

Disaster Recovery Cookbook for Linux Part 2: Bare Metal to Running System

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Where to Get This Presentation

- The presentation and sample execs can be downloaded from:

<http://www.sinenomine.net/publications/presentations/2007/05/wavv-greenbay>

Agenda

- Things Are Really Broken. Now What?
- Overview of Recovery
- Getting the 1 Pack System Restored
- Restoring the Rest of the System in Parallel
- Notes on tape management issues in raw CMS
- Linux-specific DR Issues
 - Why DDR and ADRDSSU aren't your friends for Linux DR
 - Some possible solutions
- Q&A

Things are Really Broken...

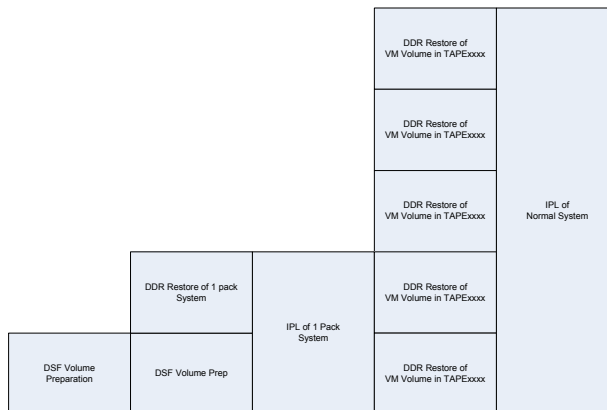
- When we last left our hero, we had:
 - Prepared a DR Kit
 - Tested the kit 2nd level
 - Explored a few possible ways that a DR test could fail

- And then...BOOM!

Overview of Recovery

- Retrieve the DR Kit tapes and documents from a safe location
- IPL DSF and format a disk volume
- IPL DDR and restore the 1 pack system
- IPL from the 1 pack system
- Make any changes needed to TCPIP
- Log into TAPExxxx userids and DDR restore of VM volumes
- Restore Linux backup server
- IPL your normal production system
- Bring up the Linux backup server and start restoring guests

Picture Version



Preparing a Volume for the 1 pack System

- Load your DR Kit SA Utilities tapes into drives
- IPL DSF tape from HMC
- Run CPVOL FORMAT UNIT(cuuu) NVFY VOLID(SCRTCH)
 - Verify not necessary since you're going to overwrite it immediately with the DDR image
 - Main reason for this is to eliminate potential problems with CP areas being incompletely prepared or (worse yet) accidentally incorrectly formatted
- **Note: z/OS version of DSF does NOT correctly prepare VM volumes!**

Restoring the 1 Pack System

- IPL DDR from DDR tape
- Hit Enter on the terminal you want to use as the console
- Type:
SYSPRINT CONS
INPUT cuu type
OUTPUT cuu type SCRTCH
RESTORE ALL
<blank line>

Restoring the Rest of the System

- Log in to one of the TAPExxxx userids
- The DRKit tools provide a PROFILE EXEC that attaches the tape drive at real address xxxx to the userid at virtual address 181 and prompts for a real disk device address to attach at virtual address 500.
- Runs non-SA DDR

```
SYSPRINT CONS
INPUT 181 type
OUTPUT 500 type SCRTCH
RESTORE ALL
<blank line>
```
- **Note: IPL 190 to restart the user. DRKIT does not create a CMS NSS in order to avoid requiring the 1 pack system to have spool areas**

Tape Management in Raw CMS

- There really isn't any. DDR and SPXTAPE deal exclusively with non-labeled tapes.
- Future enhancement to DRKIT would be to write a replacement that understood multi-volume tapes and could make sure that labels were honored in the right sequence.
- Also, note that your tape management system won't be functioning at this point, so you need the paper listings from the DRKIT runs to know what tapes you need.

Linux DR

- Linux DR is a bit harder than VM in that Linux exploits caching of data in memory to a much greater degree than CMS ever did.
- Make sure your VM volume dumps include a recovery system

(We build our Linux systems from a template userid that is never logged in, so we can use it as a recovery/repair system if necessary. If you build your systems by hand, you should also maintain a Linux boot tape as part of your DR kit.)

Why DDR/ADRDSSU isn't a Good Idea for Linux

- Since DDR/ADRDSSU are CMS/zOS utilities, they must run outside the Linux environment
 - They are not aware of what may be cached in memory
 - They are not aware of pending modifications to disk
 - They can only dump disks with standard labels (not a huge problem these days, but still there)

DDR/ADRDSSU is only safe to use with Linux when the Linux system is shut down completely and logged off

Note: Some Exceptions

- It may be wise to periodically shut down your Linuxen and use volume dumps to take a snapshot.
 - Speeds recovery somewhat (most of the Linux-oriented backup tools are capable of skipping restoring files that have not changed, and CMS tape and disk I/O is still more efficient than Linux tape I/O)
 - If hardware snapshot capabilities are available, use them to generate snapshots and dump the volumes offline.
- Using the volume dump tools in DRKIT is a good way to provide this snapshot
- This approach still requires a complete shutdown of the Linux guest being backed up!

So What Can We Do with Linux DR?

- Linux recovery needs to be a cooperative process
 - Volume dumps
 - Backups from within the Linux system
- Use of virtual networking is important – defining a internal VSWITCH or guest LAN as a backup LAN segment
- Linux-based backup server to handle the backups, backup client inside each guest to do the file selection and processing

Amanda

- Open Source
- Supplied with most Linux distributions
- Weak on tape management
- Does not support spanning tapes in open source version
 - Commercial version (zManda) does

Bacula

- Also open source
- Supplied on modern Linux distributions
- More sophisticated data management
- Data migration capability
- Multi-tier backups (disk->disk->tape, etc)
- Better device handling
- Multivolume tape dumps (including IBM SL!)
- Available as appliance or RPMs

Commercial Solutions

- TSM
- CA Brightstore
 - Both expensive
 - Not well adapted to mainframe life

Problems with All the Options

- Linux-originated tools don't cope well with mainframe tape
- Mainframe-originated tools don't cope well with Linux data
- Cost
- Function

- Positives: all the Linux options also can address external machines as well

Summary

- While it's not perfect, DRKIT helps guide the process of preparing for a disaster and recovering from a disaster
- Step by step, VM is the best thing ever to happen to DR
- Separation of Linux disk from VM disk is important to make DR easier

Q&A

