

Installing a Usable z/VM System is Easy!

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Agenda

- Standard z/VM installation
 - History and current method
- A new z/VM system
 - What is there
 - What would be better?
- z/VM installation system
 - Modifying it
 - Creating disk images
 - Restoring the images
- Customization
 - System
 - Network
 - Input panel
- Our install process
 - Booting LPAR
 - Network
 - Input fields
 - System restore
 - Automated customization
- IPL new system
 - Other items
 - ..like SSI

z/VM Installation

Overview and a little history

Originally tape based

- Restore a starter system using DDR
 - The system must match your DASD!
(3330, 3350, 3380, 3390, FB-512)
- IPL that system
- Restore minidisks from tape (VMFPLC2 format)
- Problems with tape formats and compatibility

Now based on capabilities of the HMC

- Read files from DVD, USB, or server
- Load images into memory
- "Restart" the LPAR
- Documented in the Hardware library
"Installing software by using Load from Removable Media or FTP server support"

Summary of the z/VM Installation

- Load VM nucleus and Ramdisk; Start LPAR
- Use HMC 3270 to fill in fields
- Start installation
 - Format, label, and allocate disks
 - Load minidisk image files
 - Pipeline stages created to do this
(Not documented, for installation only)
 - Restores initial part of RES disk, initial spool
 - Restores minidisk by minidisk
- IPLs restored system (2nd level)
 - Init spool, init SFS, apply service (RSU)
- Install complete!

Installation Has Finished

Now, what do we have?

A “starter” z/VM system

- One spool volume
- One page volume
- No volumes defined to add workload
- Minimal security (no RACF or TLS/SSL)
- No system automation, little monitoring
- Minimal performance monitoring
- Minimal network setup (no vswitch defined)
- No API capability
- No framework for Linux

How do you proceed?

- Maybe you’ve done this before?
 - Did you take notes?

Or

- Follow a redbook (cookbook)
- Instructions from a class
- You have Richard’s lab book
(Hopefully you went yesterday!)

Fortunately, we upgrade systems more often than performing fresh installs.

But what if this is your first z/VM system?

Let's Do Something Different!

Create a system ready to be used – a.k.a. a “Usable System”

First, we must create that system

- Install the basic system
- Configure networking, configure a vswitch
- Activate RACF, Dirmaint, Perfkit & configure
- Install z/VM Operations Manager & configure
- Install Linux
- Configure TLS/SSL, LDAP
- Configure and enable SMAPI
- Add some users
- Enable monitor data collection
- Lots of other miscellaneous customization

OK, we built it!

Now..

Dump it to tape

Send it in the mail!

Run standalone DDR

Ummm..

NOT!

If you were going to deploy multiple systems, how would you build the “golden” system?

How Can a Customer Restore Our System?

Especially to a “new” LinuxONE customer with no z/VM skills

Can I use the normal install process?

How does it work?

Boot up the install system, log on and look around
Gee, this looks like a small z/VM system!

- CMS
- Directory source file
- Parm disk
- SYSTEM CONFIG
- Minidisks
- Users

Our “DASD” is a RAM disk, FB-512 format

- This is one of the files loaded by the HMC

What is this RAM disk?

FBA disks are simple. 512 byte fixed blocks, numbered starting at zero. Mapped into memory.

I have a zPDT (emulated Z system.) Take the RAM disk file and mount as an FBA disk.

- Use the source directory and map minidisks
- Make some changes and reverse the process
- Test the modified RAM disk – works fine!

(Later I used Pipelines to read and write the RAM disk image to and from an emulated FBA disk. A zPDT is not required to work with it.)

The z/VM Install System

What can we learn about it?

Your z/VM system comes with source code!

- You don't get all of it – but quite a lot.

Maybe I can scan it and look for "ramdisk"

- Hint: Look in VMPSFS:MAINT730.CPDV.OBJECT
- In HCPIST ASSEMBLE at label HCPISTRD:
RAMSTART DC XL4'1800000' Start RAM Disk at 24MB line
RAMSIZE DC F'414208000' Size in bytes of RAM Disk
- This is 809000 512-byte blocks, 395 MB
- The disk on the original install system:
 - 363400 blocks, 177 MB

There is room for a larger disk!

What can we do with a 395 MB disk?

- Add
 - New install code
 - Networking (really?)
 - More users to run background tasks
 - Operations Manager for z/VM
 - Automatic LUN discovery
- We dream of more, but it is a pretty small disk!
 - My dreams..
 - A Linux system hosting a GUI
 - SSL server enabling secure connections

Dumping the System

How can we do this?

Minidisk by minidisk? Or..

Entire volumes?

- I have PIPEDDR EXEC to dump entire volumes
- I don't have development's minidisk dumper
- The restore process uses Pipelines:
dvdload | unpack | eckdrest. (load from server)
dvddecod | unpack | eckdrest (from minidisk)
- Can I somehow do this for entire volumes?
PIPE dvdload | pipeddr

(PIPEDDR will unpack or uncompress)

“dvdload” uses Diag 2C0 to fetch files

- An API to an undocumented interface
- Documented in *CP Programming Services*
 - Appendix F. Reserved DIAGNOSE Codes
Diag x'2C0' HMC Data Source Load
 - Each file is 4 MB (maximum) size
 - written to a memory buffer
- dvdload fetches a sequence of files
 - 6 character name, 2 character sequence
- Files have 4 byte record length then record
 - (just like variable length records.)
- Special end of file string.
- Fetch files until EOF. Simple!

Let's Make This Happen!

- Modify PIPEDDR to call as Pipeline stage
 - The author agreed to it!
- Create files that DVDLOAD understands
 - Add 4 byte record length (“cms4” format)
 - Maximum 4 MB size
 - Write in sequence
 - Add End of File string
- SMOPP
 - Simple Matter of Pipeline Programming
 - Create stage named TODVD REXX
 - Takes PIPEDDR records, adds length, stops after 4 MB, writes file to ftp server
 - At End of File, write EOF string

```
PIPE rexx (pipeddr exec) dump ...  
    | todvd <basename> ftp://...
```

- Each file is 4 MB or less
- Create 8 character filenames; first 6 are base name, last 2 are sequence.
- Note: “base 36” sequence number

How do we restore a volume?

```
PIPE dvdload <basename>  
    | rexx (pipeddr exec) restore ...
```

- DVDLOAD uses Diag 2C0 to read a file
- Continues reading files in sequence
- Stops when it sees End of File string

Customizing the Cloned System

The system must be tailored to the environment

What may need to be changed after the restore?

