: Copy the Source Volumes to the Target Volumes

➡ Task 6: Update the User Directory", or "Task 6A: Update the User Directory Using DirMaint

➡ Task 7: Update the System Configuration File

➡ Task 8: Enable the Existing Members to Access the Target Member

➡ Task 9: IPL the Target Member

➡ Task 10: Start the ESM Service Virtual Machine

➡ Task 11: Update the VMSES/E System-Level Product Inventory Table

➡ Task 12: Update the CRR Server LU Name

➡ Task 13: Build the Saved Segments and Named Saved Systems

➡ Task 14: Start the Service Virtual Machines

➡ Task 15: Test and Verify

Legend

➡ Business As Usual

➡ Handle With Caution (changes scale linearly with SSI-8)

➡ Handle With Care (considerable changes for SSI-8)

Handle-With-Caution (Cheat Sheet) ➡

Task	Task Description	What Changes	Where it lives
2	Configure TCP/IP Stack	PROFILE TCPIP	TCPMAINT 198
		TCPIP DATA	TCPMAINT 592
3	Make Server Virtual Machines Multi-Nodal	Applicable Configuration Files	N/A
4	Customize Startup Machine	PROFILE EXEC (for AUTOLOG1 or AUTOLOG2)	AUTOLOG1 or AUTOLOG2 191 minidisk

* This is not a replacement for following the steps in CP Planning and Administration: "Adding a Member to a z/VM SSI Cluster by Cloning an Existing Member"

Know WHAT You're Changing

- These steps are generally meant to set up your services

- A misstep here could leave you without a key system service

- When your IDENTITYs enter their new home, make sure the lights are on!

What Tasks to be Mindful of With SSI-8?

➡ Task 1: Prepare the CP-Owned Volumes for the Target Member

➡ Task 2: Create the TCP/IP Configuration for the Target Member

➡ Task 3: Update the Configuration Files for Other Service Virtual Machines and Servers

➡ Task 4: Customize the System Startup Virtual Machine

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➡ Task 6: Update the User Directory, or Task 6A: Update the User Directory Using DirMaint

➡ Task 7: Update the System Configuration File

➡ Task 8: Enable the Existing Members to Access the Target Member

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➡ Task 15: Test and Verify

Legend

➡ Business As Usual

➡ Handle With Caution (changes scale linearly with SSI-8)

➡ Handle With Care (considerable changes for SSI-8)

Handle-With-Care (Cheat Sheet) ➡

Task	Task Description	What Changes	Where it lives
6	Update User Directory • Use a directory manager to simplify this task	DIRECTORY statement	USER DIRECT
		New subconfigs for IDENTITYs	
		New MDISK statements for system residence and member-specific volumes	
7	Update System Config	System_Identifier	System Config
		SSI Statement	
		System_Residence	
		CP_Owned Statements	
		User_Volume_List	
		ACTIVATE ISLINK Statements	
		Member-specific networking	
8	Enable access of existing members to new target	SET SSI SLOT command	Performed on current system's MAINTvrm ID
		ACTIVATE ISLINKs	
		Define new spool volumes	

* This is not a replacement for following the steps in CP Planning and Administration: "Adding a Member to a z/VM SSI Cluster by Cloning an Existing Member"

What's so Tedious? ➡

User Directory Changes

Add new system residence volume to DIRECTORY statement(s)

Add MDISKs for New DASD

SUBCONFIGs for IDENTITYs

DIRECTXA to create new object directory on each member

Adding ISFC Connectivity

Configure CTCs in IOCDS

Define Logical Links in SYSTEM CONFIG

Activate additional Links on each member

User Directory Key Points

General Information

- Changes can be made with a directory manager (highly recommended) or by editing USER DIRECT

- Add new system residence volid to DIRECTORY statement
  - Multiple DIRECTORY statements may be used (up to 8)

- IDENTITYs will need additional subconfigs for running on the new member systems

- Changes must be written to the object directory on ALL active members
  - A directory manager will take care of this
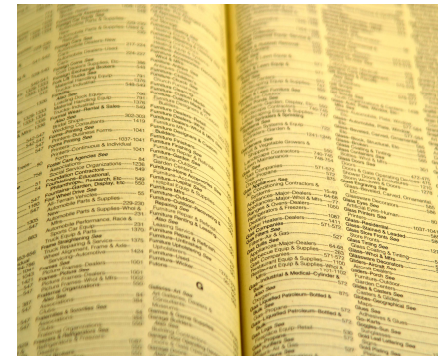
If Using DirMaint

- You'll need DIRMSATx and DATAMOVE servers for each new member you add.

- Make sure all satellite servers are active before adding a new member

Adding ISFC Connectivity

In a 4 Member
SSI, each member
needs 3 logical links.

