

# Data Backups

There are two kinds of hard drives: the ones that have already crashed and the ones that will eventually crash.

# Murphy's Law

---

- There are two kinds of hard drives:
  - *the ones that have already crashed and*
  - *the ones that will eventually crash*
- Another form
  - *The question is not whether your hard disk will crash. The question is when?*
- Backing Up your data is protection against hard disk failure.

# Protection Methods

---

- Back up your Data!
- Backup Methods
- Back up System Files
- Make an Emergency Disk
- Power Protection
- Cooling
- Virus Protection
- Stay Current
- Keep it clean

# Backup Defined

---

- Backup is a process where files on a server or workstation drive are copied and stored on a reliable form of media (e.g., tape).

# Terminology

---

- **Archive Bit** A file can only be in two states: either it has been backed up or it is a new or modified file. The archive bit indicates if the file is new/modified since the last Normal or Incremental backup or if it has been backed up.
- **Restore** A process by which data that has been backed up to tape is returned to disk.

# Terminology

---

- **Permanent Backup** A backup that is intended to never be overwritten.
- **Overwrite** When performing a Backup operation, choosing Overwrite will start the backup at the beginning of the tape, and will replace the data on the tape with the data being backed up.
- **Copy Backup** Backs up all selected files, but does not affect the file's backup status (does not reset the archive bit).

# Backup System Components

---

- Media
  - Floppy Disk
  - Hard Disk
  - CD-R, CD-RW
  - Tape (DAT vs. DLT)
  - Magneto Optical (Bernoulli), Jazz, ZIP, others
- Hardware (Drives, Autoloaders)
- Interface (SCSI, EIDE, USB, Parallel Port)
- Software (Standalone, Network based)
- Network (Remote Backup)

# Types of Backup

---

- Full Backup
- Incremental Backup
- Differential Backup
- Full Copy Backup

# Full Backup

---

- **A Full Backup includes all files on your drive(s). The Archive Bit is reset.**
- **Advantages:**
  - Files are easy to find - Since full backups include all data on your hard drive, you don't have to search through several tapes to find the file(s) you need to restore. If you should need to restore the entire system, all of the most current information would be found on the last backup tape.
- **Disadvantages**
  - Redundant backups - Since most of the files on your system rarely change, each backup following the first is mostly a copy of what has already been backed up.
  - Full backups take longer to perform - Can be very time consuming.

# Incremental Backup

---

- **An Incremental backup includes files that were created or changed since the last backup. The Archive Bit is reset.**
- Please be aware that any process which changes the Archive Bit, can impact on Incremental or Differential Backups. These can include: backup by other devices, backup with Microsoft Backup to floppy, Xcopy, MSDOS Backup, etc.
- Advantages
  - Better use of media - Only files that were created or changed since the last backup are included, so there is much less data storage space required.
  - Less time required - It only backs up the files that have been modified since the last backup.
- Disadvantages
  - Multiple tapes needed for restore - The files can be spread over all the tapes in use since the last full backup. You may have to search several tapes to find the file you wish to restore.

# Differential Backup

---

- A Differential Backup includes all files that were created or modified since last Full backup. The Archive Bit is not reset.
- Please be aware that any process which changes the Archive Bit, can impact on Incremental or Differential Backups. These can include: backup by other devices, backup with Microsoft Backup to floppy, Xcopy, MSDOS Backup, etc.

# Differential Backup

---

## ■ Advantages

- Less Time--This method requires much less time than a Full backup.
- More Efficient Restore - You would have a maximum of two tape sets to perform a full restore, the last Full backup and the last Differential backup tapes.

## ■ Disadvantages

- Longer and longer time needed - The amount of data backed up each day following the Full backup gets larger and larger each day. Example, if the Full backup was done on Friday then Wednesday's Differential backups would have the data that was backed up on the Monday tape and on Tuesday's tape plus whatever was changed or created on Wednesday.
- Redundant backups - Each days backup would store much of the same information plus the latest information added or created since the last Full Backup.

# FULL COPY BACKUP

## Instead of FULL BACKUP

---

- A Full Copy Backup includes all files on your drive(s). The Archive Bit is not reset.
- Note: This feature may not be available in some versions of backup software.
- If a Full Copy is performed, Incremental and Differential backups are not possible since Full Copy does not reset the Archive Bit.
- Usage: A Full Copy is useful in peer-to-peer networking environments. In some cases, when attempting a Full Backup in a peer-to-peer environment you may experience random lockups. This is due to the reset of the Archive Bit in a shared environment. By doing a Full Copy Backup, the Archive Bit is not touched and no lockups are encountered.

# Backup Process for Servers/Workstations

---

- How to set up the backups so as not to limit the server?
- When backups are run?
- How to keep users informed?

# Backup Considerations

---

- What are you backing up? Server and/or Workstations
- How often do you want a backup?
- Full vs. Incremental vs. Differential vs. Partial

# Partial Server Backup

---

- Partial Server Backup does just the directories you specify.
- You need to decide how often you want a FULL backup regardless of what you do nightly.
- When can you start the backup without interfering with production? This determines how many machines can be backed up in a day.