- Real addresses (DASD and OSA)
- Disk labels
- System name
- IPL parameters
- IP info (IP address, VLAN, etc.)

Other changes we can make

- Add paging and spooling disks
- Add disks ready for Linux workloads
- Adjust to different size DASD or LUNs

- I developed an XEDIT based panel for INSTPROD EXEC; use that idea
- Ask for the values to be customized
- Verify values as valid, issue errors, etc.

```
5697-J10 Operations Manager for z/VM Installation
Please enter or update the fields highlighted below

Product: 5697J10F
Component: OPMGR                               Envelope file name on MAINT730 500:
                                                _____
                                                SERVLINK

Use DirMaint?: YES                               DirMaint allocation: AUTOG
                                                Enter: AUTOG - allocation by group name
                                                AUTOR - allocation by region name
Configure Logon-By?: YES                          Logon-By user ID: IBMVMI
                                                AUTOV - allocation by volume id

The allocation name is a volume label, group, or region name that has been
defined to DirMaint. Use the correct name corresponding to the allocation
unit selected above. See the program directory for space requirements.

Common allocation name: _____
System allocation name: _____

Number of worker userIDs: 4 (Worker servers for Operations Manager)

PF1=HELP PF3=QUIT PF5=Process ENTER=Refresh
```

Network customization

Set up a network connection on the Installer system

On a newly installed system, you run IPWIZARD

- IPWIZARD asks for:
 - Host name and domain
 - OSA address
 - VLAN id (if needed)
 - IP address
 - Netmask
 - MTU
 - Gateway IP address
 - DNS addresses
- It creates a basic network connection
 - No vswitch is configured
 - Telnet is enabled
 - The configuration is tested

We can use this!

Add users, minidisks, and files so that IPWIZARD can run on the installer system.

- We don't need all of TCPIP
 - A bit of trial and error to see what is needed
- Once this runs successfully we have
 - A working IP connection
 - The values in IPWIZARD \$FILE\$ on 2CC

The installed system is configured with this info

- A working IP connection on the first IPL
- Uses a vswitch with failover and other networking best practices

RESTORESIS panel

The information needed to restore and customize the system

The RESTORESIS command shows a 3270 panel

- The system customization information
 - System name
 - DASD real addresses and labels
 - OSA devices
 - Networking VLAN, MAC address prefix
- Ranges of devices can be specified
 - Paging disks
 - Linux workload disk
 - Redhat Openshift Cluster disks (not shown)
 - Input of specific addresses also possible
- System group name is not used by z/VM
 - The Linux guest system uses that value

```
z/VM Express System Installation
Please enter or update the fields highlighted below

System Name:  HOST      System Group Name:  _____

Installation destinations:

Volume:  M01RES  Address:  _____  IPL volume for z/VM
Volume:  VMCOM1  Address:  _____  z/VM Common volume
Volume:  730RL1  Address:  _____  z/VM Release 7.3 product volume
Volume:  M01U01  Address:  _____  z/VM Additional Products
Volume:  M01S01  Address:  _____  Spool volume
Volume:  M01S02  Address:  _____  Dedicated dump space (optional)

A sequence number (01, 02) is added to each Label Prefix to form a Label

Linux volumes:  (Minimum of 150 GB total Linux space required.)

Label prefix:  ZVML  Beginning address:  _____  Number of addresses:  1

Paging volumes:  (You must specify at least 1 paging device)

Label prefix:  M01P  Beginning address:  _____  Number of addresses:  __

Networking:  (Addresses are used in triples, 3 at a time)

Primary OSA device address:  4100  Port:  0  VLAN:  _____  (optional)
Failover OSA device address:  _____  Port:  0  Failover OSA is optional

MAC Address Prefix:  02_____  Must begin with 02

Restore using z/VM FTP client?:  YES  "NO" uses the HMC media support

PF1=HELP  PF2=Toggle  PF3=QUIT  PF4=Select  PF7=Backward  PF8=Forward
```

Alternate Restore Option

We can restore using the Pipelines ftp stage

Did you notice?

Restore using z/VM FTP client?: YES "NO" uses the HMC media support

- Because we created a network connection
 - we can use the ftp stage directly to a server
- This is MUCH faster than Diag 2C0
 - Restore in less than 10 minutes vs. an hour or so
- Some additional fields if this is enabled:

z/VM Express System Installation

Please enter or update the fields highlighted below

Installation FTP Server: This is the same server used to boot this partition with the installation image files.

Host name or IP Address: _____

FTP User ID: _____

FTP Password:

Path or directory: _____

IPWIZARD, the sequel

- IPWIZARD works, but it is several screens
- I had a few more requirements:
 - Ask for a Linux IP address
 - Force layer 3
 - Ask if Telnet server should be disabled
- I created a single panel to ask all in one place
 - Called SETUPNET EXEC
- It still calls DTCIPWIZ EXEC for the setup
 - Same thing that IPWIZARD does
 - It still creates IPWIZARD \$FILE\$ C

What is Customized?

Disks:

- Format page and spool
- Label volumes and set owner
- Erase or release residual data at end (ECKD)
- Update IPL parms on RES disk

System config:

- Update DASD labels
- Add spool or page as specified
- Add Edevice defs (SCSI)
- Update vswitch (OSA addresses, VLAN)
- MAC prefix
- System name
- Threads (1 or 2), STP enabled (if available)
- CP variables with our z/VM ESI level

Directory:

- DASD labels
- VLAN (if used)
- Update the source as USER INPUT (erase Dirmaint's USER DIRECT file)
- Write the object directory

Dirmaint:

- Create EXTENT CONTROL

VMSES/E:

- Change the system name

TCPIP:

- IP address, MTU, netmask, default route
- TCPIP DATA: Host name and domain
- Name server addresses

