IBM Enterprise2013
pST588 - Planning For System Recovery
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Enterprise2013

Objectives

- Expand thinking to go way outside of just AIX

- Understand key points to consider in planning

- Focus on **RECOVERING** data not backups

Factors influencing backups

- Consolidated systems

- Level of application integration/ability to synchronize multiple applications

- Operations in multiple time zones
  - "Normal" operating hours have extended well outside of 8-5

- Required web presence that is integral to business
  - Business is exclusively on-line

- Downtime cannot be tolerated due to nature of business
  - Stock trading
  - Banking

Backing up to restore

- Backups should not be done just to complete a check box

- Time is a major factor when backups are used to recover business critical system

- The recovery process should be the main driving factor in backups

- Without recovery, backups are wasted resources

Special Considerations: LPARs

- Documented at: http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/index.jsp?topic=/p7hbm/copylparconfig.htm

- Use the system planning tool to save the CEC/LPAR configuration to the local HMC

- Then use the 'System Plan' icon on the far left side to manage system plans – they can be saved to media or ftp'ed to another system

- Name XXXX.sysplan and is an *binary* file (be sure to use binary mode when ftp'ing this file)

- PC side of system planning tool is available at: http://www-947.ibm.com/systems/support/tools/systemplanningtool/

- Can be used to import/clone/restore LPAR configuration on a CEC

- ***Always check GUI for success/failure status***

- Also available on the IVM (Integrated Virtualization Manager)

- Can be sent to DR site ahead of time

Special Considerations: VIO Servers

- Documented at:
  http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/index.jsp?topic=/iphb1/iphb1_vios_backup_backup.htm

- Restore process is documented here:

  http://publib.boulder.ibm.com/infocenter/powersys/v3r1m5/index.jsp?topic=/iphb1/iphb1_vios_backup_restore.htm

- Should also perform a snap command from the padmin login and before normal backup process outlined above

- Whether you use backupios or viosbr depends on whether you are restoring to the same hardware:
  – backupios can be use to restore on different hardware
  – viosbr can ONLY be used to restore to the same hardware

- Need to keep current with HMC/VIO/Sysplan code to avoid issues

- Needs to be pulled off the VIO server and saved someplace

- Each VIO Server needs to be backed up individually

- Remember that the LPAR/CEC configuration needs to be in place for the VIO server restoration to work correctly

- **Virtual device configuration will be lost if recovery is on different hardware**

Special Considerations: AIX

- AIX OS file systems cannot be saved and restored for system recovery by normal backup processes

- AIX OS files can be saved and recovered on a file-by-file basis with almost any command

- AIX installation should account for the system it may be restored on

- Firmware levels should also be saved

- Always create a mksysb for AIX before applying APARs

Special considerations: Volume Groups

- Volume group structure data is only saved for rootvg by default

- Having volume group structure data allows for quick recovery of the volume group, logical volumes and file systems including customized attributes

- Damaged volume groups may be able to be reconstructed if maps are available

- Volume group structures can also be modified by changing the data file before restoring

- Consider using 'savevg –ipr –f OUTFILE VGNAME'
  - NOTE: this does not save any data!
  - Cannot be used on rootvg (use mksysb for rootvg)!
  - Creates a backup/restore format file
  - Attribute of the VG can then be edited before running restvg

Special considerations: Volume Groups

savevg -ipr -f /tmp/k.img l3kern_vg

restore -qf /tmp/k.img
  x ./tmp/vgdata/vgdata.files43932
  x ./tmp/vgdata/vgdata.files
  x ./tmp/vgdata/l3kern_vg/filesystems
  x .
  x ./tmp/vgdata/l3kern_vg/l3kern_vg.data
  x ./tmp/vgdata/l3kern_vg/backup.data

vi ./tmp/vgdata/l3kern_vg/l3kern_vg.data

restvg –f ./tmp/vgdata/l3kern_vg/l3kern_vg.data –r hdiskX

Special considerations: VGDAs

- VGDA – Volume Group Descriptor Area – describes the VG (Volume Group) layout

- At least one copy on each disk in a VG

- Best to save this before running VG related commands in case of a failure:
  - Small VG:
    dd if=/dev/hdiskX of=/tmp/hdiskX.vgda bs=128K count=17
  - Big VG:
    dd if=/dev/hdiskX of=/tmp/hdiskX.vgda bs=128K count=71
  - SVG(Scalable):
    dd if=/dev/hdiskX of=/tmp/hdiskX.vgda bs=512K count=137

Special considerations: File systems

- Many file systems have logs that must be saved as raw devices

- File systems that share a log must be backed up together

- Some file systems have special requirements for handling the logs when snapshots are done

- File systems/backups should be tested for integrity before they are saved

- Single recovery stream should be used to reduce file fragmentation and the performance impacts of fragmented files

