

Introduction to z/VM

Installation and Upgrade

Sam Capodiccì

z/VM Install and Packaging

s.capodiccì@ibm.com

Agenda

1. [Overview](#)
 1. What is Traditional Installation?
What is Upgrade Installation?
 2. SSI vs. non-SSI
2. [Traditional installation](#)
 1. Example of a 7.4 second-level installation
3. [Upgrade installation](#)
 1. Example of a 7.3 → 7.4 upgrade
4. [Tips & Tricks](#)

Section 1

Overview

Traditional Installation

Install a *new* z/VM system or SSI cluster

- **First level:** install directly onto an LPAR via the HMC's Integrated 3270 console
- **Second level:** a guest VM of a first-level system using its TCPIP stack
- Installs to a set of DASD
- Customize according to your needs
- Includes preinstalled licensed programs that can be enabled at any time



Upgrade Installation (AKA Upgrade-in-place)

Upgrade an *existing* z/VM system

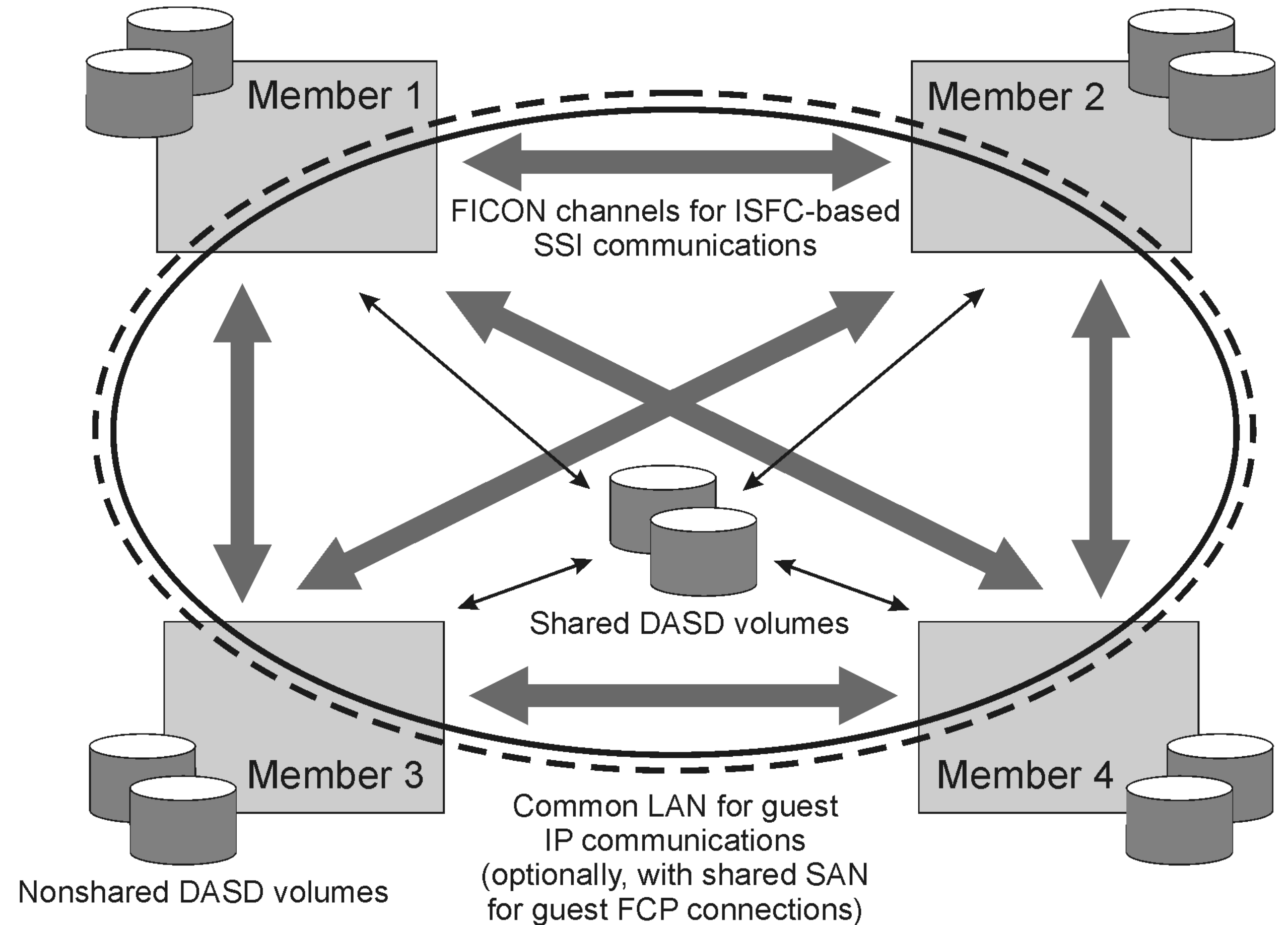
- 7.2 → 7.4
- 7.3 → 7.4
- Temporary work system installed second-level
- Move the new release level code down onto your current system with **minimal impact**



SSI Installation

SSI (Single System Image) Cluster: a multisystem environment in which the z/VM systems can be managed as a **single resource pool** and virtual machines can be moved from one system to another **while they are running**.

For this introductory session, we will cover examples of non-SSI installations, but...



SSI Installation

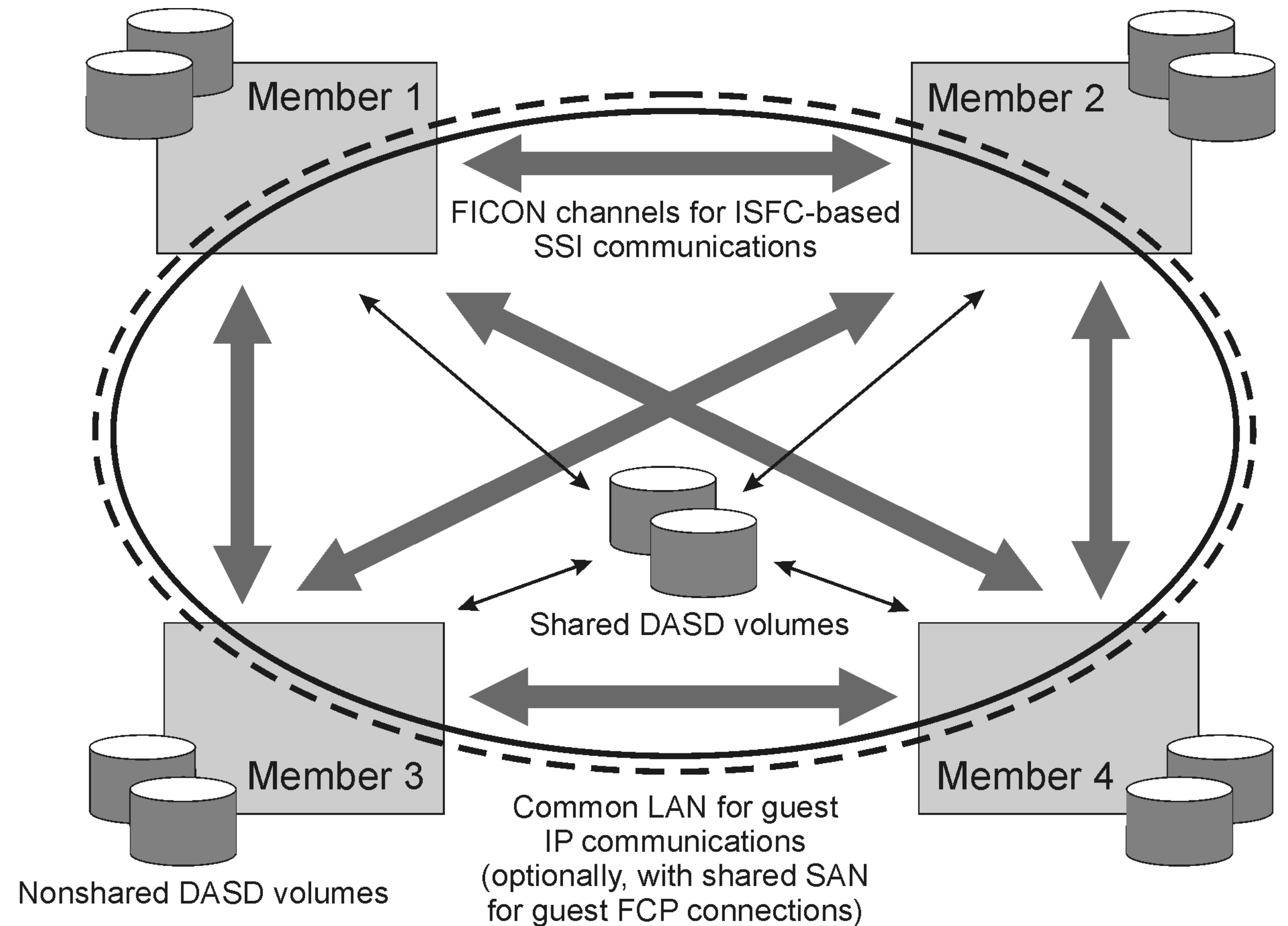
...here's some of the differences!

