Backup Your Computer

− with Emphasis on Macs −

A "Learn-30"

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# Preaching to the choir

What Could Go Wrong?

- Lost or corrupted file or folder
- Corrupt application
- Corrupt disk drive (reformat)
- Disk drive failure (replace)
- Theft or loss of computer
- House fire

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Media Life Expectancy

- Hard Disk Drives (HDDs):
  - 80% last 4 years
  - 50% last 6 years
  - 5% failure/year
  - "Infant mortality" effect
- Longevity factors: ← Live link… click here
  - Temperature
  - Physical trauma
  - Brand at a particular point in time
  - Usage
- References:

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In 2014 3TB Seagate disk drives had a failure rate of 40%
A year later the failure rate of 9.6%
In 2015 the Seagate 4TB drive had improved tremendously
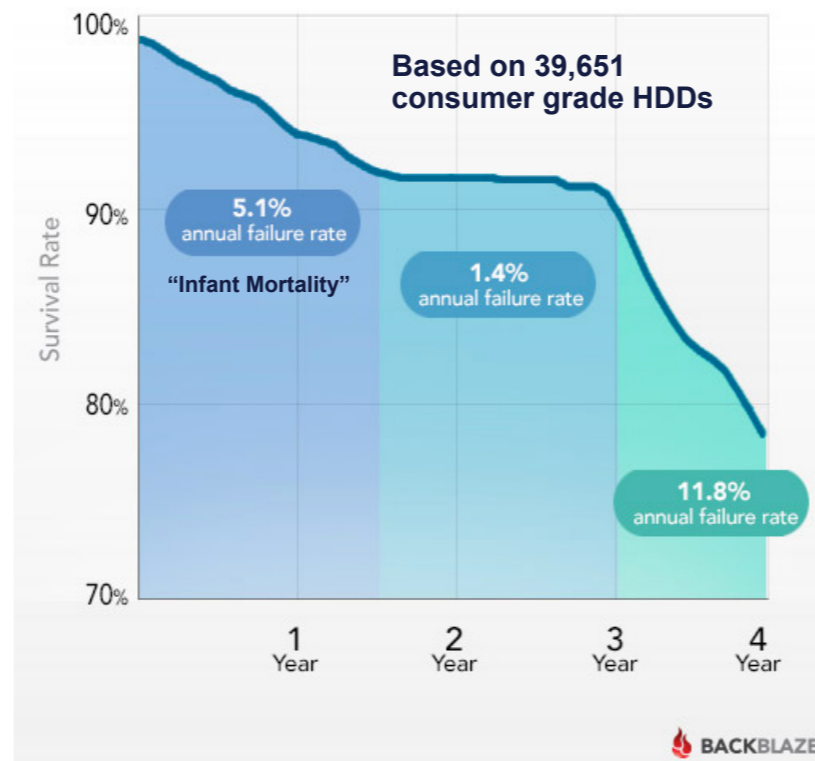
Backblaze hard drive failure rate, over the first four years

For details see

Media Life Expectancy (cont.)

- Solid State Drives (SSDs)
  - MLC (multi-level cell); most consumer products
  - SLC (single-level cell)
- Last how long (MLC SSDs)?
  - 700 TB reads/writes: at 40 GB/day… 50 years
  - "last a lifetime" (i.e., 10+ years)
  - "wrote hundreds of terabytes without any problems"
- My experience: Failure of a 2-year old SSD necessitating reformatting and full system recovery from backup

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There is a TLC (three level cell) for lower-end consumer products but it's not recommended for critical applications that require frequent updating of data.

There is also a eMLC (Enterprise multi level cell) class that's a good fit for light enterprise use and high-end consumer products.

"Wear leveling" spreads the reads/writes around the device to no particular location is singled out.

SSDs work by storing electrons (electrical charge) in non-volatile NAND flash ships (transistors)

Windows Backup Software

- File History (Win 10)
- System Image (Win 7, 8 and 10)
- Backup & Restore (Win 7 and 8)
- Third party software:
  - Acronis: True Image, Cloud
  - Genie Backup Manager
  - Macrium
  - Paragon Backup & Recovery
  - Shadow Protect
  - Todo Backup Workstation
- Additional references:

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With Acronis you can restore individual files from a disk image.