# Workstation Backup

---

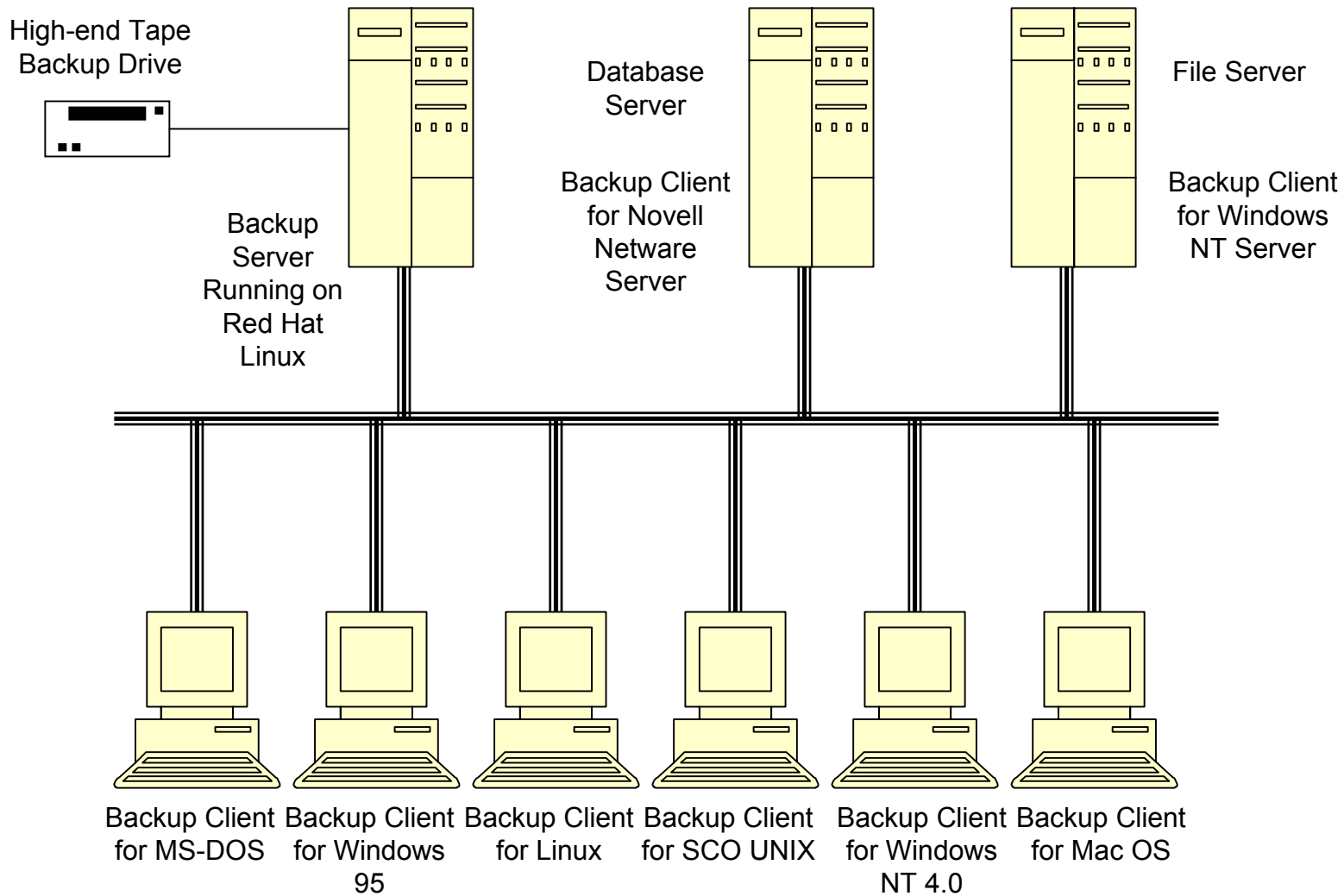
- Individual backups of each workstation  
Is this practical? How often does the software on a workstation change? How long will it take to get a baseline of EVERY workstation? Should you just do particular ones? What criteria should you use?
- Hardware: Size, speed, number of tapes/disks, controllers
- Software: Ability to do full, incremental, differential backups; capable of changing setup daily; setup once - continue forever; how much effort to maintain

# History

---

- How often are you cycling tapes? Think of it in terms of "WEEKS", not days.
- How many weeks worth do you want to store?
  - Where do you store them?
  - Do you need to keep a baseline of the file server away from the area?
  - Have your DRP ready and practised

# Client Server Software Systems for Backup



# Enterprise Backup Software

---

- ArcServe from Computer Associates
- Backup Exec from Seagate
- Others

# Disaster Recovery System

---

- Combines the most recent available backup with some utility software to restore the system with the minimum effort
- Generally, prepares Disaster Recovery Disks which must be updated when system configuration changes