

Advanced SUSE Linux Enterprise Server Administration (Course 3038)

Chapter 5 *Manage Backup and Recovery*

Objectives

- Develop a Backup Strategy
- Create Backup Files with tar
- Work with Magnetic Tapes
- Copy Data with the dd Command

Objectives (continued)

- Mirror Directories with the rsync Command
- Automate Data Backups with the cron Service
- Troubleshoot the Boot Process of a SLES 9 System
- Configure and Install the GRUB Boot Loader

Develop a Backup Strategy

- Objectives
 - Choose a Backup Method
 - Choose the Right Backup Media

Choose a Backup Method

- Full backup
 - Best possible method of data backup
 - All system data is copied to a backup media once a day
 - To restore data
 - Most current backup media is copied back to the system's hard disk
 - Disadvantage
 - Time frame available to perform backups (Backup window)
- Perform backups when the system is not used

Choose a Backup Method (continued)

- Perform an incremental backup
 - Perform a full backup once a week
 - Then you perform a backup every day
 - That copies only files that have changed since the backup the day before
 - Advantage
 - Backup window can be much smaller
 - Disadvantage
 - Recovery time is longer

Choose a Backup Method (continued)

- Perform a differential backup
 - Perform a full backup once a week
 - Then you perform backups every day
 - To record files that have changed since the last full backup
 - Advantage
 - To restore data from a differential backup, you need just two backup media
 - Disadvantage
 - Amount of data to be backed up grows every day

Choose a Backup Method (continued)

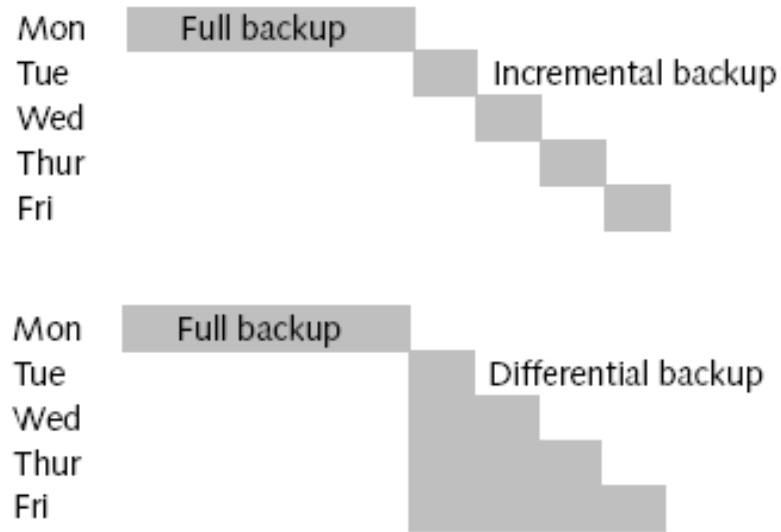


Figure 5-1

Choose the Right Backup Media

- Tape drives are used most often
 - They still have the best price-to-capacity ratio
 - Normally these are SCSI drives
- Other media for data backup include
 - Writable CDs or DVDs, removable hard drives, and magnetic-optical (MO) drives
- Storage Area Networks (SANs) are also used
 - SAN often uses magnetic tapes to store the data
- Store backup media separately from backed up systems
- Store sensitive backup media offsite

Create Backup Files with tar

- Objectives
 - Create tar Archives
 - Unpack tar Archives
 - Exclude Files from Backup
 - Perform Incremental and Differential Backup
 - Use tar Command-Line Options

Create tar Archives

- tar format
 - Container format for files and directory structures
 - Extension of the archive files end in .tar
- Normally data in the archive files is not compressed
 - You can use additional compression commands
- Directories are typically backed up with
 - `tar -cvf /backup/etc.tar /etc`
 - `tar -cvf /dev/st0 /home`
- View the contents of an archive by entering
 - `tar -tvf /backup/etc.tar`

Unpack tar Archives

- Unpack files from an archive
 - `tar -xvf /dev/st0`
- Extract just one file
 - `tar -xvf /test1/backup.tar -C /home/user1/.bashrc`

Exclude Files from Backup

- List of these files must be written in an exclude file
 - Line by line
- List is then passed to tar with the option -X
 - `tar -cvf /dev/st0 /home -X exclude.files`