The Install Process, Start to Finish

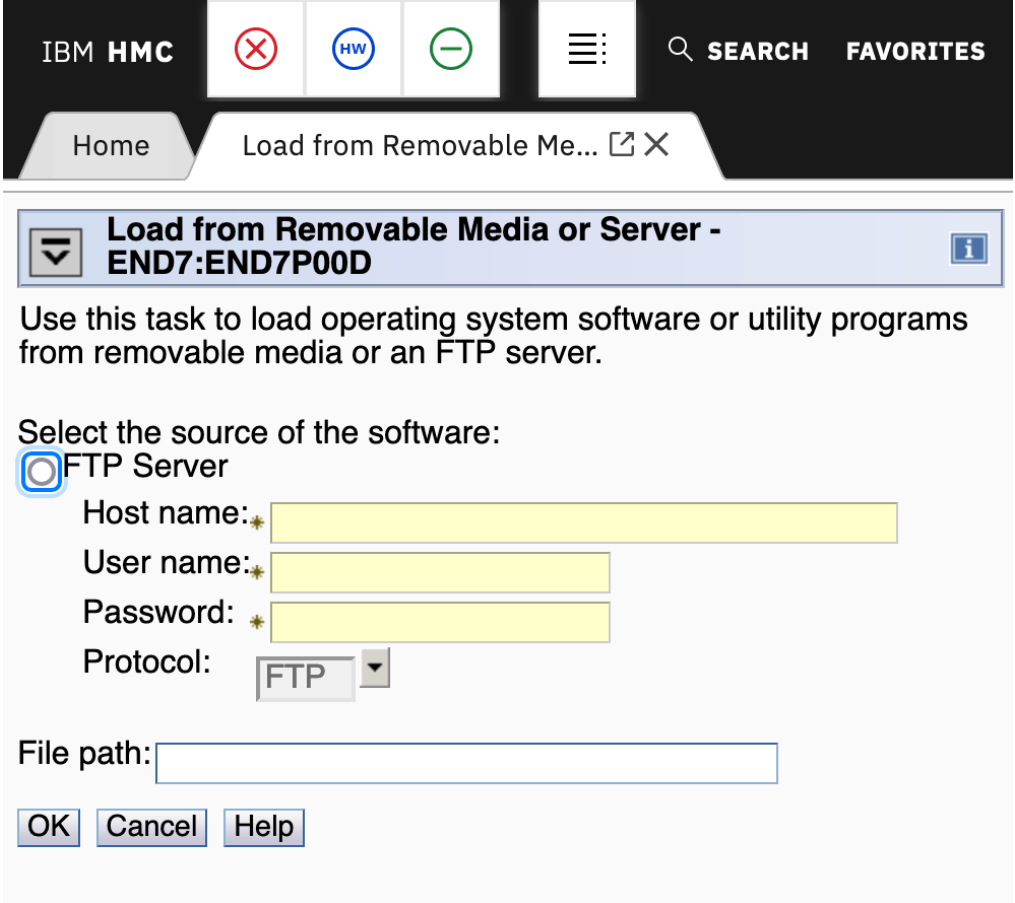
Let's show each step in the process

Assumptions:

- You have an LPAR defined and ready, or
- A Partition created (DPM mode)
- You have the installation files either
 - On a server accessible by the HMC
 - Loaded as an ISO file (DPM mode only)
 - On a USB inserted into the HMC

To start:

- “Load from Removable Media or Server”
 - Protocols FTP, SFTP, and FTPS supported



The screenshot displays the IBM HMC web interface. At the top, there is a navigation bar with the IBM HMC logo, several status icons (a red 'X', a blue 'HW' circle, and a green minus sign), a search icon, and the text 'SEARCH FAVORITES'. Below the navigation bar, there are two tabs: 'Home' and 'Load from Removable Me...'. The main content area is titled 'Load from Removable Media or Server - END7:END7P00D'. It contains the following text: 'Use this task to load operating system software or utility programs from removable media or an FTP server.' Below this, it says 'Select the source of the software:' followed by a radio button selected for 'FTP Server'. There are four input fields: 'Host name:*', 'User name:*', 'Password:*', and 'Protocol:' with a dropdown menu currently set to 'FTP'. At the bottom, there is a 'File path:' input field and three buttons: 'OK', 'Cancel', and 'Help'.

- The Integrated 3270 Console is required
 - It displays the fields and allows input
 - This is just like a normal z/VM install
- You are not required to start it first
 - If you forget, these messages are shown
 - Operating System Messages task
 - Start up the 3270 and log on
 - The user id is MAINT
- Notice that you can log on to user id LOG here
 - This is truly a line mode interface
 - Remember the typewriter consoles?
 - The install process will send messages to this console to track progress
 - This is helpful if there is a login timeout on your HMC

