Migrating live Linux and z/VM systems to new DASD

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SHARE session 16574
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INNOVATION® DATA PROCESSING

Agenda

Introductions

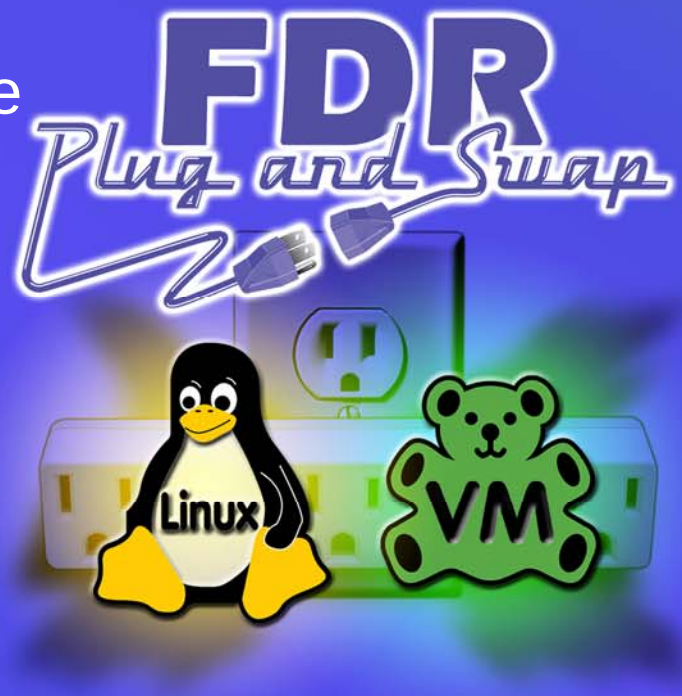
Hierarchy of Availability

Business Continuance Tools

z/VM & z/OS Platform Convergence

Estimating Migration Effort

Summary



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Agenda

- **Introductions**
- Hierarchy of Availability
- Business Continuance Tools
- z/VM and z/OS Platform Convergence
- Estimating Migration Effort
- Summary

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Introductions

- Who am I?
  - Michael MacIsaac
  - Product Manager for z/VM and Linux
  - mmacisaac@fdrinnovation.com
- Who are you?
  - An Innovation Data Processing customer?
  - An FDRPAS on z/OS customer?
  - A z/VM & Linux only shop?
  - z/VM SSI?
  - z/VM SMAPI configured?

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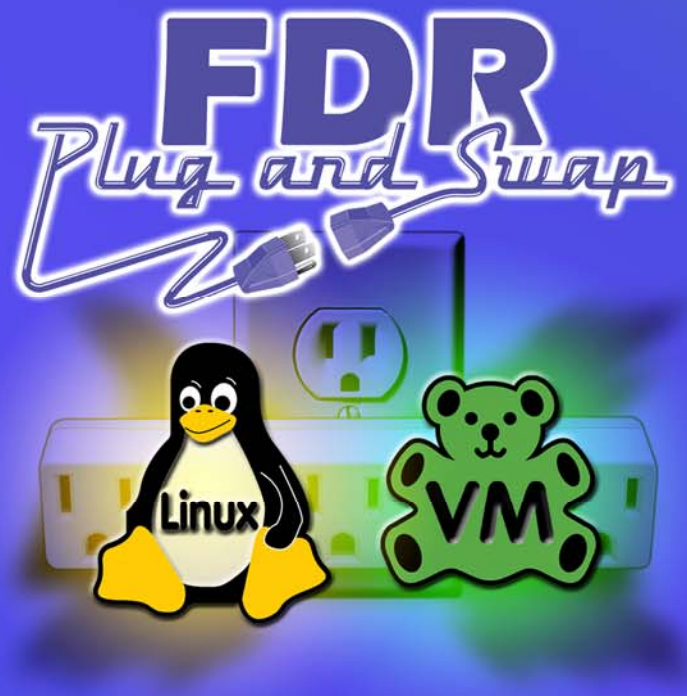

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Hierarchy of Availability

- Hierarchy of availability (lower to higher)
  - High Availability
  - Continuous Operations
  - Continuous Availability

Source: "*High Availability Architectures For Linux on IBM System z*" Version 2, June 15, 2010 by Steve Wehr, Scott Loveland and Harriet Morril of IBM

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Tools in Your “Availability” Toolbox

- Resilient hardware with dynamic features
  - Mainframe, PR/SM, standby memory/CPUs, etc.
- Disk local mirroring and remote replication tools
- Resiliency z/VM and Linux features
  - Hot plugging memory, CPUs, file systems
- HA software
  - Oracle RAC, IBM WAS XD, IBM DB2 HADR, etc.
- Business continuance tools
  - z/VM 6.2+ SSI and LGR
  - Innovation FDRPAS for z/OS & FDRPASVM for z/VM

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Business Continuance Tools (on z/VM and Linux)

z/VM SSI and LGR

FDRPASVM non-disruptive migration

z/VM and z/OS Platform Convergence

Estimating Migration Effort

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z/VM SSI and LGR

- Single System Image (SSI)
  - 2-4 z/VM “member” systems share and coordinate resources
  - This becomes an “SSI cluster”
- Live Guest Relocation (LGR)
  - Running Linux systems can move cross-LPAR or CEC
  - Memory and CPU are moved, but not disk
- Can eliminate planned outages