Perform Incremental and Differential Backups

- Use a snapshot for incremental backups
 - Make a full backup with a tar command
 - `tar -cz -g /backup/snapshot_file -f /backup/backup_full.tar.gz /home`
 - Perform an incremental backup
 - `tar -cz -g /backup/snapshot_file -f /backup/backup_mon.tar.gz /home`
- Use the find command to search for files to back up
 - Make a full backup
 - `tar -czf /backup/backup_full.tar.gz /home`
 - Back up all files that are newer than the full backup
 - `find /home -type f -newer /backup/backup_full.tar.gz -print0 | tar --null -cvf /backup/backup_mon.tar.gz -T -`

Use tar Command-Line Options

Table 5-1

-c	Creates an archive.
-C	Changes to the specified directory.
-d	Compares files in the archive with those in the file system.
-f	Uses the specified archive file or device.
-j	Directly compresses or decompresses the tar archive using bzip2, a modern efficient compression program.
-r	Appends files to an archive.
-u	Only includes files in an archive that are newer than the version in the archive (update).
-v	Displays the files, which are being processed (verbose mode).
-x	Extracts files from an archive.
-X	Excludes files listed in a file.
-z	Directly compresses or decompresses the tar archive using gzip.

Exercise 5-1 Create Backup Files with tar

- In this exercise, you will do the following:
 - Part I: Create a Full Backup
 - Part II: Create an Incremental Backup

Work with Magnetic Tapes

- Command `mt`
 - Positions tapes
 - Switches compression on or off
 - Queries the tape status
- Magnetic tape drives are always SCSI devices
 - `/dev/st0`
 - `/dev/nst0`
- Query status of the tape
 - `mt -f /dev/st0 status`

Work with Magnetic Tapes (continued)

- Position the tape at the beginning of the next file
 - `mt -f /dev/nst0 fsf 1`
- Spool the tape back to the beginning
 - `mt -f /dev/nst0 rewind`
- Eject the tape from the drive
 - `mt -f /dev/nst0 offline`
- Check whether data compression is switched on or off
 - `mt -f /dev/st0 datcompression`

Copy Data with the dd Command

- Command dd
 - Converts and copies files byte-wise
 - Can copy all kinds of data
 - Including entire hard disk partitions
- Copy a file
 - `dd if=/etc/protocols of=protocols.org`
- Copy a complete partition
 - `dd if=/dev/sda1 of=boot.partition`
- Create a backup copy of the MBR
 - `dd if=/dev/sda of=/tmp/mbr_copy bs=512 count=1`

Exercise 5-2 Create Drive Images with dd

- In this exercise, you use dd to create a drive image

Mirror Directories with the rsync Command

- Objectives
 - Perform Local Copying with rsync
 - Perform Remote Copying with rsync

Perform Local Copying with rsync

- Mirror all home directories
 - `rsync -a /home /shadow`
- Mirror the content of a directory and not the directory itself
 - `rsync -a /home/. /shadow`
- Exclude files from backup
 - `rsync -a --exclude-from=/home/exclude /home/. /shadow/home`

Perform Local Copying with rsync (continued)

Table 5-2

Option	Description
-a	Puts rsync into the archive mode.
-x	Saves files on one file system only, which means that rsync does not follow symbolic links to other file systems.
-v	Enables the verbose mode. Use verbose mode to output information about the transferred files and the progress of the copying process.
-z	Compresses the data during the transfer. This is especially useful for remote synchronization.
--delete	Deletes files that no longer exist in the original directory from the mirrored directory.
--exclude-from	Does not back up files listed in an exclude file.

Perform Remote Copying with rsync

- With rsync and SSH
 - Log in to other systems
 - Perform data synchronization remotely over the network
- Copy home directory of the user tux to a backup server
 - `rsync -ave ssh root@DA1:/home/tux /backup/home/`
- Backup of the home directory is copied back to the DA1 system
 - `rsync -ave ssh /backup/home/tux root@DA1:/home/`

Exercise 5-3 Create a Backup of a Home Directory with rsync

- In this exercise, you will do the following
 - Part I: Perform a Local Backup with rsync
 - Part II: Perform a Remote Backup with rsync