Operating System Messages - END7:END7P00D

Message

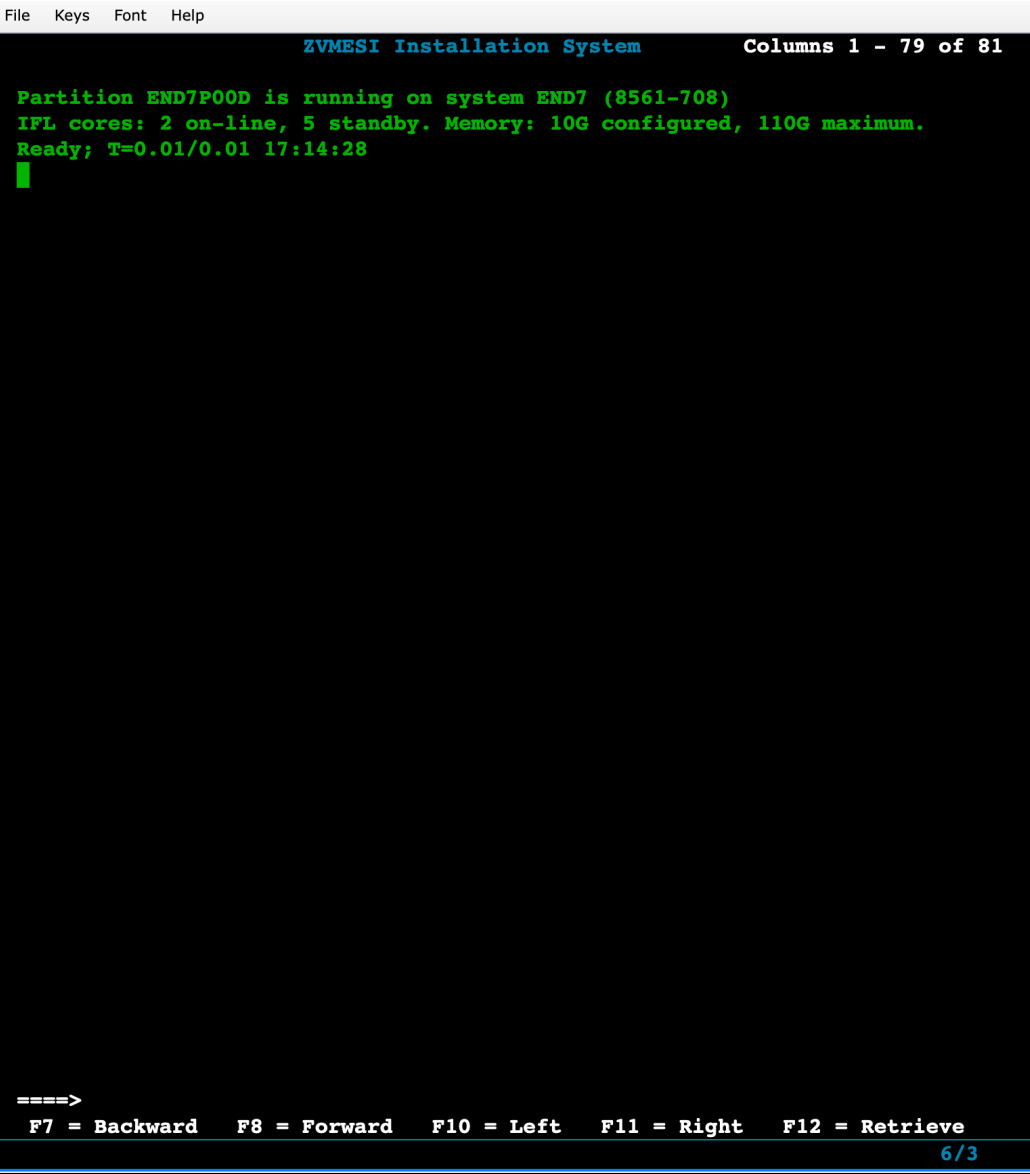
```

16:58:57 FILES:  NO RDR,  NO PRT,  NO PUN
16:58:57 LOGON AT 16:58:57 UTC  TUESDAY 06/20/23
16:58:57 SYSC      LOGON AS MAINT   USERS = 1
16:58:57 FILES:  0000001 RDR, 0000001 PRT,    NO PUN
16:58:57 HCPIOP952I 10G system storage: Permanent = 10G Reconfigurable = 0
16:58:57 HCPCRC8082I Accounting records are accumulating for userid OPERACCT.
16:58:57 HCPCRC8082I EREP records are accumulating for userid OPEREREP.
16:58:57 XAUTOLOG OPMGRM1
16:58:57 Command accepted
16:58:57 AUTO LOGON ***      OPMGRM1  USERS = 2      BY MAINT
16:58:57 AUTO LOGON ***      OPERATOR  USERS = 3      BY OPMGRM1
HCPCF06776I OPERATOR removed your userid as the system operator ID.
z/VM V7.3.0   2022-06-27 12:57
HCPCLS6056I XAUTOLOG information for OPMGRM1: The IPL command is verified by the
Partition END7P00D is running on system (8561-708)
IFL cores: 2 on-line, 5 standby. Memory: 10G configured, 110G maximum.
***-----***
*** The HMC Integrated 3270 Console is REQUIRED for installation.
***
*** Please start the Integrated 3270 Console task on the HMC for this
*** LPAR or Partition and log on to user MAINT (do not enter a password.)
***
*** This session will now log off.
***
*** You may log on to user ID LOG to view a real time log of the
*** installation process.
*** Enter LOGON LOG in the Command input area and press Send.
***-----***
CONNECT= 00:00:01 VIRTCPU= 000:00.00 TOTCPU= 000:00.01
LOGOFF AT 16:58:59 UTC TUESDAY 06/20/23
z/VM ONLINE--ZVMESI
  
```


The Integrated 3270 Console screen



Notice that Fullscreen CMS is used



Setting up the network – Run SETUPNET

- All the values are on 1 screen
- IPWIZARD can also be used

```
z/VM Express System Installation
Please enter your network information in the fields below

z/VM Host Name: _____
Domain Name: _____
z/VM IP Address: _____
Subnet Mask: _____ Enter /nn for mask bits or x.x.x.x
Gateway IP Address: _____ This is the address of your router
Linux Host Name: lxocpb01 (default name is shown)
Linux IP Address: _____ (default is the next IP address)
DNS Addresses: _____ Domain Name Servers
                  _____ One server address is required
                  _____ Additional servers are optional

VLAN Id: _____ VLAN number is optional
MTU Size: _____ MTU is Maximum Transmission Unit
Device Address: _____ Press PF4 to choose
OSA Port Number: 0 (0 or 1)
Connection Type: IP (only used for the installation system)
Enable the TELNET server?: NO (optional on the installation system)

PF1=HELP PF3=QUIT PF4=Select PF5=Process ENTER=Refresh
```

After the values are entered, Press PF5

- DTCIPWIZ sets up TCPIP
- The connections are validated

```
ZVMESI Installation System Columns 1 - 79 of 81

Partition END7P00D is running on system END7 (8561-708)
IFL cores: 2 on-line, 5 standby. Memory: 10G configured, 110G maximum.
Ready; T=0.01/0.01 17:27:37
setupnet
** NOTE: ** You do not need to respond to the prompt to restart TCPIP.
              It is restarted automatically.
DTCIPW2508I DTCIPWIZ EXEC is attempting to create the necessary
DTCIPW2508I configuration files
The TCP/IP stack (TCPIP) must be restarted as part of this procedure. Would
you like to restart TCPIP and continue?
Enter 0 (No), 1 (Yes)
USER DSC LOGOFF AS TCPIP USERS = 8 FORCED BY MAINT
USER DSC LOGOFF AS TCPIP USERS = 8 FORCED BY MAINT
Successfully PINGed Interface (9.60.87.36)
Successfully PINGed Gateway (9.60.86.1)
Successfully PINGed DNS (9.0.0.1)
DTCIPW2519I Configuration complete; connectivity has been verified
DTCIPW2520I File PROFILE TCPIP created on TCPIP 198
DTCIPW2520I File TCPIP DATA created on TCPIP 592
DTCIPW2520I File SYSTEM DTCPARMS created on TCPIP 198
Ready; T=0.86/1.78 17:27:59
-

====>
F7 = Backward F8 = Forward F10 = Left F11 = Right F12 = Retrieve
```