Each provides
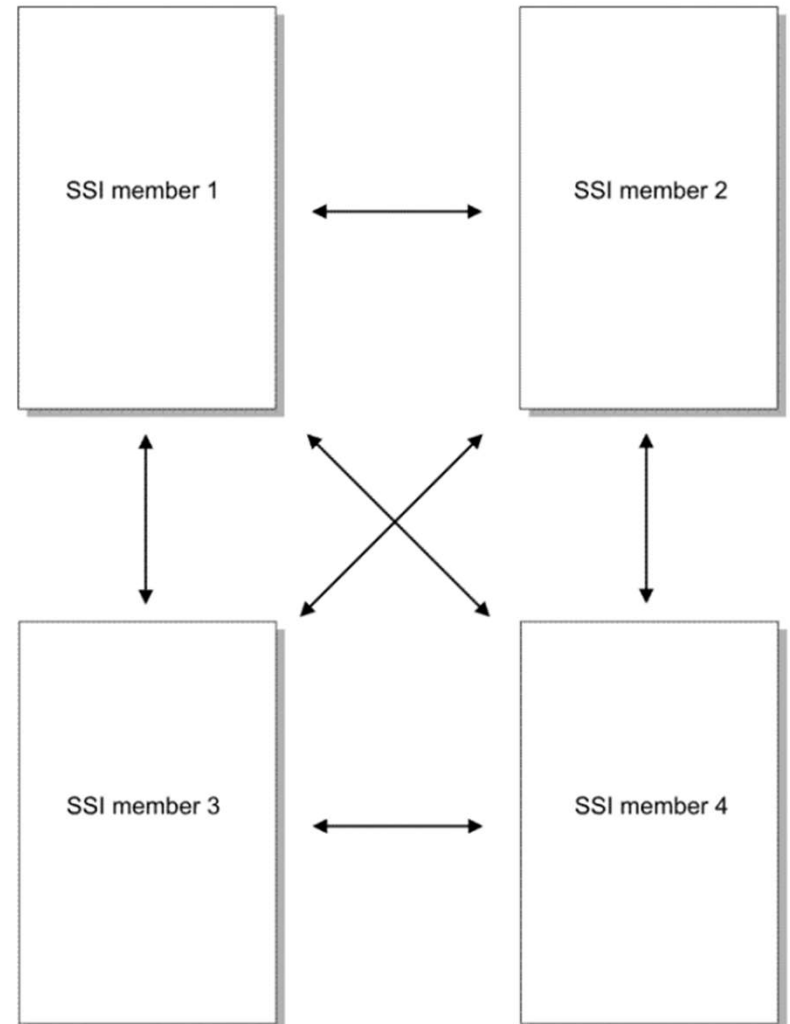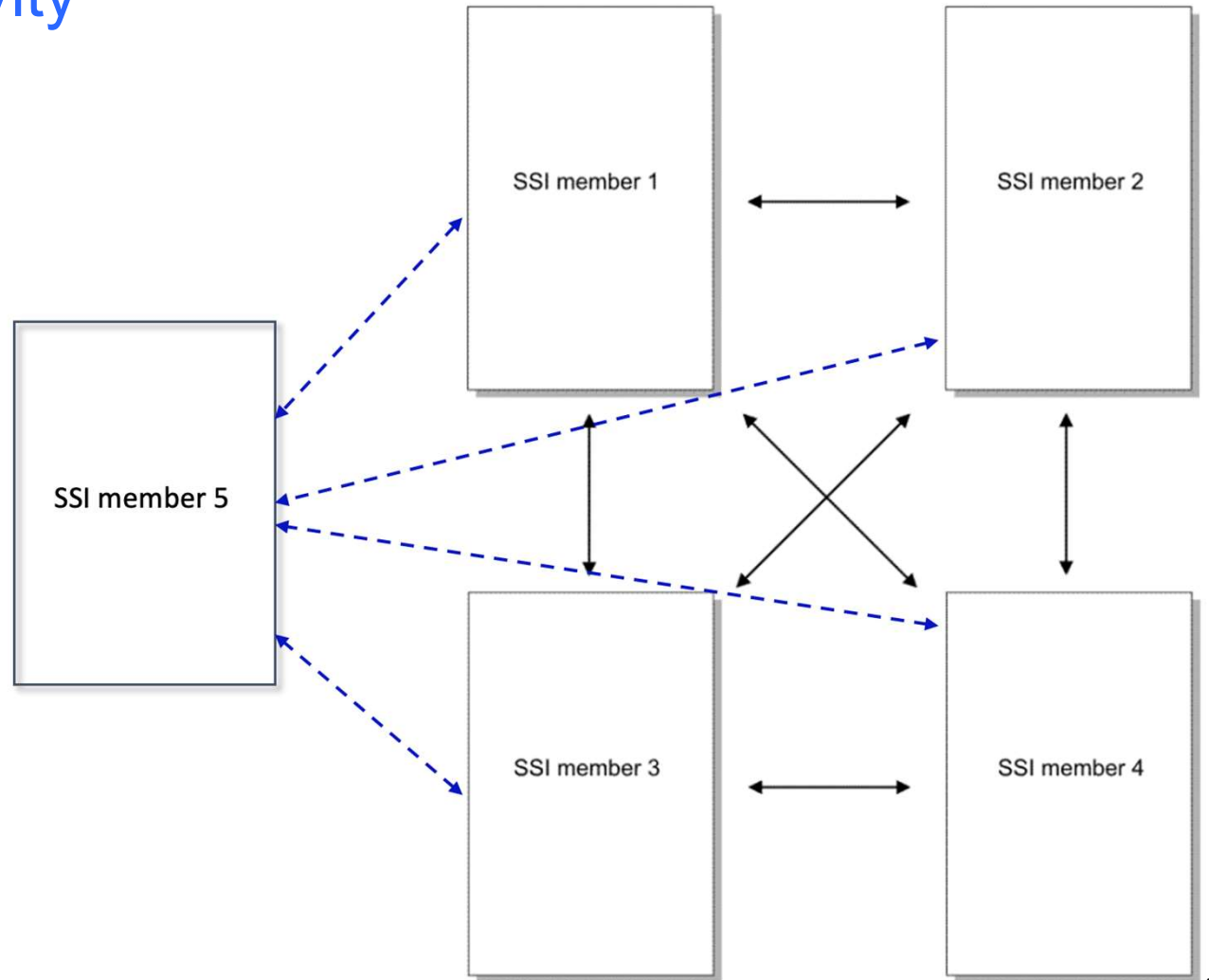connectivity to the
other 3 members