Traditional installation

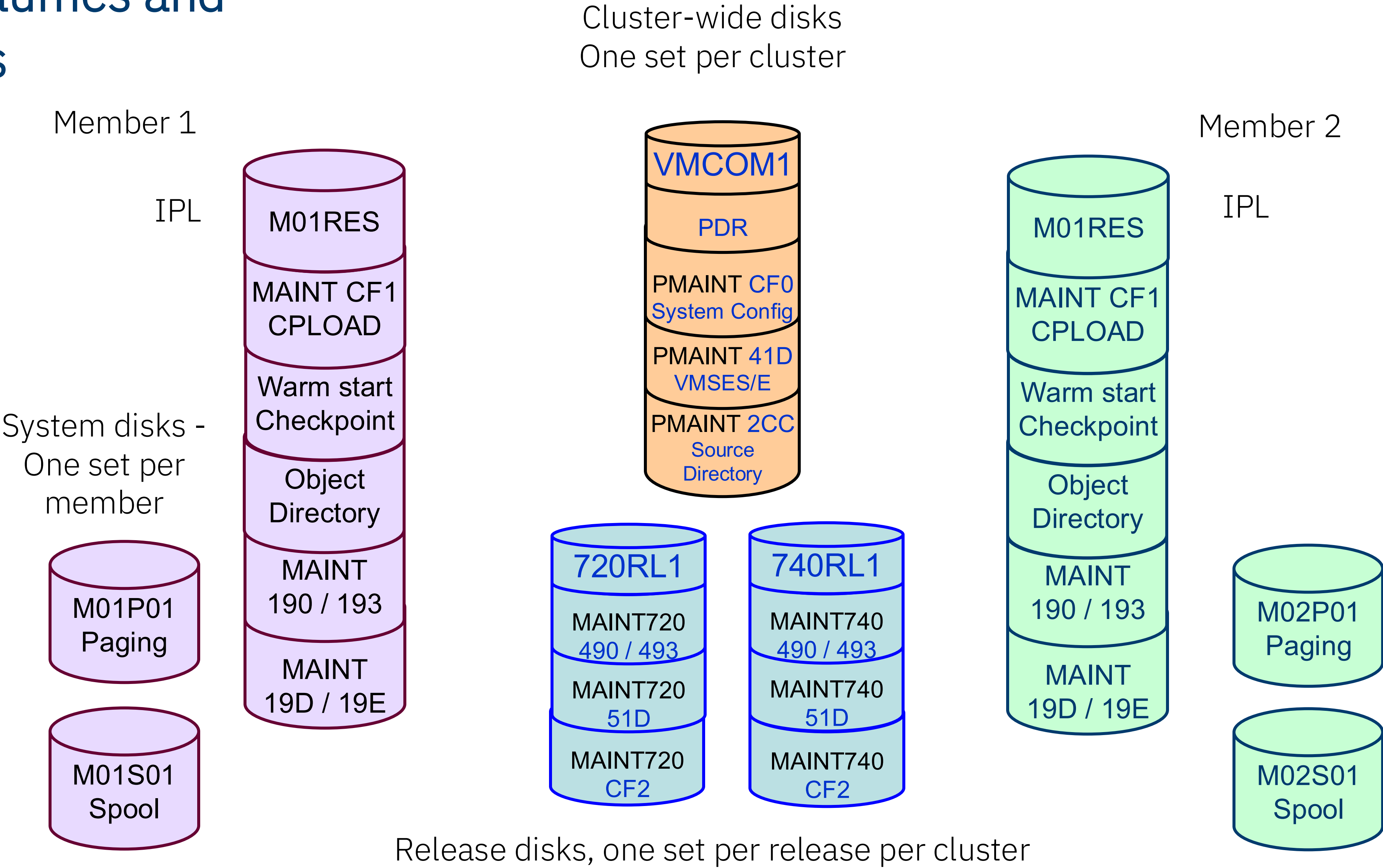
- Common and release volumes are **shared**, but each member needs its own system residence volume, paging, and spool
- Choose to install **up to 4 members at once**

Upgrade Installation:

- Upgrade the members **one at a time** for minimal disruption
- All members must be at the **same release level** (ex. all 7.2 or all 7.3) before upgrading



DASD Volumes and Minidisks



Section 2

Traditional Installation

7.4, second level, non-SSI



Materials (Requirements and Restrictions)

*NOTE: CMS Minidisk as a file source is just one example!

There are multiple install file sources for both first- and second-level, including DVD drives, USB drives, and an FTP server.

General

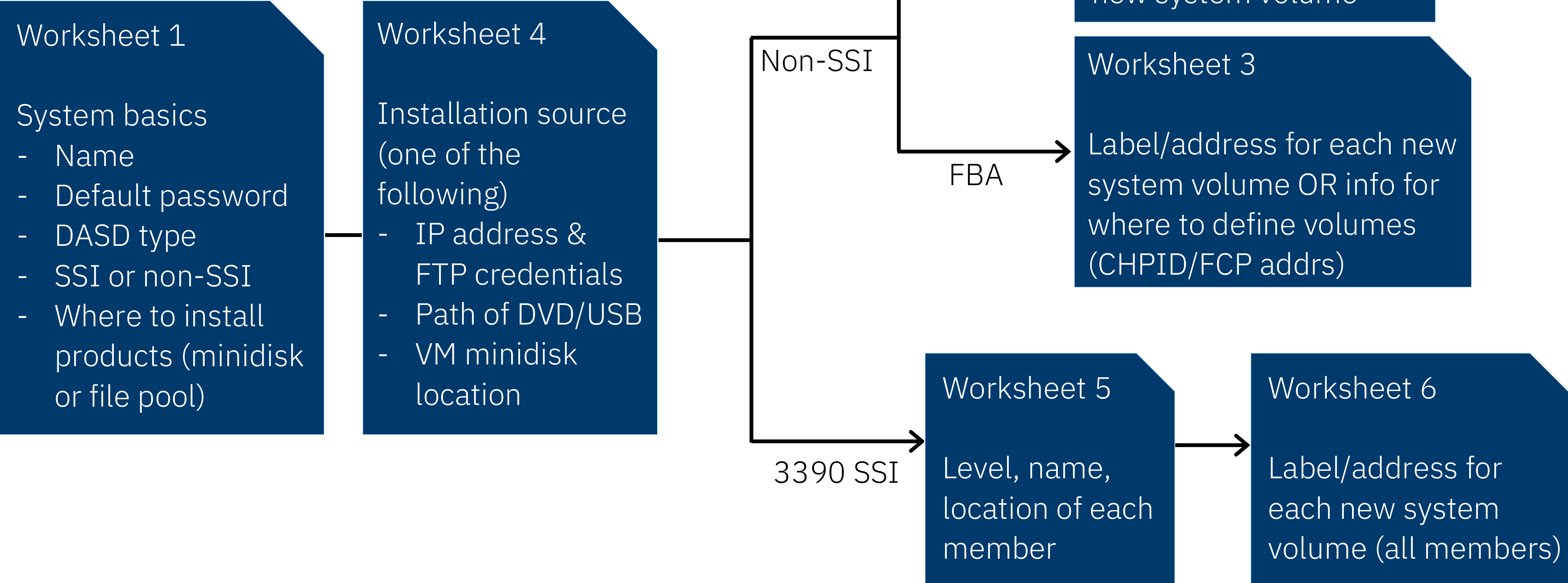
- A CMS-formatted minidisk* containing the z/VM 7.4 product
 - Order electronic delivery of the product via IBM Shopz
 - Min. 8000 cylinders
- A supported processor (z/VM: General Information)
- A local 3270 terminal
- DASD volumes**
 - This example uses 3390, but **emulated** FBA on SCSI volumes is supported for **non-SSI only**
 - Different install media for 3390/FBA