Start the restore process – Enter RESTORESISY
Make a choice on the type of system

```
ZVMESI Installation System          Columns 1 - 79 of 81

Partition END7P00D is running on system END7 (8561-708)
IFL cores: 2 on-line, 5 standby. Memory: 10G configured, 110G maximum.
Ready; T=0.01/0.01 17:27:37
setupnet
** NOTE: ** You do not need to respond to the prompt to restart TCP/IP.
             It is restarted automatically.
DTCIPW2508I DTCIPWIZ EXEC is attempting to create the necessary
DTCIPW2508I configuration files
The TCP/IP stack (TCP/IP) must be restarted as part of this procedure. Would
you like to restart TCP/IP and continue?
Enter 0 (No), 1 (Yes)
USER DSC LOGOFF AS TCPIP USERS = 8 FORCED BY MAINT
USER
Succes
Succes
Succes
DTCIP Enter a selection for the intended workload of this system:
DTCIP 1. Red Hat OpenShift Container Platform
DTCIP 2. IBM Cloud Infrastructure Center
DTCIP 3. Other Linux based workload
Ready
resto Enter your selection (1 to 3): 1
DMSAC
DMSAC

====>
F7 = Backward  F8 = Forward  F10 = Left  F11 = Right  F12 = Retrieve
```

The panel is shown

```
z/VM Express System Installation
Please enter or update the fields highlighted below

System Name: _____ System Group Name: _____

Installation destinations:

Volume: M01RES Address: _____ IPL volume for z/VM
Volume: VMCOM1 Address: _____ z/VM Common volume
Volume: 730RL1 Address: _____ z/VM Release 7.3 product volume
Volume: M01U01 Address: _____ z/VM Additional Products
Volume: M01S01 Address: _____ Spool volume
Volume: M01S02 Address: _____ Dedicated dump space (optional)

A sequence number (01, 02) is added to each Label Prefix to form a Label

Linux volumes: (Minimum of 1 volumes required, minimum 30051 cylinders)

Label prefix: ZVML Beginning address: _____ Number of addresses: 1

Paging volumes: (You must specify at least 1 paging device)

Label prefix: M01P Beginning address: _____ Number of addresses: 1

Networking: (Addresses are used in triples, 3 at a time)

Primary OSA device address: 4100 Port: 0 VLAN: _____ (optional)
Failover OSA device address: _____ Port: 0 Failover OSA is optional

MAC Address Prefix: 02 _____ Must begin with 02

Restore using z/VM FTP client?: NO "NO" uses the HMC media support

PF1=HELP PF2=Toggle PF3=QUIT PF4=Select PF5=Process ENTER=Refresh
```

Devices can be selected from a menu
 Multiple devices can be selected

```

z/VM Express System Installation
Please enter or update the fields highlighted below

System Name: WORKSHOP      System Group Name: WRKGROUP

Installation destinations:

Volume: M01RES Address:      IPL volume for z/VM
Volume: VMCOM1 Address:      z/VM Common volume
Volume: 730RL1 Address:      z/VM Release 7.3 product volume
Volume: M01U01 Address:      z/VM Additional Products
Volume: M01S01 Address:      Spool volume
Volume: M01S02 Address:      Dedicated dump space (optional)

A sequence number (01, 02) is added to each Label Prefix to form a Label
Linux volumes: (Minimum of 1 volumes required, minimum 30051 cylinders)
Label prefix: ZVML Beginning address:      Number of addresses: 1
Paging volumes: (You must specify at least 1 paging device)
Label prefix: M01P Beginning address:      Number of addresses:     
Networking: (Addresses are used in triples, 3 at a time)
Primary OSA device address: 4100 Port: 0 VLAN:      (optional)
Failover OSA device address:      Port: 0 Failover OSA is optional

Select the IPL volume for z/VM
MAC
Res / 6D00 VM6D00 10017 cyl / 6D01 VM6D01 10017 cyl
     / 6D02 VM6D02 10017 cyl / 6D03 VM6D03 10017 cyl
     / 6D04 VM6D04 10017 cyl / 6D05 VM6D05 10017 cyl
     - 6D06 VM6D06 10017 cyl - 6D07 VM6D07 10017 cyl
     - 6D08 VM6D08 10017 cyl - 6D09 VM6D09 10017 cyl
     - 6D0A VM6D0A 10017 cyl - 6D0B VM6D0B 10017 cyl
     - 6D40 VM6D40 30051 cyl

Press the HELP key for more information

PF1=HELP PF2=Toggle column PF4=Select values PF6=Clear selections PF12=Cancel
  
```

DASD for paging and Linux can have multiple disks
 Either a sequence of addresses or enter specific ones

```

z/VM Express System Installation
Please enter or update the fields highlighted below

System Name: WORKSHOP      System Group Name: WRKGROUP

Installation destinations:

Volume: M01RES Address: 6D00 IPL volume for z/VM
Volume: VMCOM1 Address: 6D01 z/VM Common volume
Volume: 730RL1 Address: 6D02 z/VM Release 7.3 product volume
Volume: M01U01 Address: 6D03 z/VM Additional Products
Volume: M01S01 Address: 6D04 Spool volume
Volume: M01S02 Address: 6D05 Dedicated dump space (optional)

A sequence number (01, 02) is added to each Label Prefix to form a Label
Linux volumes: (Minimum of 1 volumes required, minimum 30051 cylinders)
Label prefix: ZVML
Device addresses: 6D40                              
Paging volumes: (You must specify at least 1 paging device)
Label prefix: PAGE Beginning address: 6D06 Number of addresses: 4
Networking: (Addresses are used in triples, 3 at a time)
Primary OSA device address: 4100 Port: 0 VLAN:      (optional)
Failover OSA device address: 5700 Port: 0 Failover OSA is optional

MAC Address Prefix: 02070D Must begin with 02

Restore using z/VM FTP client?: NO "NO" uses the HMC media support

PF1=HELP PF2=Toggle PF3=QUIT PF4=Select PF5=Process ENTER=Refresh
  