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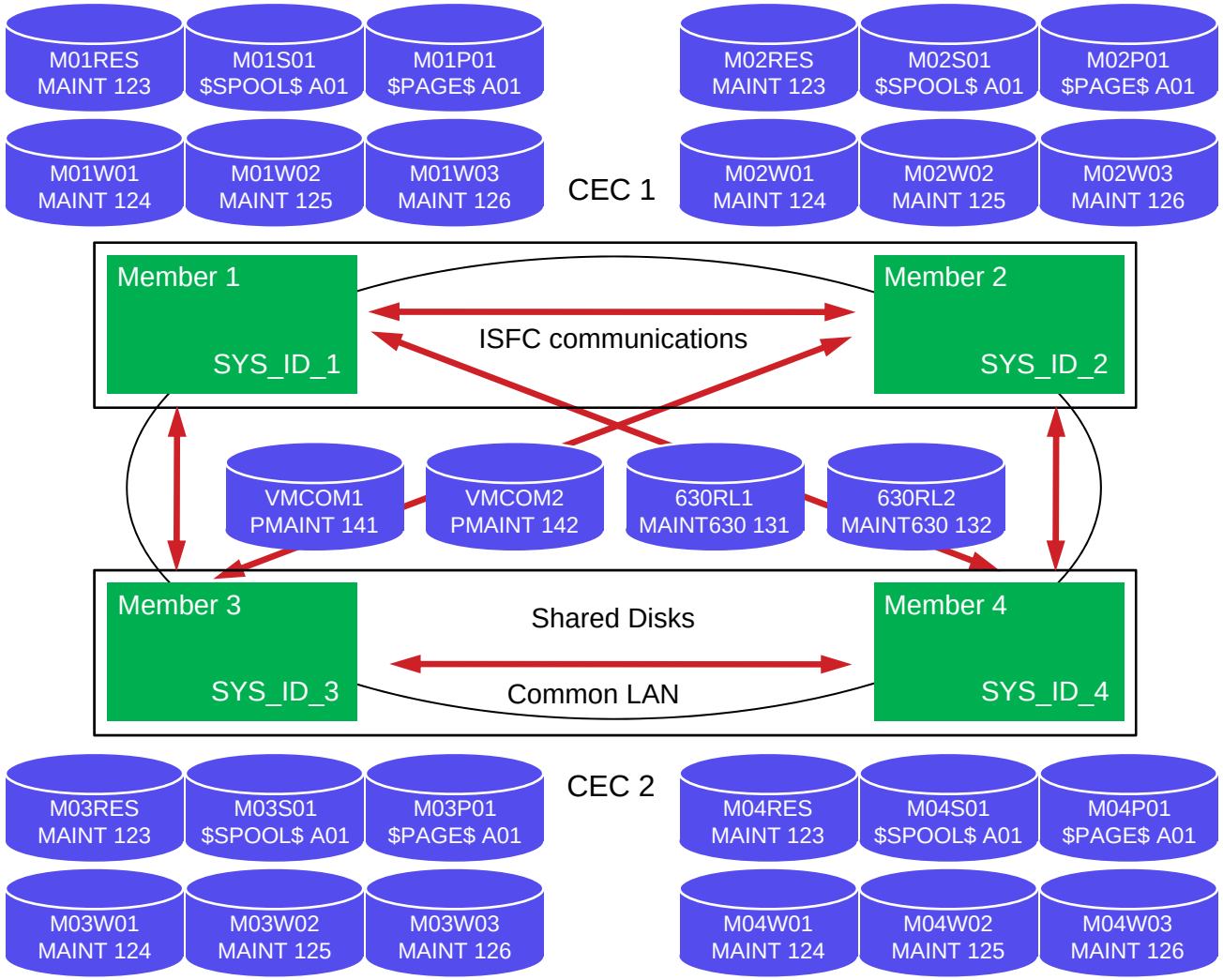
z/VM SSI Block Diagram



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FDRPASVM

- Non-disruptively migrate DASD of running systems
  - Copies entire source volume(s) to target(s)
  - Monitors changed tracks on source volume
  - Copies changed tracks
  - Swaps all I/O operations to use target volume(s)
- GA in January 2014 for User Volumes
- Added migration of CP-owned volumes in October 2014
- Supports z/VM 5.4, 6.2 and 6.3
- Non-disruptively moves volumes to a new storage system

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FDRPASVM Functions

- FDRPASVM supports migration of
  - Minidisk volumes (PERM)
  - Full-pack and DEDICATEd volumes
  - CP-owned (must have two PAGE and two SPOOL volumes)
    - Page volumes can now be moved in parallel*
  - Smaller to larger volumes (ex: 3390-9 to 3390-27)
- FDRPAS functions
  - SIMSWAP – Simulate and validate main swap task
  - SIMSWAPMON – Simulate and validate monitoring updates
  - SWAPDUMP – Create point-in-time copy of volume(s)
  - SWAP – Copy and swap volume(s)