Second-level

- A first-level system running a supported release of z/VM
- A user ID with various requirements...
 - Privilege class G (B for att. DASD)
 - 128+ MB of virtual storage
 - 191 R/W minidisk at file mode A
 - R/W access to your minidisk containing the product**
 - Access to INSTPIPE MODULE on MAINT 193 minidisk**
 - A few R/W minidisks:**
 - 2222 – 10 cylinders
 - 24CC – 10 cylinders
 - 2CF0 – 120 cylinders

Blueprints

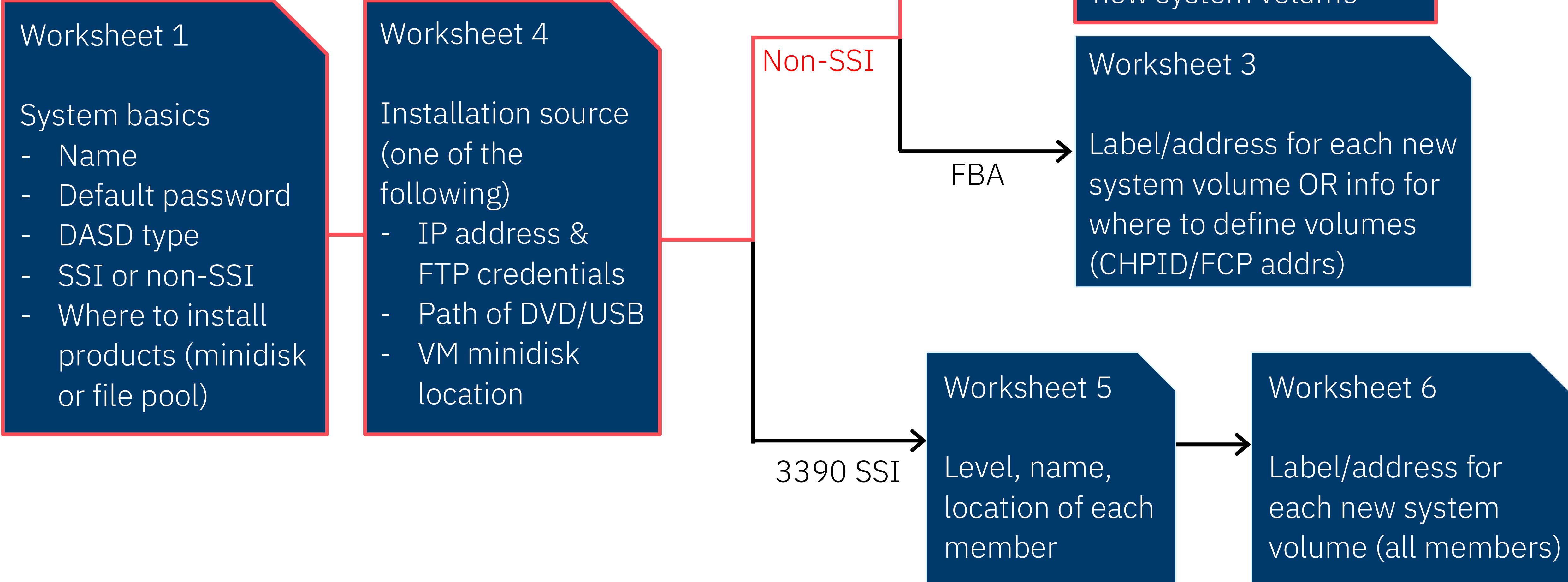
Traditional Installation Worksheets



Worksheet 7 exists for SSI first-level configuration only.

Blueprints

Traditional Installation Worksheets

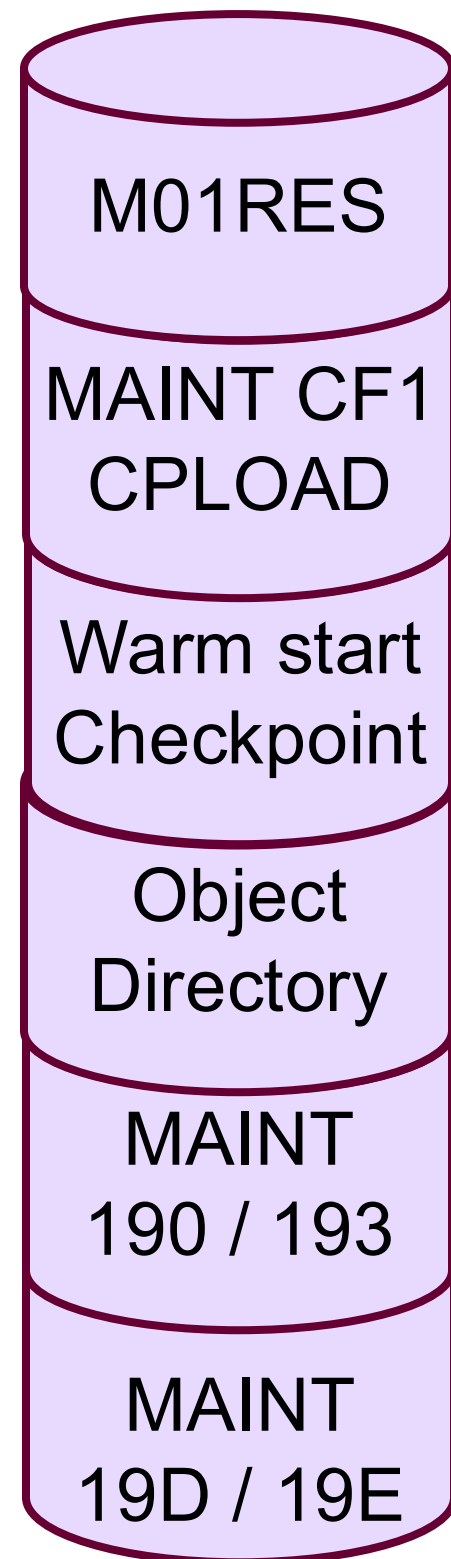
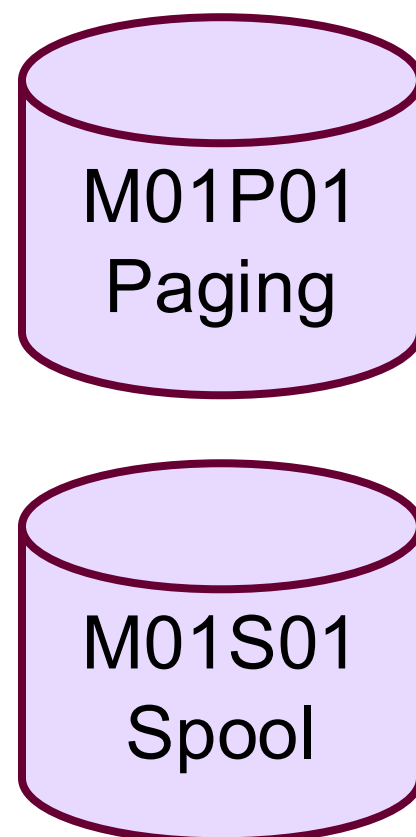


Worksheet 7 exists for SSI first-level configuration only.