Figure 43. Fully Connected ISFC Topology

Adding ISFC Connectivity

In an (n) - Member SSI, each member needs (n-1) logical links.

Each provides connectivity to the other (n-1) members

SSI member 1

SSI member 2

SSI member 5

SSI member 3

SSI member 4

Adding ISFC Connectivity (Diving Deeper)

- 3 Main Steps

  1. Configuration of physical CTCs

  2. Defining logical links in SYSTEM CONFIG for new or currently down cluster members

  3. Activating logical links for cluster members that are currently running

CAUTION: A logical link is required from EACH MEMBER to ALL OTHER MEMBERS. Missing one logical link definition will prevent a member from successfully joining the cluster.

A Note on Hardware

- The art of configuring a CTC network does not change with eight members

- Remember IBM Best Practices

  - 8 CTCs across 2 physical CHPIDS between systems (4 rdev's on each ISLINK) is recommended

  - 4 CTCs across 2 physical CHPIDS between systems (2 rdev's on each ISLINK) might be acceptable

  - The important thing is to have redundancy (multiple CHPIDS) and concurrency (multiple CTCs per CHPID)
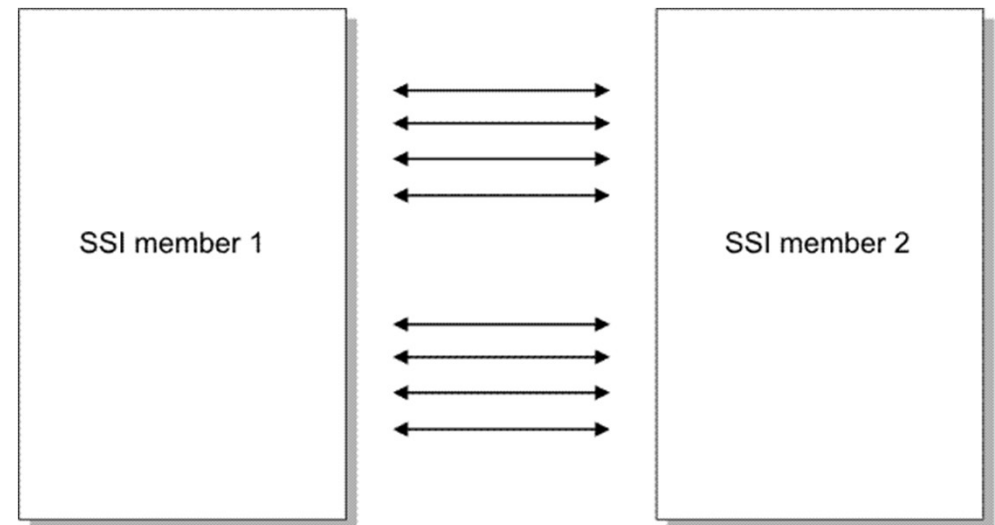
Defining Logical Links in SYSTEM CONFIG

```
/*********************************************************************************/
/*              Activate ISLINK statements                                    */
/*********************************************************************************/

   GDLTST8A:       ACTIVATE ISLINK 0850 0851    NODE GDLTST8B
   GDLTST8A:       ACTIVATE ISLINK 0860 0861    NODE GDLTST8C
   GDLTST8A:       ACTIVATE ISLINK 0870 0871    NODE GDLMST8D
   GDLTST8A:       ACTIVATE ISLINK 0878 0879    NODE GDLMST8E
   GDLTST8A:       ACTIVATE ISLINK 0880 0881    NODE GDLMST8F
   GDLTST8A:       ACTIVATE ISLINK 0888 0889    NODE GDLAST8G
   GDLTST8A:       ACTIVATE ISLINK 0890 0891    NODE GDLAST8H

   GDLTST8B:       ACTIVATE ISLINK 0858 0859    NODE GDLTST8A
   GDLTST8B:       ACTIVATE ISLINK 0898 0899    NODE GDLTST8C
   GDLTST8B:       ACTIVATE ISLINK 08A8 08A9    NODE GDLMST8D
   GDLTST8B:       ACTIVATE ISLINK 08B0 08B1    NODE GDLMST8E
   GDLTST8B:       ACTIVATE ISLINK 08B8 08B9    NODE GDLMST8F
   GDLTST8B:       ACTIVATE ISLINK 08C0 08C1    NODE GDLAST8G
   GDLTST8B:       ACTIVATE ISLINK 08C8 08C9    NODE GDLAST8H
```

