Computer Science CSCI 251

Systems and Networks

Dr. Peter Walsh

Department of Computer Science

Vancouver Island University

peter.walsh@viu.ca

Backup Strategy

A backup is a copy of computer data which may be used to restore data that is lost, corrupt or inaccessible.

- ◯ Methods
  - full, differential, incremental
- ◯ Storage Devices
  - disk, DVD, tape
- ◯ Schedule
  - backup frequency
- ◯ Copies
  - 3-2-1 Rule
- ◯ Retention Period
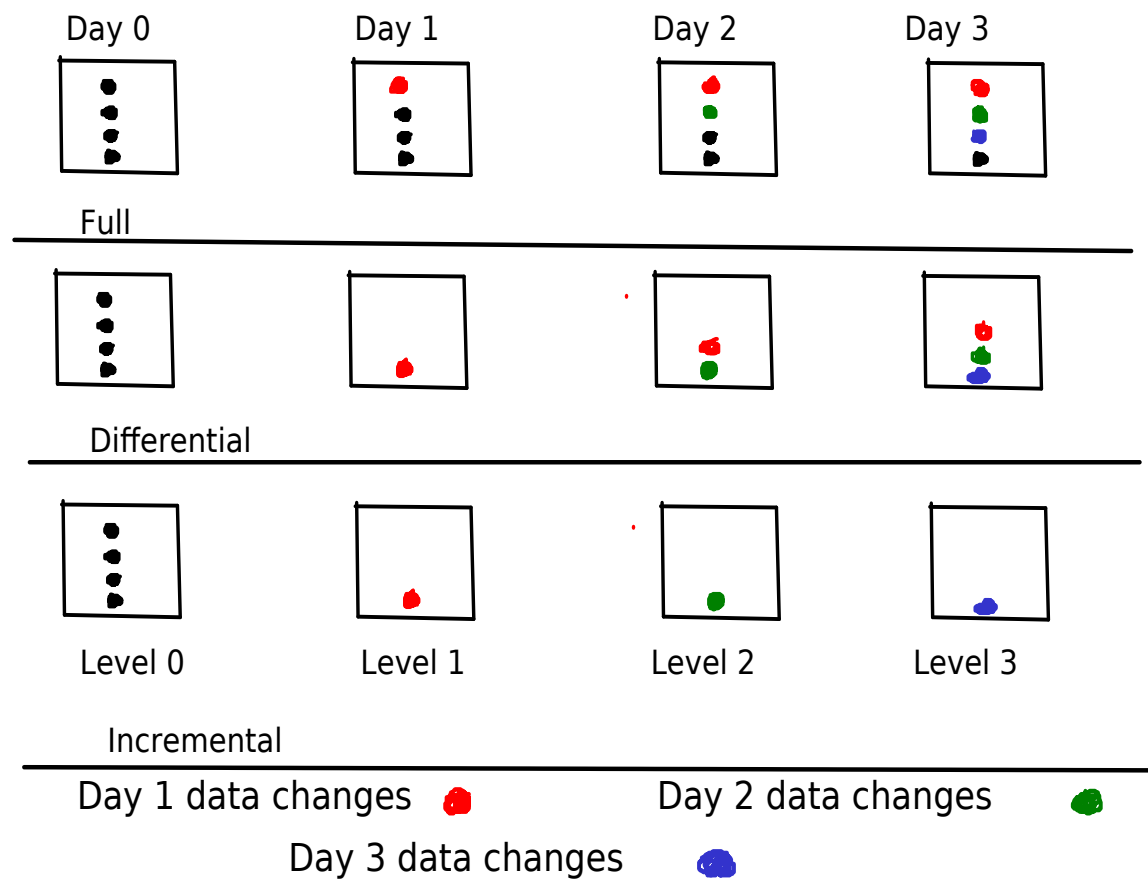 - economic concerns
  - legal/privacy concerns