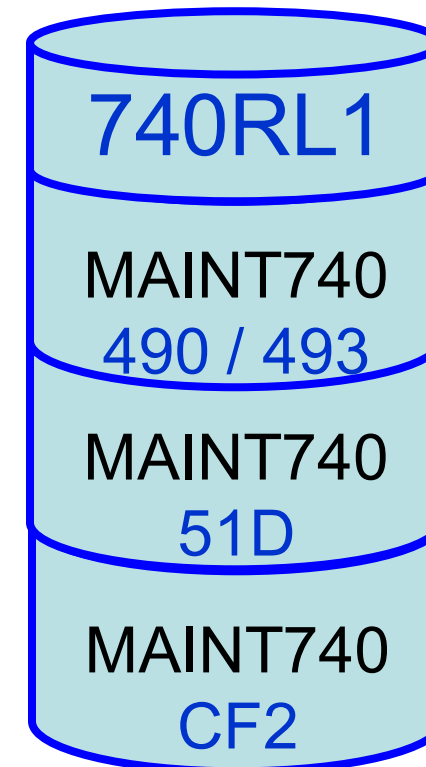
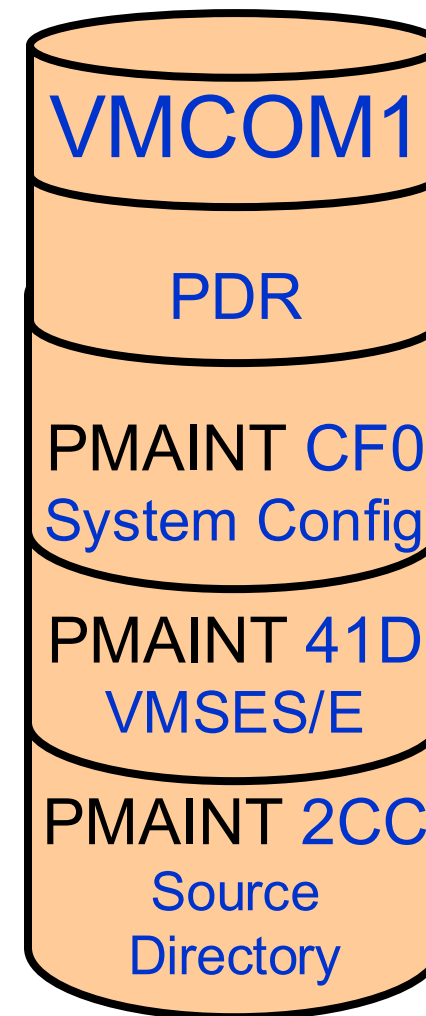
Blueprints DASD Layout

Member volumes include...

- System residence volume: where the info for your specific system “lives”. IPL this disk to start up the system
- Paging space: CP-owned
- Spool space: may be shared!



Common volumes: shares space for things like system configuration



Release volumes: content specific to 7.4

For this example, we will need **six volumes**:

1. VMCOM1: Common volume
2. 740RL1: Release volume
3. 740RL2: Release volume
4. M01RES: System residence volume
5. M01S01: Spool space
6. M01P01: Paging space

Foundations

Set up for installation

1. Load files onto CMS minidisk if needed – see z/VM: Installation Guide
2. Attach DASD, link source minidisk as W, link maint 193
3. INSTPIPE
4. Decode, unpack, and write the files needed to run DVDPRIME to the 2222 minidisk.
5. IPL CMS and re-access source minidisk and 2222 minidisk
6. Run DVDPRIME to load necessary files to the 24CC and 2CF0 disk.

```
instpipe
Ready;
pipe dvddecod CKD222 image w |UNPACK| ECKDREST 2222
ECKDREST: WROTE nnn TRACKS ON 2222, RC=0
Ready;

. . .

dvdprime 3390 (disk
IUGDVP8327I ** Now executing DVDPRIME on date at
time **
IUGDVP8440I Now loading 24CC disk

ECKDREST: WROTE nnnn TRACKS ON 24CC, RC=0
IUGDVP8440I Now loading 2CF0 disk

ECKDREST: WROTE nnnn TRACKS ON 2CF0, RC=0
IUGDVP8392I DVDPRIME EXEC ended successfully
Ready; T=n.nn/n.nn hh:mm:ss
```

Blueprints II

INSTPLAN

Worksheet 1

System basics

- Name
- Default password
- DASD type
- SSI or non-SSI
- Where to install products (minidisk or file pool)

```
instplan traditional
```

```
*** 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      DIRM      M      ICKDSF
  M      PERFTK  M      RACF      M      RSCS
  M      TCPIP  M      VMHCD

Select a System Default Language.
  X AMENG      _ UCENG

Select a System DASD type, DASD size can be changed.
  X 3390      10016      _ FBA DASD      6.0

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

Select a System Type: Non-SSI or SSI
  X Non-SSI Install:      System Name XXXXXXXX
  _ SSI Install:      Number of Members _      SSI Cluster Name _____

Enter a default password for your system that adheres to restrictions
set by your security manager.
  Default Password:      XXXXXXXX
```

Blueprints II

INSTPLAN

```
IUGIPX8475I Final selections display
The products you selected to load to minidisk are:
VM DIRM ICKDSF PERFTK RACF RSCS TCPIP VMHCD

The products you selected to load to SFS are:
NONE

The system default language selected:
AMENG

The common service filepool name is:
VMPSFS

The install type you selected is:
Non-SSI

The system name is:
XXXXXXXXXX

The DASD type you selected to load on is:
3390 - 10016 cylinders

The volumes needed to load z/VM are:
COMMON: VMCOM1
RELEASE: 740RL1 740RL2
SYSTEM: M01RES M01S01 M01P01

The default password you selected is:
XXXXXXXXXX

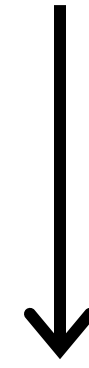
Do you want to continue ? (Y/N)
```

Blueprints II

INSTPLAN

Worksheet 2

Label/address for each
new system volume



| *** z/VM INSTALLATION VOLUME DEFINITION *** | | | |
|---|--------|---------|--------------|
| TYPE | LABEL | ADDRESS | FORMAT (Y/N) |
| COMMON | VMCOM1 | 1000 | Y |
| RELVOL | 740RL1 | 1000 | |
| RELVOL2 | 740RL2 | 1000 | |
| TYPE | LABEL | ADDRESS | |
| SCTSTVM1 | | | |
| RES | M01RES | 1000 | |
| SPOOL | M01S01 | 1000 | |
| PAGE | M01P01 | 1000 | |

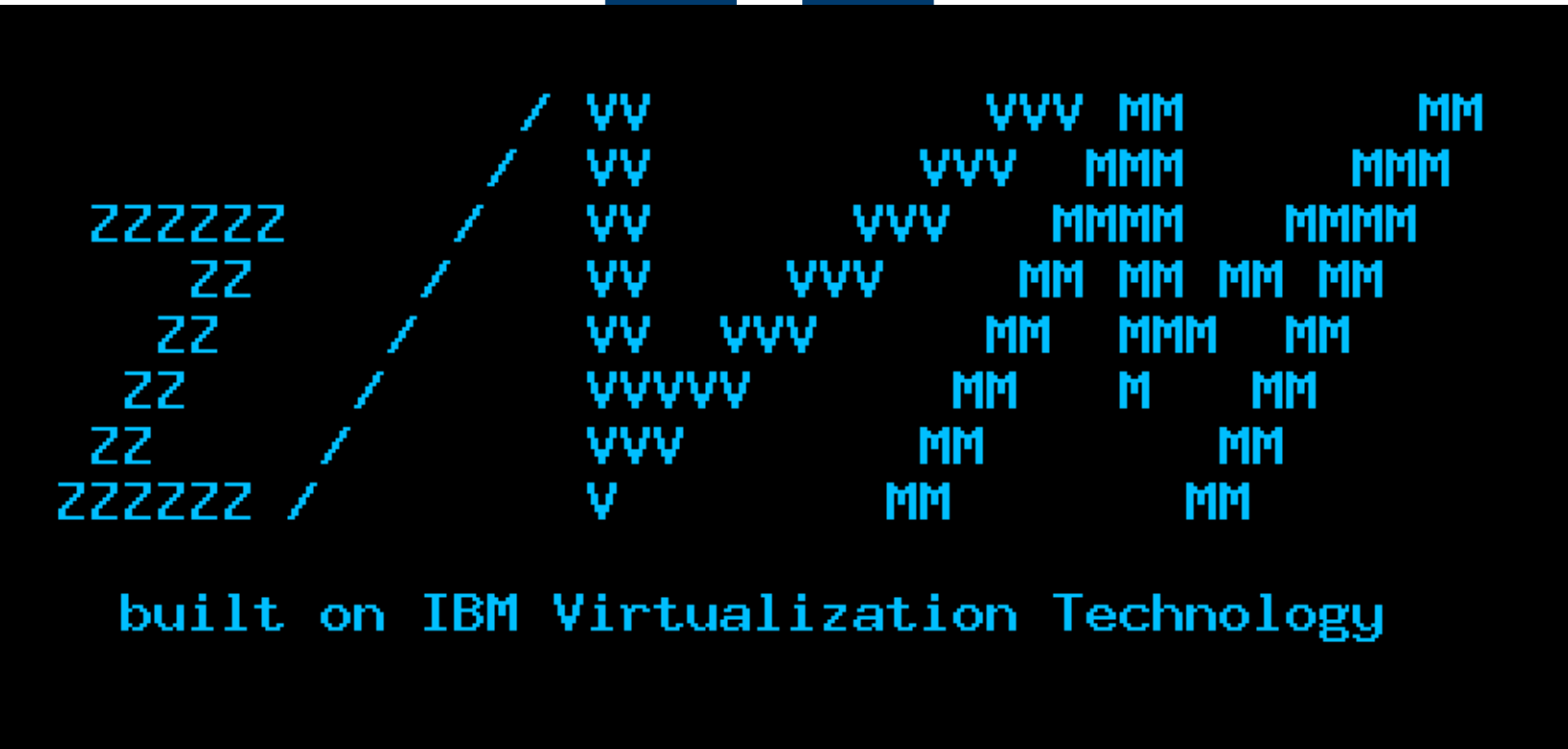
Construction begins!