```

If you make an error, a message is shown

```
z/VM Express System Installation
Please enter or update the fields highlighted below

System Name:  WORKSHOP          System Group Name:  WRKGROUP

Installation destinations:

Volume:  M01RES  Address:  6D00  IPL volume for z/VM
Volume:  VMCOM1  Address:  6D01  z/VM Common volume
Volume:  730RL1  Address:  6D02  z/VM Release 7.3 product volume
Volume:  M01U01  Address:  6D03  z/VM Additional Products
Volume:  M01S01  Address:  6D04  Spool volume
Volume:  M01S02  Address:  6D05  Dedicated dump space (optional)

A sequence number (01, 02) is added to each Label Prefix to form a Label
Linux volumes:  (Minimum of 1 volumes required, minimum 30051 cylinders)

Label prefix:  ZVML
Device addresses:  6D44  _____

Paging volumes:  (You must specify at least 1 paging device)

Label prefix:  PAGE  Beginning address:  6D06  Number of addresses:  4

Networking:  (Addresses are used in triples, 3 at a time)

Primary OSA device address:  4100  Port:  0  VLAN:  9876  (optional)
Failover OSA device address:  5700  Port:  0  Failover OSA is optional

MAC Address Prefix:  02_____  Must begin with 02

Restore using z/VM FTP client?:  NO  "NO" uses the HMC media support

VLAN number must not be greater than 4095
MAC address prefix must be a 6 digit value starting with 02
Linux device 1 device 6D44 does not exist

PF1=HELP  PF2=Toggle  PF3=QUIT  PF4=Select  PF5=Process  ENTER=Refresh
```

When it is correct, press PF5 to process
DASD list is shown for verification

```
ZVMESI Installation System  Lines 75 - 101 of 101
Columns 1 - 79 of 81

Installation selections and values are saved.

Partition END7P00D is running on system END7 (8561-708)
IFL cores: 2 on-line, 5 standby. Memory: 10G configured, 110G maximum.

If these addresses are incorrect, run RESTORESIS CONFIG and make corrections.

These volumes will be initialized and the basic system is restored to:
ECKD DASD  6D00 VM6D00, new label will be M01RES
ECKD DASD  6D01 VM6D01, new label will be VMCOM1
ECKD DASD  6D02 VM6D02, new label will be 730RL1
ECKD DASD  6D03 VM6D03, new label will be M01U01
ECKD DASD  6D04 VM6D04, new label will be M01S01

These volumes will be initialized and formatted for Paging or Dump space:
ECKD DASD  6D05 VM6D05, new label will be M01S02
ECKD DASD  6D06 VM6D06, new label will be PAGE01
ECKD DASD  6D07 VM6D07, new label will be PAGE02
ECKD DASD  6D08 VM6D08, new label will be PAGE03
ECKD DASD  6D09 VM6D09, new label will be PAGE04

These volumes will be initialized and allocated for the Linux:
ECKD DASD  6D40 VM6D40, new label will be ZVML01

Next step to perform:
Run RESTORESIS START to install and customize the system.
Ready; T=0.03/0.04 18:19:30

====>
F7 = Backward  F8 = Forward  F10 = Left  F11 = Right  F12 = Retrieve
```

Begin the Restore and Customization Process

- All the disks are labeled with the new labels
- Space for Paging and Spool are formatted
 - This is done by other virtual machines
 - Done in parallel with the restore process
- Each volume is restored
 - The progress of each volume is shown
 - Verification that the process is working
- After each volume is completed
 - The disk allocation is updated
 - The label is rewritten (if needed)
 - The owning system is set

ZVMESI Installation System

Lines 98 - 135 of 135
Columns 1 - 79 of 81

Next step to perform:

```
Run RESTORESIS START to install and customize the system.  
Ready; T=0.03/0.04 18:19:30  
restoresys start
```

Labeling all the restore disks.

```
Labeling address 6D00 with label M01RES  
DASD 6D00 ATTACHED TO SYSTEM M01RES  
Labeling address 6D01 with label VMCOM1  
DASD 6D01 ATTACHED TO SYSTEM VMCOM1  
Labeling address 6D02 with label 730RL1  
DASD 6D02 ATTACHED TO SYSTEM 730RL1  
Labeling address 6D03 with label M01U01  
DASD 6D03 ATTACHED TO SYSTEM M01U01  
Labeling address 6D40 with label ZVML01  
DASD 6D40 ATTACHED TO SYSTEM ZVML01  
Starting background format of CP volumes.
```

Restoring the z/VM system, 6 volumes.

```
Restoring RESCKD to DASD 6D00, volume 1 of 6  
PDDRMS309I Restoring data to MAINT 2000 from Pipelines
```

```
Retrieving file: RESCKD0G  
Cylinder 754 of 7545 completed (10%)  
Retrieving file: RESCKD0T  
Cylinder 1509 of 7545 completed (20%)  
Retrieving file: RESCKD0X  
Cylinder 2263 of 7545 completed (30%)  
Retrieving file: RESCKD1B  
Cylinder 3018 of 7545 completed (40%)  
Retrieving file: RESCKD1B  
Cylinder 3772 of 7545 completed (50%)  
Retrieving file: RESCKD1C  
Cylinder 4527 of 7545 completed (60%)  
Retrieving file: RESCKD1H  
Cylinder 5281 of 7545 completed (70%)  
Retrieving file: RESCKD1J
```