Apple Mac Backup Software

- Time Machine
- Carbon Copy Cloner
- ChronoSync
- Acronis (True Image & True Image Cloud)
- Retrospect
- Other:

Retrospect is aimed toward businesses and institutions. It's expensive $49 (1 computer) $179 (5 computers) PER YEAR Hard to pin down prices.

Two apps for Time Machine: (1) Backup Scheduler for Time Machine ($4.99) and (2) iScheduleTimeMachine ($1.99).

To change Time Machine backup interval, see http://hints.macworld.com/article.php?story=200710291721156. and edit the Launch Daemon "com.apple.backupd-auto.plist.

With Acronis you can restore individual files from a disk image.

Linux Backup Software

- Amanda URL
- Bacula URL
- rsync URL
- sbackup URL
- Simple Linux Backup URL
- tar URL URL URL
- Other references: URL URL URL URL URL URL

Amanda and Bacula are mature, enterprise class backup systems.
rsync is widely used
tar (tape archive) is an old standard Unix backup utility

Cloud-based Backup

- Most file based—some disk image
- Need High speed Internet connection
- Provides offsite storage
- More expensive than local backup
- Recovery is slower than local backup
- Security issues
  - SSL communication
  - End-to-end encryption

Most popular cloud backup vendors don't offer end-to-end encryption.

Nine Popular Vendors of Cloud Backup

Company	Annual Cost ($)	Storage	Free Storage	No Computers	URL
BackBlaze	50.00	Unlimited	0	1	🌐URL
Carbonite	59.99	Unlimited	0	1	🌐URL
CrashPlan	59.99	Unlimited	0	1	🌐URL
iDrive	59.50	1 TB	5 GB	Unlimited	🌐URL
Mozy	65.89	50 GB	2 GB	3	🌐URL
Nero BackItUp	69.99	Unlimited	5 GB	5	🌐URL
OpenDrive	50.00	100 GB	5 GB	1	🌐URL
SOS Online Backup	79.99	Unlimited	0	1	🌐URL
SpiderOak	129.00	1 TB	2 GB	Unlimited	🌐URL

Additional references: 🌐URL 🌐URL

iDrive is NOT an Apple product

Smartphone Backup

- iPhone
  - To iCloud
  - To Mac or PC
  - Additional information
- Android
- Blackberry
- Windows

Devise a Plan

- It's a matter of comfort (or paranoia)
- Local backup and/or the Cloud
- File and/or disk image backup
- Local: single or multiple external drives
- Frequency of backup
- Software:
  - Software accompanying operating system
  - Third party software (free or for fee)
- Create a backup log

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Don't get bogged down in selection details...

Any backup is much better than no backup!

3Ps'

...and Pray?

After Establishing a Plan…

- Implement
  - Install software
  - Perform initial backup
  - Test file recovery

- Maintenance
  - Update software
  - Test backup manually
  - Fire Drills: Test file recovery periodically

Time Machine
(The Software)

- Automatic backup, but can be done manually
- Hourly backups for the past 24 hours
- Daily backups for the past month
- Weekly backups for all previous months

When the backup disk becomes full the oldest backups are deleted

Demo Time Machine

- Typical backup
- Typical file/folder recovery*:
  - From Time Machine menu
  - From direct access to backup device
- Full system recovery booting from the Internet (we won't go there today)
  - OS X Recovery (cmd+R) + ⏻
  - From Time Machine 🌐

*Recover folder "999 Demo Stuff"
Originally located in the "Documents" folder.

Backup via the Internet takes ~65 seconds (MacBook Pro)

Four Functions: Booting from the Internet

1. Complete restore from Time Machine backup
2. Reinstall only OS X
3. Get help online
4. Disk Utility
   - repair disk
   - erase disk

Help online gives detailed information on the other options.

And now the demo…