INSTALL

Do not disconnect your user ID while install is running! The system needs to be IPLed several times during install. It may take ~20 min... keep your computer awake if you go for a coffee break ☺

```
install
IUGIIS8490I Now formatting volume: dasdaddr (1 of n)
:
IUGIIS8490I Now formatting volume: dasdaddr (n of n)
:
IUGIIS8380I Restoring IIS to lblcom, lblrll, lblres, and
lblspl
IUGIIS8341I Load of the system IIS to COMMON volume has
completed successfully
:
IUGIIS8490I Now allocating volume: dasdaddr (COMMON VOLUME)
:
IUGIDV8341I Creation of the USER DIRECT has completed
successfully
IUGILB8440I Now loading userid cuu (alias) disk 1 of nnn
:
IUGILB8440I Now loading userid cuu (alias) disk nnn of nnn
:
(etc. - a lot!)
```

Construction complete! Customize your system



Create IPLable utilities (ex. stand-alone dump device)



Configure a basic network connection using TCP/IP



Set up an External Security Manager (ESM) such as RACF



Create procedures for **backing up the system**



Enable preinstalled licensed products and features (ex. Dirmaint)



Section 3

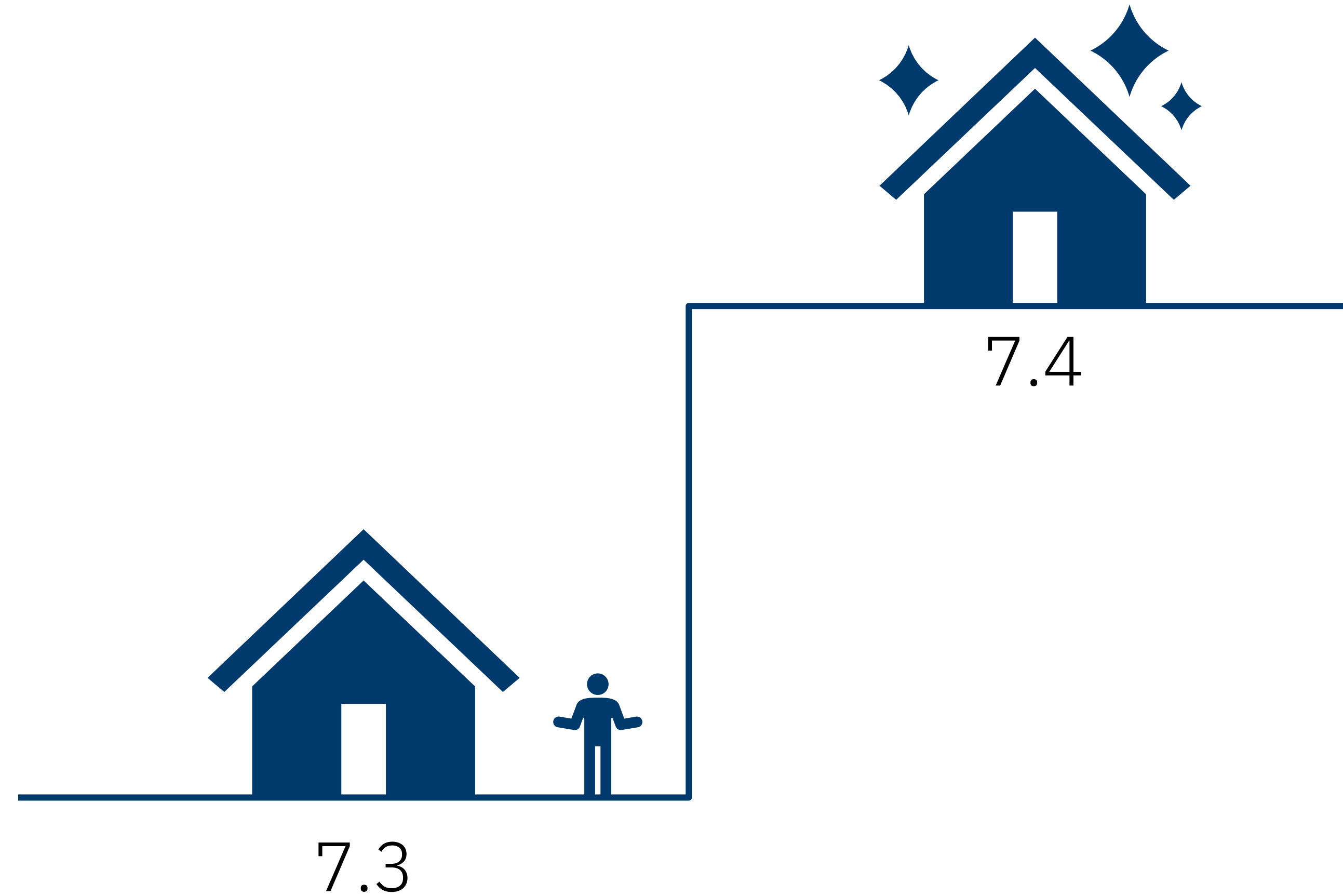
Upgrade Installation

7.3 → 7.4, non-SSI



What if you have a house already built?

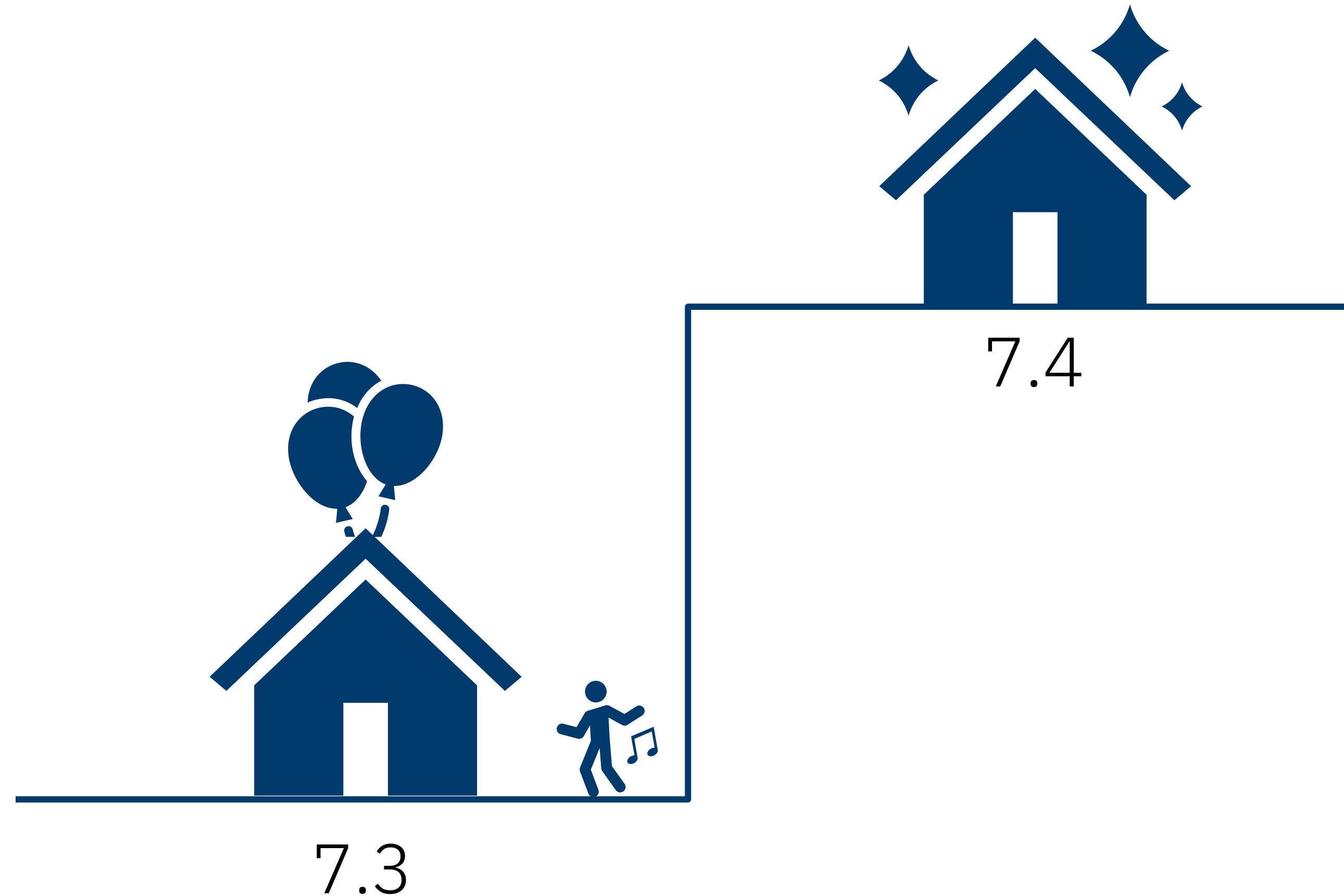
Seems like a lot of work to move your data up that mountain...