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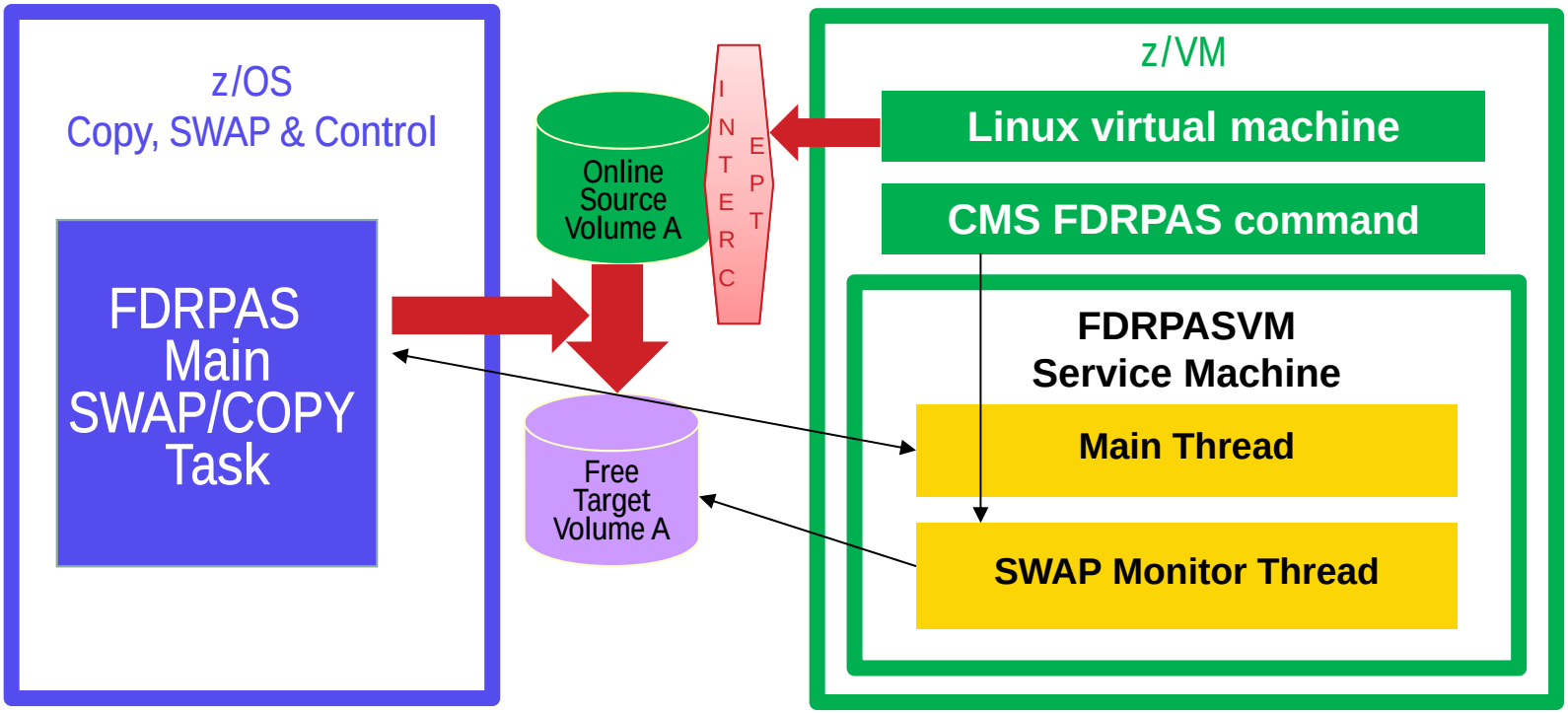
FDRPASVM Components



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FDRPASVM Component Detail

- z/VM Components
  - Track changes to source device and swaps to new unit
  - System requirements
    - Service machine (FDRPASVM) is running
    - Source volume is **online**
    - Target volume is **online** and **FREE**
  - Monitor program started with FDRPAS command
    - Start monitor on LPARs w/access to target volumes
    - Or vary volumes offline
- z/OS Components
  - Copies all tracks to target and recopies changed tracks
  - System requirements
    - Same source volume is **online**
    - Same target volume is **offline**
    - Invoke **FDRPAS** job using JCL or ISPF

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FDRPASVM IS EASY TO INSTALL & USE

- 3 files:
  - CALCDASD EXEC – understand the environment
  - EXTRFDRP EXEC – unwind DISTPIPE (saves typing)
  - FDRPASVM.DISTPIPE – the product code
- 2 virtual machines:
  - PASMAINT – stores the binaries
  - FDRPASVM – FDRPAS service virtual machine
- 1 CMS command:
  - FDRPAS – with many subcommands
    - MONITOR TYPE SWAP
    - MONSTAT
    - STOP

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FDRPASVM Setup

- Service machine (FDRPASVM) is running
  - Logon to FDRPASVM interactively

```
...
DIAGNOSE 104 ALREADY DEFINED
...
PASIUCSM020I WAITING FOR AN EVENT TO PROCESS
```

  - Start FDRPASVM on AUTOLOG1 191 disk (mode F)

```
==> x profile exec f
...
/*****************************************************************/
/* Customer processing can be added here                         */
/*****************************************************************/
"CP XAUTOLOG TCPIP"           /* Autolog TCPIP                   */
"CP SET SIGNAL SHUTDOWN 300"  /* Allow guests  5 min to shut down*/
"CP XAUTOLOG FDRPASVM"        /* Start the FDRPASVM service machine */
...
```