Automate Data Backups with the cron Service

- Automate backups in Linux with the cron service
- System jobs are controlled with the file `/etc/crontab`
 - And the files in the directory `/etc/cron.d`
- System jobs are defined using scripts in directories
 - `/etc/cron.(hourly, daily, weekly, and monthly)`
- Specify which users can create cron jobs with
 - `/var/spool/cron/allow` and `/var/spool/cron/deny`
- Jobs of individual users
 - Stored in files in the directory `/var/spool/cron/tabs`
 - Processed with the command `crontab`

Exercise 5-4 Configure a cron Job for Data Backup

- In this exercise, you use cron for data backup

Troubleshoot the Boot Process of a SLES 9 System

- Objectives
 - System Boot Process Issues
 - How to Boot a Corrupted System Directly into a Shell
 - How to Boot a Corrupted System with the Installation Media
 - How to Start and Use the SLES9 Rescue System

System Boot Process Issues

- Most common problems:
 - The system cannot boot due to a misconfigured boot loader
 - The system cannot boot because of file system corruption
 - An init script has malfunctioned and is blocking the boot process
 - The system does not start correctly because of hardware changes
- Access the file system of the corrupted system
 - To detect and fix the problem

How to Boot a Corrupted System Directly into a Shell

- Boot screen of the GRUB boot loader
 - Lets you pass parameters that modify the Linux kernel
 - Before the kernel is actually loaded
- Use the Boot Options field
 - At the bottom of the GRUB boot screen
- Boot parameter `init=new_init_program`
 - Changes the first program loaded by the kernel
 - To boot to a shell use `init=/bin/bash`

How to Boot a Corrupted System with the Installation Media

- Steps
 - Insert the SLES 9 DVD and reboot the system
 - Select Installation; then press Enter
 - When YaST displays the language selection dialog box, select Accept
 - Select Boot installed system; then select OK
 - Select the root partition of the system you would like to boot; then select Boot

How to Start and Use the SLES 9 Rescue System

- Steps
 - Insert the SLES 9 DVD and reboot the system
 - From the boot menu, select Rescue System; then press Enter
 - From the language selection dialog box, select your language; then press Enter
 - At the prompt Rescue login, enter root
 - Press the Enter key
 - You are now logged into the Rescue System as root
- Mount the corresponding partition
 - `mount -t reiserfs /dev/hda6 /mnt`

Configure and Install the GRUB Boot Loader

- Objectives
 - The Basic Functionality of a Boot Loader
 - The Basics of GRUB
 - How to Configure the GRUB Boot Loader

The Basic Functionality of a Boot Loader

- Basic tasks of a boot loader:
 - Boot various operating systems
 - Pass boot parameters to the Linux kernel
- Stages
 - Stage 1
 - Program code for stage 1 is installed in the master boot record (MBR) of the hard disk
 - Stage 2
 - Usually contains the actual boot loader
 - Files of boot loader are located in the directory /boot

The Basics of GRUB

- GRUB is the standard boot loader of SLES 9
- Features
 - Stage 2 File System Drivers
 - Includes file system drivers for
 - ReiserFS, ext2, ext3, Minix, JFS, XFS, FAT, and FFS (BSD)
 - GRUB Shell
 - Enables interactive control of the boot manager

How to Configure the GRUB Boot Loader

- Edit the file `/boot/grub/menu.lst`
- Structure of the file
 - General options are listed
 - Options for the various operating systems
 - That can be booted with the boot manager
- Example

```
default 0
timeout 8
title linux
kernel (hd0,0)/boot/vmlinuz
root=/dev/hda1
initrd (hd0,0)/boot/initrd
```

Exercise 5-5 Boot to a Shell and Configure the GRUB Boot Loader

- In this exercise, you will do the following:
 - Part I: Boot the Rescue System
 - Part II: Edit and Test the GRUB Configuration File

Summary

- You should carefully develop a backup strategy
- Full backups take a great deal of time to perform
 - They are typically combined with incremental and differential backups
- Use the tar command to create full, incremental, and differential backups
- Manage tape media with the mt command
- Use the cron service
 - To schedule tasks to occur repetitively in the future

Summary (continued)

- You may temporarily boot your Linux system using a GRUB boot parameter
 - Or by booting from your SLES DVD and choosing the appropriate options
- GRUB is the default boot loader in SLES
 - It is configured using the `/boot/grub/menu.lst` file