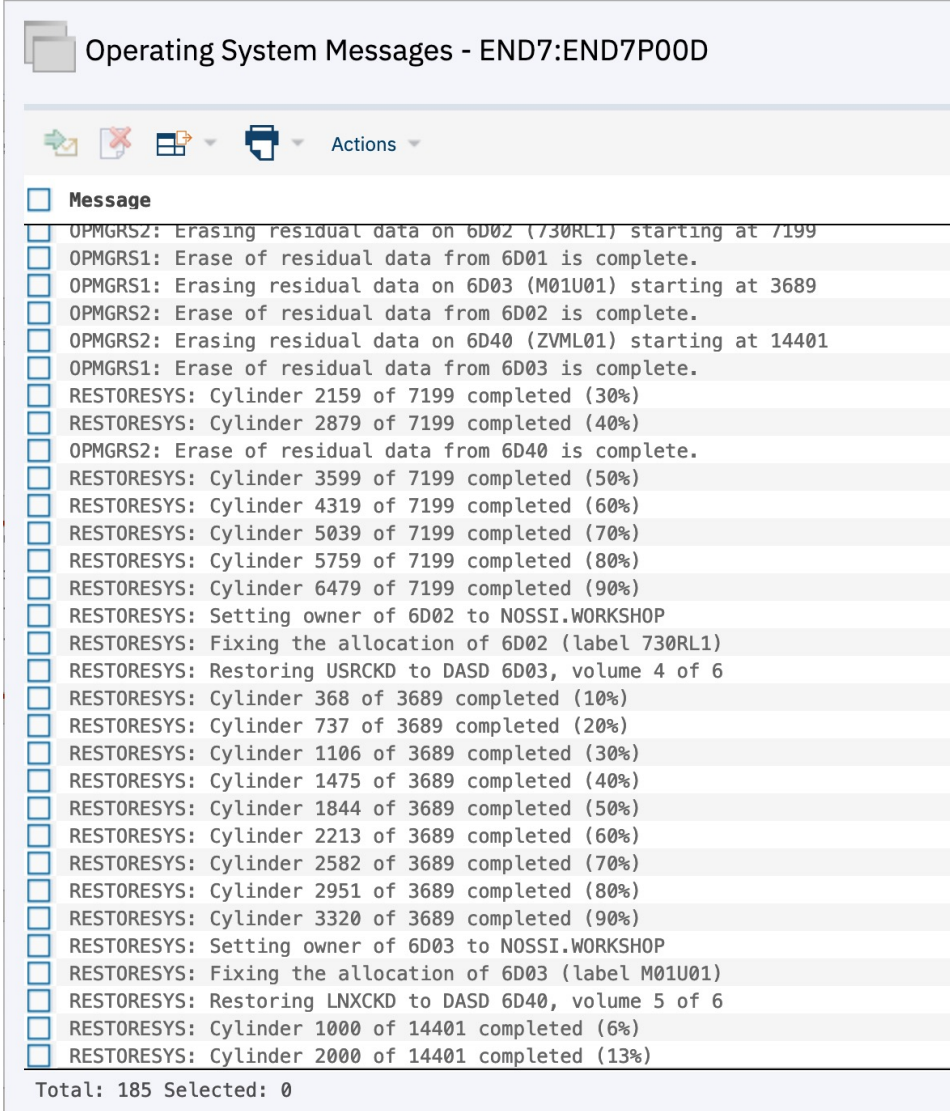
====>

F7 = Backward F8 = Forward F10 = Left F11 = Right F12 = Retrieve

Operating System Messages shows a log

We logged on to a user id named LOG to see this

These are the same messages seen on the 3270 display



Operating System Messages - END7:END7P00D

Actions

<input type="checkbox"/>	Message
<input type="checkbox"/>	OPMGRS2: Erasing residual data on 6D02 (730RL1) starting at 7199
<input type="checkbox"/>	OPMGRS1: Erase of residual data from 6D01 is complete.
<input type="checkbox"/>	OPMGRS1: Erasing residual data on 6D03 (M01U01) starting at 3689
<input type="checkbox"/>	OPMGRS2: Erase of residual data from 6D02 is complete.
<input type="checkbox"/>	OPMGRS2: Erasing residual data on 6D40 (ZVML01) starting at 14401
<input type="checkbox"/>	OPMGRS1: Erase of residual data from 6D03 is complete.
<input type="checkbox"/>	RESTORESIS: Cylinder 2159 of 7199 completed (30%)
<input type="checkbox"/>	RESTORESIS: Cylinder 2879 of 7199 completed (40%)
<input type="checkbox"/>	OPMGRS2: Erase of residual data from 6D40 is complete.
<input type="checkbox"/>	RESTORESIS: Cylinder 3599 of 7199 completed (50%)
<input type="checkbox"/>	RESTORESIS: Cylinder 4319 of 7199 completed (60%)
<input type="checkbox"/>	RESTORESIS: Cylinder 5039 of 7199 completed (70%)
<input type="checkbox"/>	RESTORESIS: Cylinder 5759 of 7199 completed (80%)
<input type="checkbox"/>	RESTORESIS: Cylinder 6479 of 7199 completed (90%)
<input type="checkbox"/>	RESTORESIS: Setting owner of 6D02 to NOSSI.WORKSHOP
<input type="checkbox"/>	RESTORESIS: Fixing the allocation of 6D02 (label 730RL1)
<input type="checkbox"/>	RESTORESIS: Restoring USRCKD to DASD 6D03, volume 4 of 6
<input type="checkbox"/>	RESTORESIS: Cylinder 368 of 3689 completed (10%)
<input type="checkbox"/>	RESTORESIS: Cylinder 737 of 3689 completed (20%)
<input type="checkbox"/>	RESTORESIS: Cylinder 1106 of 3689 completed (30%)
<input type="checkbox"/>	RESTORESIS: Cylinder 1475 of 3689 completed (40%)
<input type="checkbox"/>	RESTORESIS: Cylinder 1844 of 3689 completed (50%)
<input type="checkbox"/>	RESTORESIS: Cylinder 2213 of 3689 completed (60%)
<input type="checkbox"/>	RESTORESIS: Cylinder 2582 of 3689 completed (70%)
<input type="checkbox"/>	RESTORESIS: Cylinder 2951 of 3689 completed (80%)
<input type="checkbox"/>	RESTORESIS: Cylinder 3320 of 3689 completed (90%)
<input type="checkbox"/>	RESTORESIS: Setting owner of 6D03 to NOSSI.WORKSHOP
<input type="checkbox"/>	RESTORESIS: Fixing the allocation of 6D03 (label M01U01)
<input type="checkbox"/>	RESTORESIS: Restoring LNXCKD to DASD 6D40, volume 5 of 6
<input type="checkbox"/>	RESTORESIS: Cylinder 1000 of 14401 completed (6%)
<input type="checkbox"/>	RESTORESIS: Cylinder 2000 of 14401 completed (13%)

Total: 185 Selected: 0

Customizing the Restored System

This is done automatically once the restore is complete

The list of customization tasks was shown earlier

The installed system is booted 2nd level

- The spool disks have changed
 - The size and maybe the label
- It is necessary to perform a FORCE start
 - It starts then shuts down

The final messages help with the next steps

- Shutdown the installer system
- How to IPL the new system

```
ZVMESI Installation System          Lines 262 - 300 of 300
                                   Columns 1 - 79 of 81

Customizing the restored system.

Updating SAPL IPL parameters.
Writing SAPL...
HCPSAL6803I ENTER UP TO 3 LINES OF IPLPARMS
HCPSAL6797I MINIDISK VOLID AT OFFSET 39 IS MNTCF1

Updating the SYSTEM CONFIG file.
CONFIGURATION FILE PROCESSING COMPLETE -- NO ERRORS ENCOUNTERED.

Updating the System Logo file.

Updating the User Directory.
z/VM USER DIRECTORY CREATION PROGRAM - VERSION 7 RELEASE 3.0
EOJ DIRECTORY UPDATED
HCPDIR494I User directory occupies 62 disk pages

Updating the VMSES configuration.

Updating the TCPIP configuration. _

Creating file for Linux TCP/IP configuration.

Updating Operations Manager configuration.

Testing the start up of the restored system.
AUTO LOGON ***          ZVMBOOT  USERS = 10

Checking that the initial system IPL is finished.

System customization is complete!

Next steps:
- Shutdown the installer system by entering this command:
  SHUTDOWN SYSTEM ZVMESI
- Load or boot the Partition from address: 6D00

Ready; T=55.50/59.09 18:35:00
====>
F7 = Backward  F8 = Forward  F10 = Left  F11 = Right  F12 = Retrieve
```


Now IPL Your New System!