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FDRPASVM SWAPPING z/VM Volumes

- Example of swapping…
  Linux volume on rdev **`1887`** to **`B887`**
- Source volume is **online**
- Target volume is online and **FREE**
  - Use CP QUERY <rdev> and DETACH commands:

```
==> q 1887 b887
DASD 1887 CP SYSTEM VM1887   2
DASD B887 CP SYSTEM VMB887   0
==> detach b887 system
DASD B887  DETACHED SYSTEM
==> q 1887 b887
DASD 1887 CP SYSTEM VM1887   2
DASD B887 VMB887
```

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FDRPASVM - z/VM Monitoring

- Monitor target volume (e.g. from MAINT)
  - Access FDRPAS CMS command:

```
...
'EXEC VMLINK PASMAINT 691'
...
```

  - Issue FDRPAS command for target volume:

```
==> fdrpas monitor type swap b887
...
REQUEST ACCEPTED
SEVERING IUCV CONNECTION
...
  * MSG FROM FDRPASVM: PASIUCSM009I 1 ELIGIBLE DEVICE(S) FOUND
```

  - Watch console on FDRPASVM:

```
...
PASMONVW080I DEVICE B887(B887) WAITING FOR SWAP INITIATION
```

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FDRPAS z/OS View of z/VM Volumes

- Source volume should be **online**
- Target volume is **offline**
  - Use DISPLAY and VARY commands

```
==> d u,,,1887
  UNIT TYPE STATUS        VOLSER     VOLSTATE
  1887 3390 OFFLINE                      /RSDNT
==> d u,,,B887
UNIT TYPE STATUS        VOLSER     VOLSTATE
  B887 3390 OFFLINE                      /RSDNT
==> v 1887,online
IEE302I 1887     ONLINE
==> d u,,,1887
  UNIT TYPE STATUS        VOLSER     VOLSTATE
  1887 3390 O             VM1887     PRIV/RSDNT
```

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Running FDRPAS on z/OS

- Invoke FDRPAS job in one of two ways:
  - *Using ISPF panels*
  - *From a JCL job:*

```
==> submit
//PASTEST1 JOB ('PR=YES'),'ME',CLASS=M,
//   NOTIFY=ME
//*****************************************************************
//*  FDRPAS                                                       *
//*****************************************************************
//PASB    EXEC PASPROC
//PAS.SYSIN DD  *
*SIMSWAP TYPE=FULL,LARGERSIZE=OK,MAXTASKS=4,NONRESPONDING=FAIL
*SIMSWAPMON TYPE=FULL,LARGERSIZE=OK,MAXTASKS=4,NONRESPONDING=FAIL
*SWAPDUMP TYPE=FULL,LARGERSIZE=OK,MAXTASKS=32,NONRESPONDING=FAIL
 SWAP TYPE=FULL,LARGERSIZE=OK,MAXTASKS=32,NONRESPONDING=FAIL
 MOUNT VOL=VM1887,SWAPUNIT=B887
```

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FDRPASVM Overview

- FDRPAS and FDRPASVM at a low level
  - Install z/VM “intercepts” to monitor source volume changes
  - z/OS main SWAP task copies source to target volume
  - FDRPASVM passes changes to z/OS main SWAP
  - z/OS main SWAP task recopies changed tracks
  - Uses z/VM HYPERSWAP when source and target are in sync
  - Target volume transparently becomes the source volume
  - Remove FDRPASVM intercepts

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z/VM Output

- On z/VM virtual machine invoking FDRPAS command
  - Messages from FDRPASVM:

```
...
* MSG FROM FDRPASVM: PASMONVT_233I VMLAB63B (SERIAL# 04E2062818)
ACKNOWLEDGES SWAP OF VOL=VM1887 AND JOINED IN SWAP OF UNIT=1887 TO B887
* MSG FROM FDRPASVM: PASMONVT_241I
FDRPAS SUCCESSFULLY COMPLETED SWAP OF VOL=VM1887 TO UNIT=B887
```

  - Query source and target devices after SWAP:

```
==> q 1887 B887
DASD 1887 FDR3VM
DASD B887 CP SYSTEM VM1887   2
```

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FDRPAS z/OS Syslog Output

- JCL output (syslog)

```
FDR233  CPUB     (SERIAL# 02E2062818)
ACKNOWLEDGES THE SWAP OF VOL=VM1887  - HTC 2107900 TO HTC 2107900
FDR233  VMLAB63B (SERIAL# 04E2062818)
ACKNOWLEDGES THE SWAP OF VOL=VM1887 AND HAS JOINED IN SWAP OF UNIT=1887 TO B887
...
OPERATION STATISTICS FOR 3390 VOLUME.................VM1887
                      CYLINDERS ON VOLUME.............10,017
                      DATASETS PROCESSED...................0
                      BYTES READ FROM DASD.....7,593,410,036
                      DASD TRACKS SWAPPED............154,127
                      UPDATED TRACKS RECOPIED..........3,873
                      DASD EXCPS.....................10,418
                      TARGET DASD EXCPS..............10,371
                      CPU TIME (SECONDS)...............2.257
                      ELAPSED TIME (MINUTES).............2.6
                      SWAP TIME..........................2.4
FDR SUCCESSFULLY COMPLETED
```