How Many ISLINK Statements Should You Have?

ST_MEM = **MEMBERS** – 1

ST_TOT = **ST_MEM** * **MEMBERS**

Where:

- **ST_MEM** = number of ACTIVATE ISLINK statements required for each member

- **ST_TOT** = total number of ACTIVATE ISLINK statements required in SYSTEM CONFIG

- **MEMBERS** = number of members in the cluster

Number Of Members	Number Of ACTIVATE ISLINK statements (per member)	Number of ACTIVATE ISLINK statements (total)
1	0	0
2	1	2
3	2	6
4	3	12
5	4	20
6	5	30
7	6	42
8	7	56

Enable Existing Members

- SYSTEM CONFIG statements cover new or down members joining the cluster, but you still need to define new slots and links on running members.
  - **SET SSI SLOT n** command
  - **ACTIVATE ISLINK** command

HINTS:
- Using EXECS to issue **ACTIVATE ISLINK**'s can help you desk check.

- Using the **AT** command can be helpful for issuing ALL required commands from ONE member.
  - From MEMBER1:
    AT MEMBER2 CMD ACTIVATE ISLINK 0850 0857 NODE MEMBER3

- Spooling your console can aid debug if something goes wrong

What Could Go Wrong?

PROBLEM:
- Failure to define just one logical link can prevent successful IPL of a new or down member.

SOLUTION:
- Check ISLINK definitions
  - Active links with **QUERY ISLINK**
  - **ACTIVATE ISLINK** statements in SYSTEM CONFIG

Make it easier:
- CMS Pipelines, scripts, etc....can be helpful when desk checking

Going Live
(Arriving at your destination)

Joining New Member(s) to your SSI Cluster

Now that you've completed the cloning tasks, it's time to IPL each of your new members:

1. Verify that IPL completes successfully

2. Use the **QUERY SSI** command to verify that the new member has successfully joined the cluster

3. Verify that the resources you defined for each new member are available
   - ESM is active
   - All defined ISLINKs are active
   - Directory manager and/or satellites are active
   - Disk volumes are online
   - etc.

Road Trip Check-in (3)

YOU HAVE ARRIVED: You now have an SSI cluster with more than 4 members. Your road trip is complete. Congratulations on a safe journey!

TAKE ANOTHER LAP: Repeat the adding/cloning tasks until you have a full 8-member cluster. If you planned ahead during the first lap, additional laps will be easier.

SSI-4 capable cluster

SSI-8 capable cluster

Greater than 4 member cluster

YOU ARE HERE

Summary

- With z/VM 7.3, the benefits of a 4-member SSI cluster are extended for up to 8 members
    - Resources managed as a single resource pool
    - Virtual server mobility with Live Guest Relocation
    - Simplified system management of a multi-z/VM environment
    - Horizontal growth of z/VM workloads

- Careful planning is required for a successful road trip to more than 4 members
    - Plan naming and numbering conventions for 8 members even if you don't have immediate plans for 8 members
    - Use the worksheets

- Follow the documented procedures in order
    - Your chosen migration path to SSI-8 capable (upgrade or fresh installation)
    - Cloning an existing member to add members 5-8

- Enjoy the ride!

Thanks!

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