Most of us know what that looks like

Some details about the restored system

- RACF/VM is active
 - IDs have Password Phrases
 - All are expired
 - List of IDs and initial phrases in document
- Operations Manager for z/VM is installed
 - Monitoring consoles of running VMs
 - Cleaning up spool and log files
- Passwords are removed from several IDs
 - Some are revoked – no need to log on
 - LOGON BY enabled for some others
- CP Monitor data collection is active
 - Collects 5 to 6 days of data
 - Automatically erases old files
- TLS/SSL is configured and active
 - We created our own small CA to issue cert
 - CA is Certificate Authority
 - Certificates can be downloaded from the included Linux system
 - Secure Telnet is enabled
 - Unsecure is allowed for initial logon
 - LDAP is configured

We have a document that describes the differences.

Some Additional Features

We've added some options for special situations

Configuration using a Spreadsheet

- For planning in advance or multiple installs
 - Fill out a spreadsheet we provide
 - Values are the same as you see on the 3270
 - Save it in CSV format
 - Put it in the same directory as install files
- Fills in the fields on the 3270 panels
- Otherwise, the process is the same

Then we took that one step further

- Fully automatic installation
- No need to log on to a 3270
 - (assuming all input data is correct)
- See progress on Operating System Messages

Message

ECKD DASD 7904 M01S01, new label will be M01S01

These volumes will be initialized and formatted for Paging or Dump space:

ECKD DASD 7905 M01S02, new label will be M01S02

ECKD DASD 7990 ZVMP01, new label will be ZVMP01

ECKD DASD 7991 ZVMP02, new label will be ZVMP02

These volumes will be initialized and allocated for the Linux:

ECKD DASD 7940 ZVML01, new label will be ZVML01

ECKD DASD 7941 ZVML02, new label will be ZVML02

Labeling all the restore disks.

Labeling address 7900 with label M01RES

DASD 7900 ATTACHED TO SYSTEM M01RES

Labeling address 7901 with label VMCOM1

DASD 7901 ATTACHED TO SYSTEM VMCOM1

Labeling address 7902 with label 730RL1

DASD 7902 ATTACHED TO SYSTEM 730RL1

Labeling address 7903 with label M01U01

DASD 7903 ATTACHED TO SYSTEM M01U01

Labeling address 7940 with label ZVML01

DASD 7940 ATTACHED TO SYSTEM ZVML01

Labeling address 7941 with label ZVML02

DASD 7941 ATTACHED TO SYSTEM ZVML02

Starting background format of CP volumes.

Restoring the z/VM system, 6 volumes.

Restoring RESCKD to DASD 7900, volume 1 of 6

PDDRMS309I Restoring data to MAINT 2000 from Pipelines

Total: 94 Selected: 0

Command:

What About z/VM SSI?

Our target customers usually install a single system

SSI is great, but setting up the CTCs is harder

- The CTC connections are required!
- We hope DPM will offer configuration help

Converting an “SSI-ready” z/VM system to a single “SSI-enabled” one is documented

- Could it be done automatically?
- Maybe after restoring our system?
- Sure!
 - It needs more disks for RACF
 - SSI cluster name is needed
 - SYSTEM CONFIG and directory changes
 - Create the PDR
 - SFS config, VMSES/E
- Use the cloning process for more members
 - Documented in the z/VM Library

```
z/VM Express System Installation
Please enter or update the fields highlighted below

System Name:  WORKSHOP          System Group Name:  WRKGROUP
Enable SSI?:  YES              SSI Cluster Name:  SHOPSSI

Installation destinations:

Volume:  M01RES  Address:  _____  IPL volume for z/VM
Volume:  VMCOM1  Address:  _____  z/VM Common volume
Volume:  730RL1  Address:  _____  z/VM Release 7.3 product volume
Volume:  M01U01  Address:  _____  z/VM Additional Products
Volume:  M01S01  Address:  _____  Spool volume
Volume:  RACFDB  Address:  _____  RACF Primary database volume
Volume:  RACFBK  Address:  _____  RACF Backup database volume
Volume:  M01S02  Address:  _____  Dedicated dump space (optional)

A sequence number (01, 02) is added to each Label Prefix to form a Label
Linux volumes:  (Minimum of 1 volumes required, minimum 30051 cylinders)
Label prefix:  ZVML  Beginning address:  _____  Number of addresses:  1
Paging volumes:  (You must specify at least 1 paging device)
Label prefix:  M01P  Beginning address:  _____  Number of addresses:  __
Networking:  (Addresses are used in triples, 3 at a time)
Primary OSA device address:  4100  Port:  0  VLAN:  _____ (optional)
Failover OSA device address:  _____  Port:  0  Failover OSA is optional
MAC Address Prefix:  02_____  Must begin with 02
Restore using z/VM FTP client?:  NO  "NO" uses the HMC media support

PF1=HELP  PF2=Toggle  PF3=QUIT  PF4=Select  PF5=Process  ENTER=Refresh
```

Thanks for Listening!

Thanks to our Skunkworks team

- Ernie Horn
- Vic Cross
- Paul Novak
- Bruce Hayden

With help from

- Fred Bader
- Jacob Emery
- Jay Brenneman
- Justice Heughan
- Matt Mondics
- Stephanie Rivero

Be sure to attend our other sessions:

- *Easily Extending a Usable z/VM System!*
 - Friday 2:15 PM Cartoon room
- *Documenting, testing, and packaging of an automated bundle like z/VM ESI*
 - Saturday 9:45 AM Cartoon room

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