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FDRPASVM Customer z/OS Output

- From customer migration in July, 2014

```
...
OPERATION STATISTICS FOR 3390 VOLUME.............volser
                 CYLINDERS ON VOLUME.............10,017
                 DATASETS PROCESSED...................0
                 BYTES READ FROM DASD.....7,465,766,880
                 DASD TRACKS SWAPPED.............151,535
                 UPDATED TRACKS RECOPIED..........1,281
                 DASD EXCPS......................10,217
                 TARGET DASD EXCPS...............10,103
                 CPU TIME (SECONDS)...............0.661
                 ELAPSED TIME (MINUTES).............2.8
                 SWAP TIME..........................2.5
FDR SUCCESSFULLY COMPLETED
```

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Living up to "Non-disruptively Migrating z/VM and Linux Guests in Their Entirety"

- Customers tell us they are configuring SSI & LGR to:
  - Eliminate planned outages
  - Allow for non-disruptive hardware maintenance
  - Protect themselves against local disruption
  - Work during normal business hours
- FDRPASVM extends the scope of SSI & LGR objectives
  - While SSI & LGR are relocating memory and CPU…
  - FDRPASVM concurrently relocates z/VM & Linux disk storage

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Living up to “in their entirety”

- A Linux running on LINUX154/SSI63B on DASD 189D

```
# vmcp q userid
LINUX154 AT SSI63B
# vmcp q v 100
DASD 0100 3390 VM189D R/W      10016 CYL ON DASD  189D SUBCHANNEL = 0000

# ping vmlab2
PING vmlab2.idp.com (192.168.250.17) 56(84) bytes of data.
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=1 ttl=60 time=0.545 ms
...
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=9 ttl=60 time=0.415 ms
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=10 ttl=60 time=0.668 ms
...
--- at ping 10, started a SWAP JCL job of VM189D to 189E ---
...
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=11 ttl=60 time=0.521 ms
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=12 ttl=60 time=0.579 ms
...
--- at ping 50 from MAINT on SSI63B did a "VMRELO MOVE LINUX154 SSI63A" ---
...
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=49 ttl=60 time=0.644 ms
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=50 ttl=60 time=0.610 ms
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=56 ttl=60 time=0.856 ms
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=57 ttl=60 time=0.804 ms
```

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Living up to “in their entirety” (cont’d)


```
--- at approximately ping 144, SWAP job completed
...
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=145 ttl=60 time=0.588 ms
64 bytes from vmlab2.idpnj.com (192.168.250.17): icmp_seq=146 ttl=60 time=0.572 ms
...
--- killed ping at 146 packets ---
```

- Linux was running on…
  LINUX154/SSI63B on DASD 189D with volser VM189D

```
# vmcp q userid
LINUX154 AT SSI63A
# vmcp q v 100
DASD 0100 3390 VM189D R/W      10016 CYL ON DASD  189E SUBCHANNEL = 0000
```

- Now Linux is running on…
  LINUX154/**SSI63A** on DASD **189E** with volser VM189D

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Automating…
z/OS Job Submission from z/VM

- Drive z/OS JCL jobs from z/VM
- White paper describing how to:
  - Submit JCL job(s) from z/VM to z/OS
  - Using FILETYPE=JES mode of the z/OS FTP server
  - Using the VMFTP tool to process output from FTP
  - All in a single REXX “wrapper”
  - Second wrapper for multiple job submissions
- See http://www.fdr.com/Manuals_CurrentVersion/JCLfromVM.pdf

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FTP Session Overview

- **Submit JCL jobs through FTP**

```
==> ftp zOS.ftp.server
ftp> z/OS credentials
...
ftp> site filetype=jes
...
ftp> put myjob.jcl
...
ftp> get <jobid>.x
...
ftp> quit
```

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SUBMIT EXEC

- **Wrap JCL job submission in a REXX EXEC**

```
/* EXEC to submit a JCL job using the VMFTP tool          */
Parse upper arg jobName .
If (jobName = '') Then Do                    /* no job name passed in    */
  Say 'Error: expected parameter JobName not found'
  Return 1
End
'STATE' jobName 'JCL *'                      /* check that file exists   */
if (rc <> 0) Then Do                         /* file not found => exit   */
  Say 'Error: File' jobName 'JCL * not found'
  Return 2
End
'VMFTP FTPJOB (PARM' jobName                 /* Invoke the VMFTP macro   */
```

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FTPJOB VMFTP

- **Use VMFTP environment**

```
/* VMFTP Macro to submit a JCL job and extract output                  */
Parse upper arg jobName .                  /* get the one argument     */
system = 'myzos'                           /* target z/OS system       */
userID = 'myuserid'                        /* z/OS user ID             */
password = 'mypasswd'                      /* password: case sensitive */
jobFile = jobName||'.JCL'                  /* input file               */
                                           /* do the work              */
'open' system                              /* start the FTP session    */
userID                                     /* send the user ID         */
password                                   /* send the password        */
'site filetype=jes'                        /* set server to JCL mode   */
'put' jobFile                              /* send the JCL job         */
jobNumber = Word(output.4, 7)              /* get job # from output    */
'get' jobNumber||'.X'                      /* retrieve the job output  */
'quit'                                     /* end the FTP session      */
…
```