3-2-1 Backup Rule

Primary Copy

Media Type A

Backup 1

Offsite Copy

Backup 2

Media Type B

1

2

3
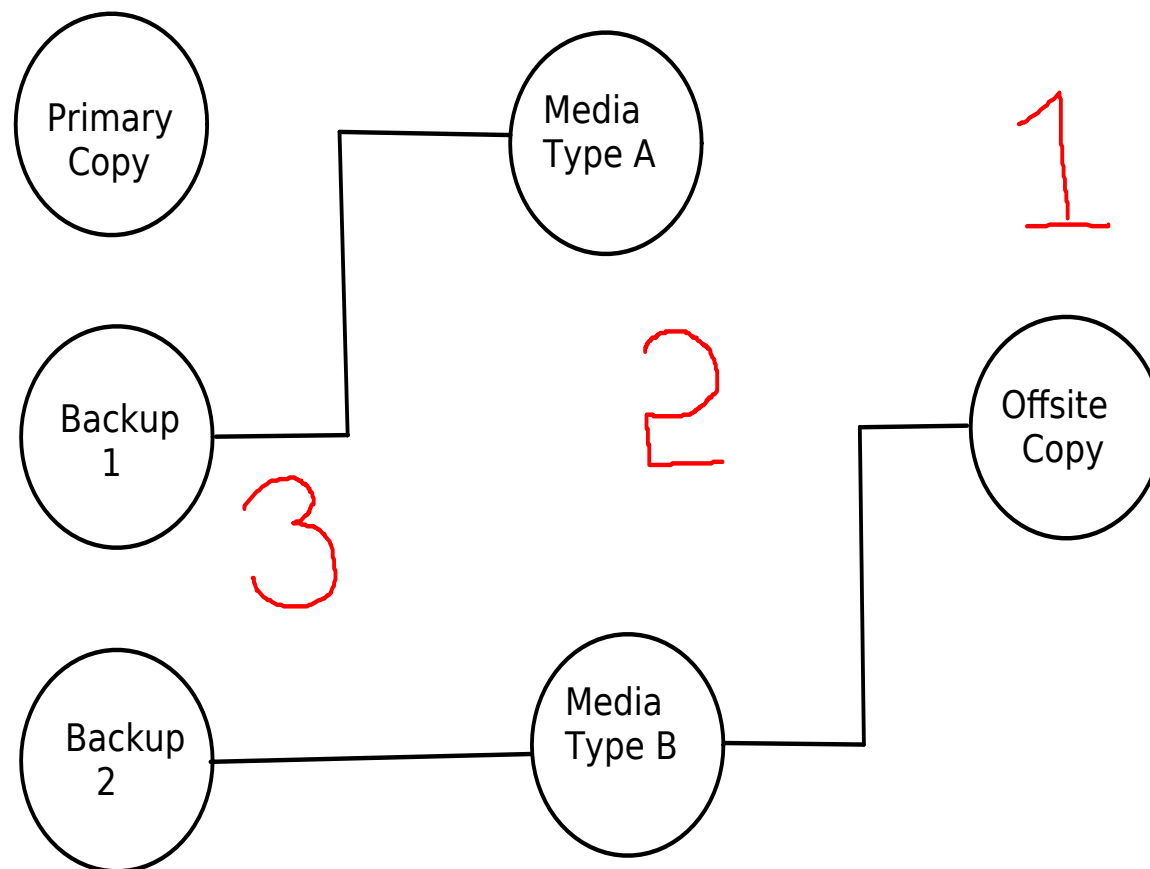
Backup Methods

○ Full
- copy all files
- time and space costly
- fast restore and recovery

○ Differential
- only copy what has changed since the last full backup
- less costly than full backup
- slower restore and recovery than full backup

○ Incremental
- only copy what has changed since the last full or incremental backup
- less costly than full and differential backups
- slower restore and recovery than full and differential backups

Computer Backups cont.

Day 0   Day 1   Day 2   Day 3

Full

Differential

Level 0   Level 1   Level 2   Level 3

Incremental

Day 1 data changes   Day 2 data changes

Day 3 data changes

Backup Options

○ Files and Directories
- *file transfer:* `cp`
- *file transfer over ssh:* `scp`
- *file transfer and synchronization over ssh:* `rsync`

○ File Systems
- *filesystem transfer over ssh* `rsnapshot`
- *filesystem incremental backup* `dump/restore`
- *networked incremental backup* `amanda-client`,
  `amanda-server`

Dump and Restore

○ Overview

- level N dump backs-up all files that have
   changed since the last dump of level less that N
- level 0 dump backs-up the entire file system
- historically, dump supports levels 0-9

○ Moderate Schedule

- perform a level 0 dump once a year
- perform a level 3 dump once a month
- perform a level 5 dump weekly
- perform a level 9 dump daily

○ Cost (Tapes/Dumps)

- $7 + 5 + 12 + 1 = 25$

Recovery Example

○ Backups
- A: level 3 (April 1)
- B: level 0 (April 2)
- C: level 1 (April 3)
- D: level 1 (April 4)
- E: level 2 (April 5)
- F: level 1 (April 6)
- G: level 0 (April 7)

○ Total Recovery April 7
- requires dump G

○ Total Recovery April 6
- requires dumps B and F

○ Total Recovery April 5
- requires dumps B, D and E