Upgrade it in place!

Why not install the [new system on the second level](#) of your home...

And move the new level of code to your current system with [minimal impact](#)?



Upgrade Installation Process (AKA Upgrade-in-place)

1. Prepare your system (get up to date with service!)
2. Install your second-level [work system](#) at the new release level... luckily you are all experts in this now 😊
 1. INSTPIPE, DVDPRIME to populate minidisks
 2. [INSTPLAN UPGRADE](#)
 3. INSTALL
3. [Backup](#) system
4. INSTUPGR STAGE 1 – production still running!
5. Shut down production, [backup](#), configure
6. INSTUPGR STAGE2
7. (If SSI) Upgrade other members
8. Remove the old version settings...
9. Start up production and fly!



Materials (Requirements and Restrictions)

*NOTE: CMS Minidisk as a file source is just one example!

There are multiple upgrade file sources, including DVD drives, USB drives, and an FTP server.

General

- An [existing z/VM 7.2 or 7.3 system](#)
 - This example starts from 7.3
- A CMS-formatted minidisk* containing the z/VM 7.4 product
 - Order electronic delivery of the product via IBM Shopz – licensed!
 - R/W access by MIGMAINT
- A supported processor (z/VM: General Information)
- A local 3270 terminal
- MIGMAINT user ID
- [New DASD](#) + space on existing volumes

Restrictions

- SSI:
 - All members at the same release level
 - Once one member is upgraded to 7.4, other members cannot be upgraded to anything but 7.4
 - All members upgraded to 7.4 before adding new members
- If managed by z/VM CSM: remove from CSM. See z/VM: Service Guide
- Cannot share RACF database with z/OS
- Cannot have certain changes made on the system – ex. changing/deleting IBM-supplied minidisk addresses. See z/VM: Installation Guide

Foundations

Set up for installation

1. Install [all required service](#) on the 7.2 or 7.3 system.
 1. CHKAPARS utility can identify service that may need to be applied post-update
 2. Complete SERVICE, PUT2PROD
2. [Back up your user directory.](#)
3. Make sure you have minidisk OR VMPSFS file pool space for your licensed products (ex. Dirmaint), depending on where you put them during install
 1. Worksheet 1 from install!
4. If using a directory manager like Dirmaint: refer to documentation for settings you may need to configure before upgrading!
5. If using an external security manager (ESM) like RACF: make sure MIGMAINT has authority and disable minidisk password checking.
6. Verify system name in VMSES/E, verify certain user IDs, verify lots of things...

Blueprints

Upgrade Installation Worksheets

Worksheet 1

Installation source
(one of the following)

- IP address & FTP credentials
- Path of DVD/USB
- VM minidisk location

Worksheet 2

Current system info:

- DASD type and volume size
- Default password
- SYSTEM CONFIG location
- How to update user directory

Worksheet 5

Space allocation for new user IDs/minidisks to be installed onto existing volumes (from the original 7.2/7.3 system)

Worksheet 3

Label/address for each new system volume

3390

Worksheet 4

Label/address for each new system volume OR info for where to define volumes (CHPID/FCP addr)

FBA

Blueprints

Upgrade Installation Worksheets

Worksheet 1

Installation source
(one of the following)

- IP address & FTP credentials
- Path of DVD/USB
- VM minidisk location

Worksheet 2

Current system info:

- DASD type and volume size
- Default password
- SYSTEM CONFIG location
- How to update user directory

Worksheet 5

Space allocation for new user IDs/minidisks to be installed onto existing volumes (from the original 7.2/7.3 system)

Worksheet 3

Label/address for each new system volume

3390

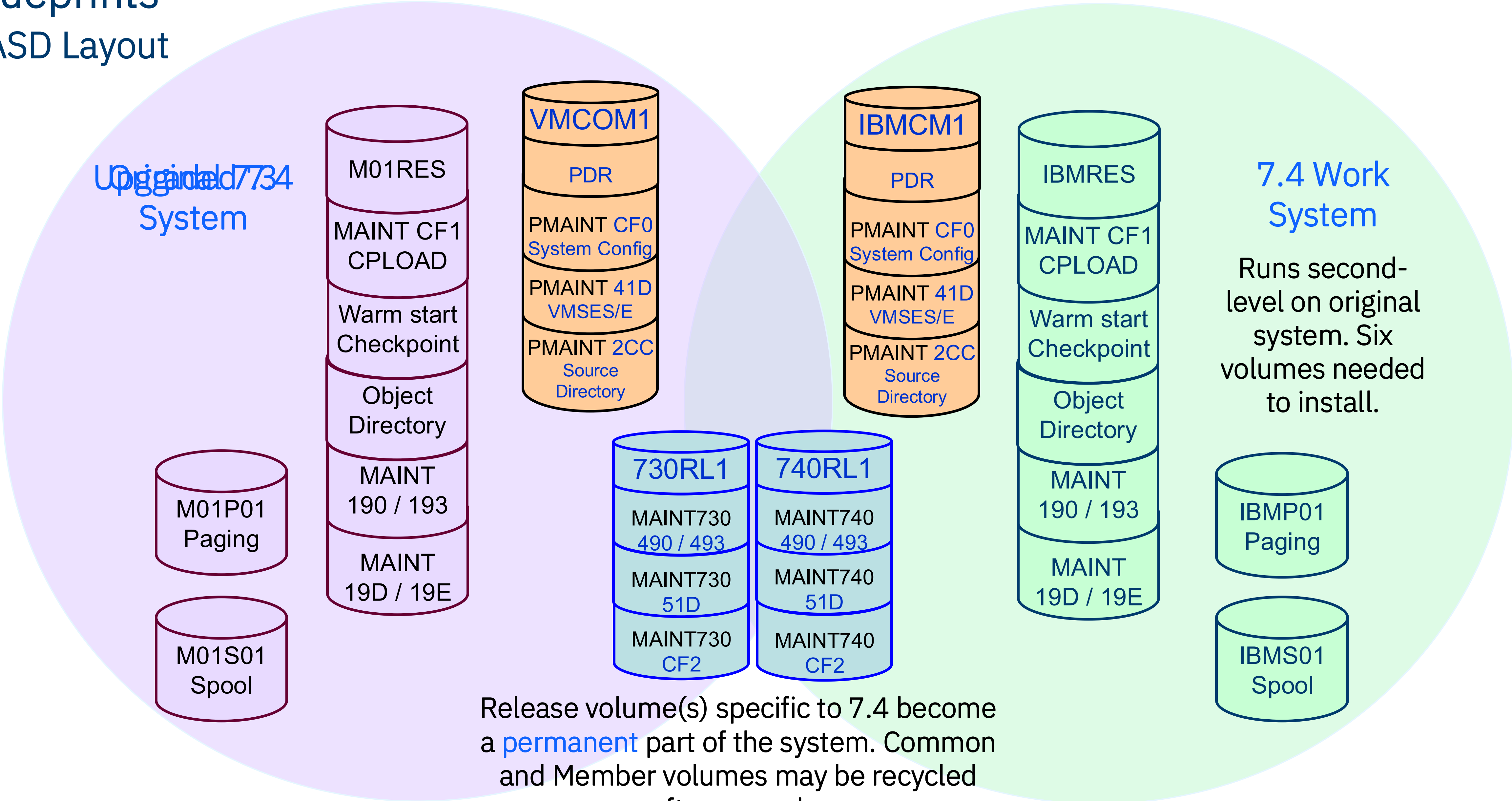
Worksheet 4

Label/address for each new system volume OR info for where to define volumes (CHPID/FCP addr)