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View and Manage z/OS devices from z/VM

- DUCB
  - Send a job to z/OS and **D**isplay **UCB**(s)
- VUCB
  - Send a job to z/OS and **V**ary **UCB**(s) online or offline
- QLABEL
  - Query the label of DASD volumes and report

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The DUCB EXEC

- The DUCB EXEC
  - Abstracts the z/OS **D**isplay **UCB** command
  - Creates a JCL job on the fly
- For example:

```
 ==> ducb 189c-189f
Displaying the state of 189C-189F
UCB 189C is OFFLINE
UCB 189D is OFFLINE
UCB 189E is ONLINE
UCB 189F is OFFLINE
```

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The VUCB EXEC

- The VUCB EXEC:
  - Abstracts the z/OS **V**ary **UCB** online|offline command
- For example:

```
==> vucb 1893 offline
Varying 1893 OFFLINE
==> ducb 1893
Displaying the state of 1893
UCB 1893 is OFFLINE
```

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Can You Estimate the Migration Effort?

FDRPASVM provides tools to help you determine…

- How much DASD space is on my systems?
  - CALCDASD EXEC reports on type and size of DASD
- Do my volumes have problem VTOCs?
  - QLABEL EXEC reports on VTOC types

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Number & Size of DASD Volumes Has an Impact on a Migration

Name	Cylinders	Notes
3390-1	1113	
3390-2	2226	
3390-3	3339	
3390-9	10017	
Small 3390-27	30051	3x size of 3390-9
3390-27	32760	Aka 3390-32k, not multiple of 1113
Small 3390-54	60102	6x size of 3390-9
3390-54	65520	Aka 3390-64k, largest directory size
Non-standard	< 65520	Any other size smaller than 65520
3390-A (EAV)	> 65520	Any other size larger than 65520

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CALCDASD EXEC

- CALCDASD EXEC
  - Needs no arguments if all DASD “belongs” to z/VM

    ```
    ==> calcdasd
    ```

  - Can take rdev-range if not all DASD “belongs” to z/VM

    ```
    ==> calcdasd  1880-1887
    ```

- Counts 3390-1s, -2s, -3s, -9s –As (EAVs) and “other sizes”
- Identifies CP-Owned, SYSTEM and ATTACHED disks
- Can report on free, offline and PAV alias devices
- Combination of **`Q DA, Q rdev, Q ALLOC`** and **`Q DA DETAILS`**

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CALCDASD Help


```
==> calcdasd help
Synopsis:
  Calculate the amount and types of DASD on a system and report

Syntax is:
  >>-CALCDASD-+---------------+-+-------------------------------+-><
              |-rdev----------| |                               |
              | <-----------< | '-(-+---------+--+----------+--+
              '-rdev1-rdev2---'     |-HELP----|  |          |
                                    |-SHORT---|  '-SortOpts-'
                                    |-FREE----|
                                    |-PAV-----|
                                    |-OFFLINE-|
                                    |-CSV-----|
                                    '-ALL-----'
SortOpts:
        --+------------+--+------------+--+------------+--
          |-SORTRDEV---|  |-SORTRDEV---|  |            |
          |-SORTVOLSER-|  |-SORTVOLSER-|  '-DESCENDING-'
          |-SORTMFG----|  |-SORTMFG----|
          '-SORTCYLS---'  '-SORTCYLS---'
```

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CALCDASD – Default Output


```
Run on VMLAB63B, V6.3(1302) at 07:50:34 EDT TUESDAY 10/21/14

Rdev Volser Mfg SSID CCA HPF Allocation      Model    Cylinders
---- ------ --- ---- --- --- ----------      -----    ---------
1880 63BRES HTC 9002 40  +   CP-Owned        3390-9       10017
1881 63BCOM HTC 9002 41  +   CP-Owned        3390-9       10017
1882 63BREL HTC 9002 42  +   System          3390-9       10017
1883 63BSP1 HTC 9002 43  +   CP-Owned        3390-9       10017
1884 63BPG1 HTC 9002 44  +   CP-Owned        3390-9       10017
1885 63BW01 HTC 9002 45  +   System          3390-9       10017
1886 VM1886 HTC 9002 46  +   System          3390-9       10017
1887 VM1887 HTC 9002 47  +   System          3390-9       10017
1888 VM1888 HTC 9002 48  +   System          3390-9       10017
188D 63BSP2 HTC 9002 4D  +   CP-Owned        3390-9       10017
188F 63BPG2 HTC 9002 4F  +   CP-Owned        3390-9       10017
Total volumes reported on: 11

Number of DASD models        CP-OWN SYSTEM  ATT'D  Total
3390-1s    (1113 cylinders):      0      0      0      0
3390-2s    (2226 cylinders):      0      0      0      0
3390-3s    (3339 cylinders):      0      0      0      0
3390-9s   (10017 cylinders):      6      5      0     11
3390-As     (sizes > 65520):      0      0      0      0
                              ----- ------ ------ ------
Total DASD models:                6      5      0     11
```