- See Developer Works article on JFS2 snapshots: http://www.ibm.com/developerworks/aix/library/au-jfs2_snapshot.html

Special Considerations: Encrypted File Systems

- Save the files in /var/efs, /etc/security/user, /etc/security/group

- Keep a record of the key store encryption password
  - **Loss of this information will make recovery of encrypted file systems impossible**

- Know how the backup software will store that on the backup media – encrypted or unencrypted

- Know where all the needed filesets are to restore the system to the exact same levels

- More information is available from "AIX V6 Advanced Security Features Introduction and Configuration":
  http://www.redbooks.ibm.com/redbooks/pdfs/sg247430.pdf

- TEST your procedures!
  - Change the date forwards for restores
  - Understand key management and know how to reset keys
  - Be very careful about over-writing current keys when restoring
  - Consider using a second staging machine to protect current data
  - Use a staging machine to ensure you do not affect your current data!

Special Considerations: GPFS

- Save the /var/mmfs/gen/mmsdrfs file on each node
  - Contains all GPFS definitions

- Use the 'mmfsctl' command with suspend/resume operations before/after performing a hardware mirror for backups

- See GPFS advanced administrators guide at:
  http://publib.boulder.ibm.com/epubs/pdf/c2351824.pdf

Special considerations: Raw Logical Volumes

- Cannot be saved/restored with file system related commands

- Have their own permissions/owners

- Striping can create 'fractured' blocks

- Any changes to the size of the LV may be problematic for the recovery software or user application

Special considerations: Databases

- Usually have logs that must be saved and restored

- Log files may need to be rotated just after the backup process starts and before actual data is saved

- Log files should also be rotated as the process completes

- Control/Configuration files may need be saved before and after the backup

- What would happen if a single copy of a single log cannot be restored?

- Consult with your DBA. Make sure all these items are addressed as part of your backup procedures

Special Considerations: System

- Build a recovery file system for each host

- Document the adapters, network configuration, file set levels, VG structures and other host unique information

- Make this near the beginning of any backup

- Allows for fast restore if needed

- Facilitates faster system recovery and host consolidation if needed

Disk Systems

- Many provide for instant point-in-time backup (snap copy) facilities

- Each snap copy can require up to 100% of the original disk space

- The snap copy can then be mounted on a different system and read for backups or other processing

- Provides a means to test the integrity of the database by starting the database on the backup system

- Many disk systems combine this with a remote mirroring option to create a duplicate storage system at a remote site

- Extreme care should be taken to prevent snapshot copies from being seen by the original host – otherwise data loss can occur (and HAS occurred in many instances)

Special Considerations: Disk systems

- Remote mirroring configuration may affect performance

- Raid configurations have different performance factors

- Connectivity/throughput between systems will affect performance

Special Considerations: Storage Architecture

- All configurations for SAN fabric, SVCs

- Document Firmware levels/model numbers for all devices

- Save firmware installation media/files if possible

- Record detailed zoning information

- Check if the FC Switches/SVCs can save their configurations to a TFTP server

- Document the process to restore the saved configuration and test the procedures

Backup infrastructure

- Can you recover your backup infrastructure itself??

- All backups need to be recoverable

- Changes in backup software may result in backup that cannot be restored

- Hardware may also need to be preserved to allow for recovery

- Need to have plans for how to recover the entire backup/recovery environment from nothing but the existing backups

- Evaluate the need for a crash kit that has all needed resources to recover from nothing

- Know where all software licensing information is and how to contact the vendors for emergency support

Designing for recovery

- Shift the focus to recovering data

- Evaluate each system to understand the impact of downtime

- Plan backup and recovery resources based on the impact of downtime

- Do not expect one plan/strategy meets all needs

- Know how long each recovery option takes

- Identify super critical information and have a plan to deal with failures of that data – archive logs might need to be on 2 different backup medias for example

- Change the backup procedures to support recovery - generate the recovery process as part of the backups

Final thoughts

- There are many software packages that save/recover data

- Multiple backup/recovery strategies may be needed

- Business function and criticality of a host will help determine what approach(es) to take

- Careful planning and implementation will result in successful recovery from multiple outages and failures

- Recover planning takes a lot of planning and testing to be successful

- Failing to be prepared for recovery can cripple or destroy your business

Checklist for recovery

- Create and save system plans for all LPARs

- Create and save storage subsystem layout backups

- Create a /recovery-$hostname file system in rootvg for each host – this way multiple recovery filesystems can be restored without a problem

- Identify the unique data on each host and the best way to backup the data to the /recovery file system

- Make sure to save structure information for all volume groups and the maps of all LVs

- Save a snap with everything except a dump

- Save configuration files for all other products – HACMP, GPFS, db2, oracle, etc.

- Test recovering a system on a regular basis

- Be prepared to recover the backup/recover host and how to make it faster/easier

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