FBA

Blueprints

DASD Layout



Foundations

Set up for work system installation

1. Load files onto CMS minidisk if needed – see z/VM: Installation Guide
2. Attach DASD, link source minidisk as W, link maint 193
3. INSTPIPE
4. Decode, unpack, and write the files needed to run DVDPRIME to the 2222 minidisk.
5. IPL CMS and re-access source minidisk and 2222 minidisk
6. Run DVDPRIME to load necessary files to the 24CC and 2CF0 disk.

```
instpipe
Ready;
pipe dvddecod CKD222 image w |UNPACK| ECKDREST 2222
ECKDREST: WROTE nnn TRACKS ON 2222, RC=0
Ready;

. . .

dvdprime 3390 (disk
IUGDVP8327I ** Now executing DVDPRIME on date at
time **
IUGDVP8440I Now loading 24CC disk

ECKDREST: WROTE nnnn TRACKS ON 24CC, RC=0
IUGDVP8440I Now loading 2CF0 disk

ECKDREST: WROTE nnnn TRACKS ON 2CF0, RC=0
IUGDVP8392I DVDPRIME EXEC ended successfully
Ready; T=n.nn/n.nn hh:mm:ss
```

Blueprints II

INSTPLAN

Worksheet 2

Current system info:

- DASD type and volume size
- Default password
- SYSTEM CONFIG location
- How to update user directory



`instplan upgrade` then confirm existing environment information + licensing

```
*** z/VM UPGRADE - USER SUPPLIED ENVIRONMENT INFORMATION ***

Enter your work system DASD size
 3390 10016

If you changed the name or location of your system configuration file,
change the values below.
System Configuration Name: SYSTEM CONFIG User ID: PMAINT Addr: CFO

Do you edit your CP user directory file manually?
 YES User Directory Name: USER DIRECT User ID: PMAINT Addr: 2CC
 NO

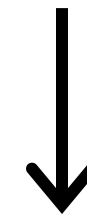
Enter a default password for your system that adheres to restrictions
set by your security manager.
Default Password: [REDACTED]
```

Blueprints II

INSTPLAN

Worksheet 3

Label/address for each new system volume



| *** z/VM UPGRADE - INSTALLATION VOLUME DEFINITIONS *** | | | |
|--|--------|---------|--------------|
| COMMON AND RELEASE VOLUMES | | | |
| TYPE | LABEL | ADDRESS | FORMAT (Y/N) |
| ===== | ===== | ===== | ===== |
| COMMON | IBMCM1 | | Y |
| RELVOL | 740RL1 | | |
| RELVOL2 | 740RL2 | | |
| SYSTEM VOLUMES | | | |
| TYPE | LABEL | ADDRESS | |
| ===== | ===== | ===== | |
| RES | IBMRES | | |
| SPOOL | IBMS01 | | |
| PAGE | IBMP01 | | |

Blueprints II

INSTPLAN

Worksheet 5

Space allocation for new user IDs/minidisks to be installed onto existing volumes (from the original 7.2/7.3 system)



| *** z/VM UPGRADE – ADDITIONAL SPACE REQUIREMENTS *** | | |
|---|---------|--------|
| Space is needed in your existing environment to load minidisks for the following user IDs. Supply the volume label. | | |
| MEMBER VOLUME USER ID | MINIMUM | LABEL |
| LWMBOSS | 10 | M01RES |
| LWMWORK | 10 | M01RES |
| COMMON VOLUME USER ID | MINIMUM | LABEL |
| 7VMDIR40 | 184 | VMCOM1 |
| KEYSTORE | 10 | VMCOM1 |

Blueprints II

INSTPLAN

IUGPUX8475I System upgrade information

Existing system information:

System being upgraded: **TRUSSP**
System type: Non-SSI
Common service filepool: VMPSFS
System Config location: PMAINT CFO
System Config filename: SYSTEM CONFIG
Edit directory: NO
z/VM products/features enabled: DirMaint

Additional space requirements:

| MEMBER SPACE: | USER ID | MIN | LABEL |
|---------------|---------|-----|--------|
| | LWMBOSS | 10 | MO1RES |
| | LWMWORK | 10 | MO1RES |

| COMMON SPACE: | USER ID | MIN | LABEL |
|---------------|----------|-----|--------|
| | 7VMDIR40 | 184 | VMCOM1 |
| | KEYSTORE | 10 | VMCOM1 |

Work system information:

Work system type: NEW
DASD size selected: 3390 - 10016 cylinders
Format volumes: Y
Volume labels and addresses:
IBMCM1
740RL1
740RL2
IBMRES
IBMS01
IBMP01

The default password you selected is:

TRUSSP

IUGINP8392I INSTPLAN EXEC ended successfully
Ready; T=0.15/0.16 14:34:22

Construction begins! INSTALL

After the usual install messages (~20 min), this message will pop up.

Type GO and wait.

Finally, IPL CMS from the MIGMAINT user ID.

```
install
IUGIIS8490I Now formatting volume: dasdaddr (1 of n)
:
*****
*
* The installation of your upgrade work system is complete.
* This system will be SHUTDOWN and you will be returned to.
* MIGMAINT on the system you are upgrading.
*
* Once the system shutdown is complete:
*
* IPL CMS on MIGMAINT
* Continue with the instructions in the Installation Guide.
*
*****
*****
*
* Type GO to continue
*
*****
go
:
ipl cms
```

Start attaching your balloons...

Stage 1

1. BACK UP YOUR SYSTEM!

1. All volumes except paging
2. USER DIRECT
3. SYSTEM CONFIG

2. From MIGMAINT: run INSTUPGR STAGE1 (PRIME to generate the STAGE1 changes table

3. Run the INSTUPGR STAGE1 (COMMIT command to upgrade your system with STAGE1 changes defined in the \$STAGE1\$ \$TABLE\$ file

```
access 24cc c
Ready; T=n.nn/n.nn hh:mm:ss

instupgr stage1 (prime
IUGUPG8392I INSTUPGR ended successfully
Ready; T=n.nn/n.nn hh:mm:ss

instupgr stage1 (commit
Now processing line 10 of nnn
Now processing line 20 of nnn
:
IUGUPG8392I INSTUPGR ended successfully
Ready; T=n.nn/n.nn hh:mm:ss
```

Halfway there!

Rework your customizations



```
ZZZZZZZ / VV VVV MM MM
ZZ VV VVV MMM MMM
ZZ VV VVV MM MM MM MM
ZZ VV VVV MM MMM MM
ZZ VVVV MM M MM
ZZ VVV MM MM
ZZZZZZZ / V MM MM
built on IBM Virtualization Technology
```

If using an **ESM** such as RACF: Verify authorizations, define and authorize new user IDs

Convert the RACF database and make it exclusive to z/VM

If using **DirMaint**: Copy configured files to the new release version, then recycle

Rework or remove any **LOCALMODs** that are not compatible with the new release



Take off!

Stage 2

1. STOP PRODUCTION and BACK UP YOUR SYSTEM!

1. All volumes except paging
2. USER DIRECT
3. SYSTEM CONFIG

2. From MIGMAINT: run INSTUPGR STAGE2 (PRIME to generate the STAGE2 changes table

```
access 24cc c
Ready; T=n.nn/n.nn hh:mm:ss

instupgr stage2 (prime
IUG2FC8535I Creating temporary work copy of MAINT 190 minidisk
z/VM DASD DUMP/RESTORE PROGRAM
COPYING MNT190
COPYING DATA 09/06/22 AT 20.33.21 GMT FROM MNT190 TO MNT190

INPUT CYLINDER EXTENTS          OUTPUT CYLINDER EXTENTS
      START      STOP              START      STOP
           0      nnnn                0      nnnn

END OF COPY
END OF JOB

IUGUPG8392I INSTUPGR ended successfully
Ready; T=n.nn/n.nn hh:mm:ss
```

Take off!