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CALCDASD – Default Output (cont'd)


```
Slot  Vol-ID  Rdev  Type    Status                  SSIOwner SysOwner
   1  63BRES  1880  Own     Online and attached     -------- --------
   5  63BCOM  1881  Own     Online and attached     -------- --------
  10  63BSP1  1883  Own     Online and attached     -------- VMLAB63B
  11  63BSP2  188D  Own     Online and attached     -------- --------
 254  63BPG2  188F  Own     Online and attached     -------- --------
 255  63BPG1  1884  Own     Online and attached     -------- VMLAB63B

CP-owned TDISK PAGE SPOOL and DRCT allocation:
    Type  Volumes   Cylinders        GB   % used
    ----  -------   ---------      ----  -------
   TDISK        0           0      0.00     0.00
    PAGE        2       20033     17.03     7.25
   SPOOL        2       20033     17.03     0.86
    DRCT        1          20      0.02    15.00
          -------   ---------      ----  -------
Total:           5       40086     34.07     4.06

Total cylinder allocation:
       Type        Cylinders        GB
       ----        ---------       ----
   CP-OWNED             60102      51.08
     SYSTEM             50085      42.57
   ATTACHED                 0       0.00
                    ---------    -------
Total DASD:            110187      93.65
```

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CALCDASD – Short Output


```
==> calcdasd (short
Number of DASD models          CP-OWN SYSTEM  ATT'D  Total
3390-1s    (1113 cylinders):        0      0      0      0
3390-2s    (2226 cylinders):        0      0      0      0
3390-3s    (3339 cylinders):        0      0      0      0
3390-9s   (10017 cylinders):        6      5      0     11
3390-As     (sizes > 65520):        0      0      0      0
                               ----- ------ ------ ------
Total DASD models:                  6      5      0     11

CP-owned volumes:
Slot  Vol-ID  Rdev  Type   Status                  SSIOwner SysOwner
   1  63BRES  1880  Own    Online and attached     -------- --------
   5  63BCOM  1881  Own    Online and attached     -------- --------
  10  63BSP1  1883  Own    Online and attached     -------- VMLAB63B
  11  63BSP2  188D  Own    Online and attached     -------- --------
 254  63BPG2  188F  Own    Online and attached     -------- --------
 255  63BPG1  1884  Own    Online and attached     -------- VMLAB63B
…
```

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CALCDASD – Short Output (cont'd)


```
CP-owned TDISK PAGE SPOOL and DRCT allocation:
    Type  Volumes   Cylinders         GB   % used
    ----  -------   ---------       ----  -------
   TDISK        0           0       0.00     0.00
    PAGE        2       20033      17.03     7.25
   SPOOL        2       20033      17.03     0.86
    DRCT        1          20       0.02    15.00
          -------   ---------       ----  -------
Total:           5       40086      34.07     4.06

Total cylinder allocation:
       Type        Cylinders         GB
       ----        ---------       ----
   CP-OWNED            60102      51.08
     SYSTEM            50085      42.57
   ATTACHED                0       0.00
                    ---------    -------
Total DASD:           110187      93.65
```

WARNING: only 2 spool volumes - use (DRAIN 51 on FDRPAS MONITOR command

WARNING: only 2 page volumes - use (DRAIN 51 on FDRPAS MONITOR command

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CALCDASD – rdev range


```
==> calcdasd 1880-1887

Run on VMLAB63B, V6.3(1302) at 08:25:05 EDT TUESDAY 10/21/14

Rdev Volser Mfg SSID CCA HPF Allocation      Model    Cylinders
---- ------ --- ---- --- --- ----------      -----    ---------
1880 63BRES HTC 9002 40  +   CP-Owned        3390-9       10017
1881 63BCOM HTC 9002 41  +   CP-Owned        3390-9       10017
1882 63BREL HTC 9002 42  +   System          3390-9       10017
1883 63BSP1 HTC 9002 43  +   CP-Owned        3390-9       10017
1884 63BPG1 HTC 9002 44  +   CP-Owned        3390-9       10017
1885 63BW01 HTC 9002 45  +   System          3390-9       10017
1886 VM1886 HTC 9002 46  +   System          3390-9       10017
1887 VM1887 HTC 9002 47  +   System          3390-9       10017
Total volumes reported on: 8

Number of DASD models         CP-OWN SYSTEM  ATT'D   FREE  Total
3390-1s    (1113 cylinders):      0      0      0      0      0
3390-2s    (2226 cylinders):      0      0      0      0      0
3390-3s    (3339 cylinders):      0      0      0      0      0
3390-9s   (10017 cylinders):      4      4      0      0      8
3390-As     (sizes > 65520):      0      0      0      0      0
                               ----- ------ ------ ------ ------
Total DASD models:                4      4      0      0      8
```

