

Disaster Recovery Cookbook for Linux Part 1: Before the Storm

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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

- What Is The Point of Disaster Recovery?
- My Overall Approach (Yours Might Be Different)..
- What Should You Prepare?
- SPXTAPE, DDR, DSF and Other Friends
- The Wonders of a 1-pack System
- General Observations on Life and Disaster Management
- Q&A

What's the Point?

- May sound like an obvious questions, but different goals exist in different organizations
 - Return to normal operation
 - Relocate and resume operations
 - Replace the original implementation
- Regardless of goal, the problems circulate around how to preserve and manage configurations for operations in possibly different locations and circumstances

DR, My Way

- For us, DR is to provide the fastest possible return to “normal” operations
 - May be different hardware configuration
 - May have different network connectivity

- We rely heavily on VM to insulate the production configuration from hardware details
 - Enforce separation of VM and guest data
 - Sequence initialization and command/control for configuration

DR, My Way

- Capture:
 - Hardware configuration
 - Hypervisor configuration
 - Disk
 - Spool
 - Network configuration
 - Guests and guest data

DR Toolkit

- Paper Copy of IOCP or IODF
- Standalone ICKDSF
- Standalone DDR
- One-Pack VM System
- DDR dumps of VM packs
- SPRXTAPE dumps of spool files
- DDR dumps of Linux backup server
- Linux backup tapes/DFSMS migration tapes

Key Assumptions and Practices

- Guest DASD separate from VM/CP DASD
- Linux backups performed by separate backup server
- Backup catalog maintained by Linux backup server

DRKIT EXEC

- Download from www.sinenomine.net/vm/drkit
- Automates creation of our DR kit; modify to suit
- Number of subsidiary EXECs called from DRKIT
 - Generate IOCP printout (we don't use IODF)
 - Create standalone utility tapes
 - Create 1 pack system
 - Dump spool files
 - Dump Linux backup server

- Latest version will be available as soon as I get back home, wait a week or so before you try to download it..

IOCP/IODF

- Remember that VM can sense configuration, so IODF required only if you force the requirement
- If IOCP/IODF maintained on z/OS, then recover it there
- If maintained on VM, use IOCP (NOWRITE REPORT or HCD REPORT functions to produce output.
 - DRKITIO EXEC (called from DRKIT EXEC)

Standalone Tapes

- DRKITSU EXEC effectively performs:

```
FILEDEF INMOVE DISK nnnn SAIPL S  
FILEDEF OUTMOVE TAP1 NL 1 (RECFM F  
LRECL 80  
MOVEFILE
```

- We put each utility on separate tapes to avoid multiple trips to the HMC to do IPLs to skip the unwanted utility

Caution: Disable Local Terminal Controllers

- The standalone utilities take the FIRST terminal I/O interrupt they find after IPL as the console
- It's a good idea to disable any local non-SNA terminal controllers attached to the machine using the hardware offline switch on the controller while you're working with the SA utils – you don't want an anxious dialup user in control of the machine

Create 1-pack System

- The 1 pack system relies on the fact that VM does not actually need spool or page areas to run, especially in today's very large memory sizes.
- The idea is to get a VM image that will fit onto a single pack (ideally, a single tape) that you can restore quickly, then use multiple virtual machines to do the rest of the work, eg get away from the SA utilities as quickly as possible

Critical: 1 pack System Volume Offline at IPL

- It's VERY important that the volume you use for the 1 pack system NOT be in the CP_Owned list for the production system!
- It's also smart to put it in the Offline_at_IPL list in the production system, so you need to explicitly bring it online when it's needed

Anatomy of the 1 Pack System

- CP (dump areas turned off in SYSTEM CONFIG)
- MAINT 190 (CMS and CMS utilities)
- OPERATOR 191
- MAINT privileged userid
- DRCT area
- TCPIP 191, 198 and 592
- FTPSERV 191
- DRCONFIG 191
- DRCONFIG 192 (the DRKIT execs)
- DRCONFIG 195 (shared R/O 191 for TAPExx userids)
- DRCONFIG 19E (192 for TAPE userids, contains the profiles for TAPExx userids)
- TAPE0590-TAPE059F (unprivileged userids, one per tape drive in your recovery configuration)

DRKIT1P EXEC

- Takes current sysres, newvol, new vol label as command line arguments
- Checks for needed privs
- Copies the required areas (CP IPL text, MAINT disks, etc to new volume)
- Writes directory to new volume DRCT area
- Creates DDR dump of the newly created volume
- Prints new tape label on label stock (modify for your shop)

DRKITVPD EXEC

- Needs real device label
- Dumps a VM pack
- Requires class A in default system – uses DEFINE MDISK to temporarily define a minidisk covering cyl 0 to end of designated pack
 - DEFINE MDISK
 - DDR to tape
 - Print label for tape
 - DETACH defined mdisk
- Called repeatedly from DRKIT EXEC

DRKITSPD EXEC

- Requests a tape mount on device 590
- SPXTAPE DUMP for NSS
- SPXTAPE DUMP for spool files
 - We don't care about VM spool files much, so there's no checking for out-of-tape in the current version. It's a known bug; if anyone decides to fix it, we'd like a copy...

DRKITLBS EXEC

- Dumps Linux backup server
 - Requests shutdown of backup server via S5INIT
 - Calls DRKITVPD to dump the disks
 - Restarts backup server via S5INIT
 - Prints tape labels for backup server dumps

DRKIT Lunchbox

- The last step in DRKIT sends a message to the operators to pack the “lunchbox”
 - This is actually a metal fireproof box about the size of a lunchbox. The tapes, printouts and dumps go into the box by the emergency exit from the machine room. Last person out is supposed to grab the box.
 - Copies of the kit are also sent to offsite storage

Testing the Kit

- If you have a few spare disk volumes, it's a good idea to periodically test your DR kit
- Create a virtual machine on your normal system (we call it DRKITTST)
 - Attach three tape drives
 - Attach a disk
 - IPL the SA DSF utility tape
 - IPL the SA DDR utility tape
 - Restore the 1 pack system
 - PA1 and IPL the 1 pack system

Observations

- Running DRKIT weekly seems to be a good interval
 - Too much longer than a week, and it's hard to recover to the current state
 - Running the individual components more frequently is possible
 - DRKITLBS needs to be run at least once a day

Observations

- Testing is an important part of successful DR
 - Again, seems obvious, but many organizations don't do it, and are stuck when things DON'T work.

Q&A

Coming in Part 2

- What to do with the kit following a disaster
- Some more details on the Linux backup piece
- Why DDR doesn't work well for Linux backups
- Lots of time for questions