Stage 2

1. Upgrade your system with STAGE2 changes defined in the \$STAGE2\$ \$TABLE\$ file
 1. INSTUPGR STAGE2
(COMMIT
 2. Reaccess the files on your updated 190 disk
 3. Re-issue the command to complete the upgrade

```
instupgr stage2 (commit
Now processing line 10 of nnn
Now processing line 20 of nnn
:
IUGUPG8529I The 190 disk on the current system has been upgraded.
IUGUPG8529I You must IPL the 190 disk to reaccess the new files,
IUGUPG8529I To complete commit processing:
IUGUPG8529I IPL 190 PARM AUTOOCR
IUGUPG8529I ACCESS 24CC C
IUGUPG8529I and then re-issue:
IUGUPG8529I INSTUPGR STAGE2 (COMMIT
Ready; T=n.nn/n.nn hh:mm:ss
ipl 190 parm autocr
:
Ready; T=n.nn/n.nn hh:mm:ss
acc 24cc c
Ready; T=n.nn/n.nn hh:mm:ss
instupgr stage2 (commit
Now processing line 10 of nnn
Now processing line 20 of nnn
:
IUGUPG8392I INSTUPGR ended successfully
Ready; T=n.nn/n.nn hh:mm:ss
```

Clean up...

Post-upgrade tasks

1. Verify that the user directory is compatible with the new release.
2. Review the changes made to SYSTEM CONFIG.
3. Review the *sysname* \$WRNFILE on MIGMAINT, 2CF0.
4. Shut down and IPL the upgraded system.
5. Use MIGR51D to update MAINT740's 51D minidisk with VMSES inventory files for licensed software products that were *not* pre-installed.
6. Recycle work system volumes (EXCEPT release volumes)
7. Perform post-upgrade tasks specific to your system (ex. update directory entries, SYSTEM CONFIG...)



```

*** VM Software Inventory Disk (51D) Segment Migration ***

Set action code AC to D = Do Not Migrate or to M = Migrate segment. Action
code P means segment will be migrated due to product migration. To change a
segment name upon migration, enter the new name under the Segname in place
of ===== or ***** ( ===== Must be changed, ***** May be changed).

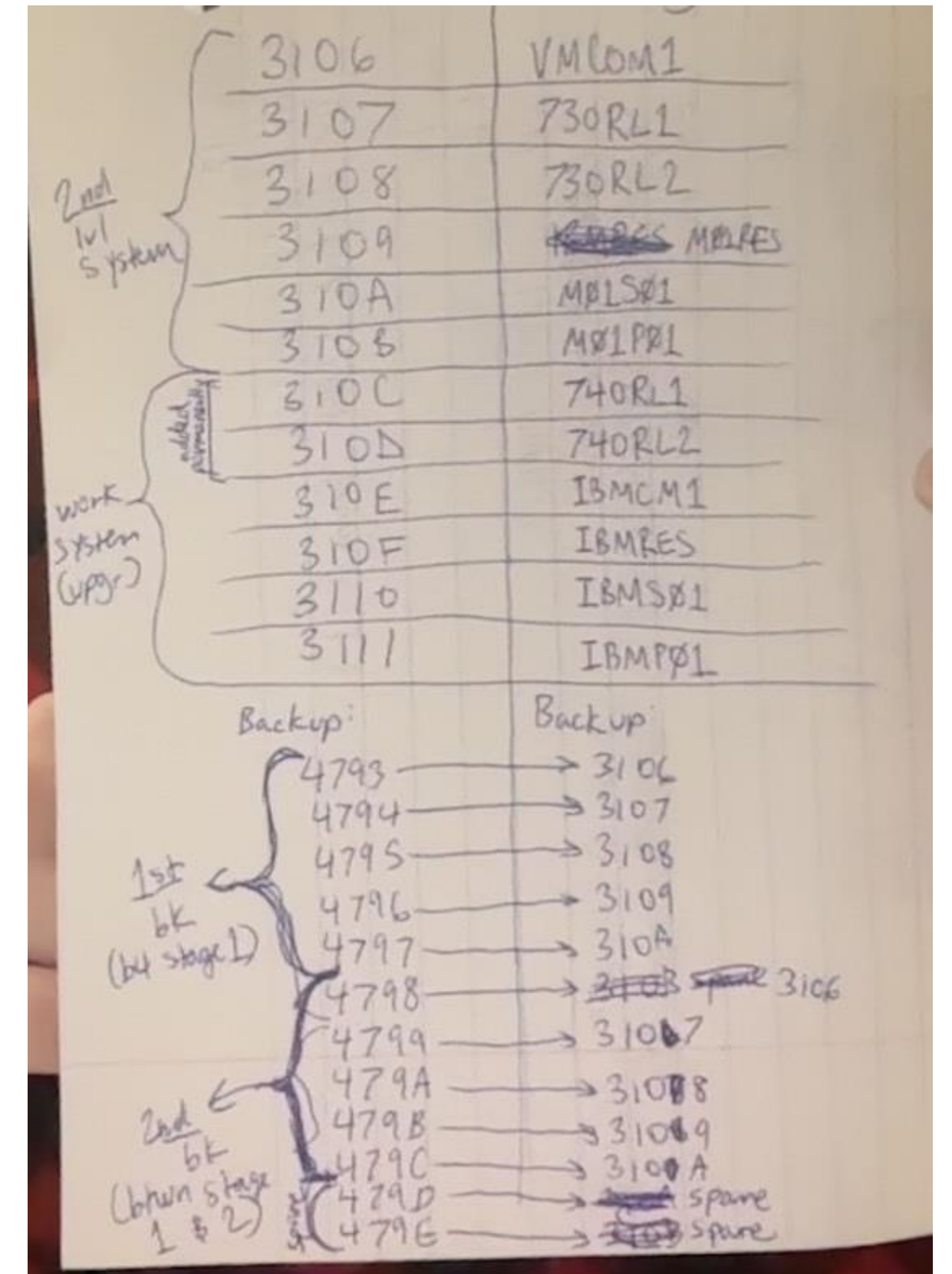
AC Segname      Prodid  Compname      Defparms      Bldparms
-----
D CMSBAM        Old->  7VMCMS30 CMS           B0D-B37 SR     PPF(SERV2P
New->  7VMCMS40 CMS           B0D-B37 SR     PPF(SERV2P
===== Mig->  6VMCMS20 CMS           B0D-B37 SR     PPF(SERV2P
D CMSDOS        Old->  7VMCMS30 CMS           B00-B0C SR     PPF(SERV2P
New->  7VMCMS40 CMS           B00-B0C SR     PPF(SERV2P
===== Mig->  6VMCMS20 CMS           B00-B0C SR     PPF(SERV2P
D CMSFILES      Old->  7VMCMS30 CMS           1900-1BFF SR   PPF(SERV2P
New->  7VMCMS40 CMS           1900-1BFF SR   PPF(SERV2P
===== Mig->  6VMCMS20 CMS           1900-1BFF SR   PPF(SERV2P
D CMSPIPES      Old->  7VMCMS30 CMS           2C00-2DFF SR   PPF(SERV2P
New->  7VMCMS40 CMS           2C00-2DFF SR   PPF(SERV2P
===== Mig->  6VMCMS20 CMS           2C00-2DFF SR   PPF(SERV2P
Page 1 of 4
  
```

Section 4

Tips & Tricks

For beginners, from a beginner...

1. Use a chart or spreadsheet to visualize your DASD layout before installing
 1. If using volumes for backups, use higher-numbered ones
 2. Attach only the DASD you need! Detach backups
 3. For upgrade: When planning out the work system, consider where you want your release volumes to be, since these are the only ones becoming permanent
2. Many steps may require you to use multiple 3270 sessions logged into different user IDs – keep a close eye on what disks you access and update from each!
3. If you start seeing strange errors or access issues, check whether your directory manager is online and operational.



My extremely scientific DASD layout

References and Next Steps

1. [z/VM: Installation Guide](#)

1. Do NOT use this presentation as your sole reference. These slides provide a conceptual foundation for understanding the Installation Guide and do not cover every essential step!

2. [z/VM Installation News](#)

3. [Program Directory for Directory Maintenance Facility for z/VM](#)

1. Appendix C. Preparing for the z/VM Upgrade Installation Procedure

Thank you!

Sam Capodiccì

z/VM Install and Packaging

s.capodiccì@ibm.com

www.linkedin.com/in/sam-capodiccì-b8541323b

IBM