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CALCDASD – rdev range (cont'd)


```
CP-owned volumes:
Slot  Vol-ID  Rdev  Type   Status                  SSIOwner SysOwner
   1  63BRES  1880  Own    Online and attached     -------- --------
   5  63BCOM  1881  Own    Online and attached     -------- --------
  10  63BSP1  1883  Own    Online and attached     -------- VMLAB63B
  11  63BSP2  188D  Own    Online and attached     -------- --------
 254  63BPG2  188F  Own    Online and attached     -------- --------
 255  63BPG1  1884  Own    Online and attached     -------- VMLAB63B

CP-owned TDISK PAGE SPOOL and DRCT allocation:
    Type  Volumes   Cylinders        GB   % used
    ----  -------   ---------      ----  -------
   TDISK        0           0      0.00     0.00
    PAGE        2       20033     17.03     7.25
   SPOOL        2       20033     17.03     0.86
    DRCT        1          20      0.02    15.00
          -------   ---------      ----  -------
Total:          5       40086     34.07     4.06

Total cylinder allocation:
       Type        Cylinders        GB
       ----        ---------      ----
   CP-OWNED            40068     34.06
     SYSTEM            40068     34.06
   ATTACHED                0      0.00
                     ---------    -------
Total DASD:            80136     68.11
```

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Are there volumes with problem VTOCs?

- DASD's Volume Table of Contents (VTOC) can be:
  - z/OS-style VTOC starts on cyl 0, trk 1, rec 1 for 14 tracks
  - z/VM-style VTOC starts on cyl 0, trk 0, rec 5
  - Other (unknown)
- z/VM-style VTOC
  - tells z/OS "volume is full – don't touch / don't try to use it"
- z/OS-style VTOC… could lead to problems
  - may incorrectly tell FDRPAS the volume is not full
- Run a QLABEL EXEC health check to verify your volumes

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Example of using QLABEL


```
==> att 4640-464e *
DASD 4640 ATTACHED TO MAINT 4640 WITH DEVCTL HYPERPAV BASE
...
DASD 464E ATTACHED TO MAINT 464E WITH DEVCTL HYPERPAV BASE
==> qlabel 4640-464e
Rdev Key  Label Volser VTOC
---- ---- ----- ------ ----
4640 VOL1 VOL1  VM4640 0000000005
4641 VOL1 FDR3  S11S01 0000000005
4642 VOL1 VOL1  VM4642 0000000005
…
464B VOL1 FDR3  S11P02 0000000005
464C VOL1 FDR3  S12S02 0000000005
464D VOL1 VOL1  VM464D 0000000101
464E VOL1 VOL1  VM464E 0000000005

z/VM VTOC pointers (0000000005) found:  14
z/OS VTOC pointers (0000000101) found:  1
  WARNING: SELECT FROM(0),TO(EndCyl) should be used
```

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Tools to help you plan… CALCDASD and QLABEL EXECs

- Request a copy of CALCDASD EXEC and/or the QLABEL EXEC, email:
  - support@fdrinnovation.com

  Subject: CALCDASD and QLABEL EXECs

  Please send me a copy of CALCDASD and QLABEL EXECs.

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Introductions

Hierarchy of Availability

Business Continuance Tools

z/VM and z/OS Platform Convergence

Estimating Migration Effort

Summary

User Testimonial

Benefits

Resources

Q & A

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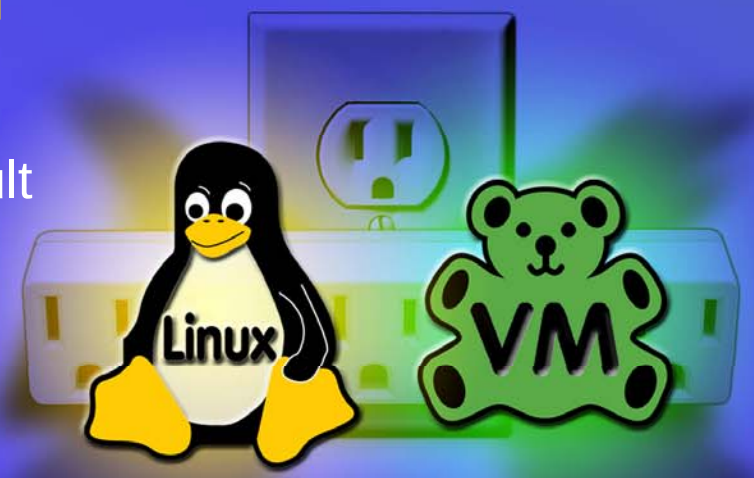
Testimonial…
from a Large Financial Institution

Non-Disruptive Migration

“The business units requirements that rely on Linux volumes have made it very difficult for us to schedule outages to move their systems. FDRPASVM now allows us to move them non-disruptively like FDRPAS does for our z/OS volumes.”

A Large Financial Company



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Backup/Restore of z/VM and Linux

- FDR ABR (Automatic Backup and Restore)
  - Now supports z/VM and Linux DASD
  - Simpler JCL
  - Backups can be stacked on multi-file tapes
  - Standardize z/VM and Linux backup with z/OS

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Key Points

- FDRPASVM is unique – no other tool does this
- FDRPAS technology has a proven reliability record
  - Over 1700+ customer migrations since 2001
- FDRPASVM has helpful tools to:
  - Estimate the migration effort
  - Validate the environment
  - Manage the migration
- Supports concurrent processing:
  - Of many volumes
  - By many users
- You don’t have to bring z/VM or Linux systems down

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Resources

- This presentation:
  - Will be made available to the Linux Executive Council
- My e-mail address
  mmacisaac@fdrinnovation.com

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Questions???

Thank you!

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