An Introduction to Data Protection

By Michael Dexter
SNIA DPCO Governing Committee

Data Protection is NOT the contents of the EU Data Protection Directive :(

“But I clicked ‘Backup Now’!”

Good Start!

#1: Avoid a False Sense of Security

Data Protection is the process of guaranteeing that your data is...

1. Integrous – Maintaining integrity and consistency
2. Resilient – Resistant to mechanical failures/outages
3. Versioned – Accessible in a previous state
4. Replicated – “Backed up” to local and remote locations
5. Archived – Versioned and replicated for long-term storage
6. Secure – Resistant to unauthorized theft or destruction
7. Private – Available for authorized purposes only
8. Available – Accessible in a timely manner
9. Usable – Equally available now and in the future
10. Compliant – with legal and regulatory requirements

Data Protection: Integrity

- Is your data free of corruption or bitrot?
- How would you know?
- Is your virtual machine storage flushed to disk?
- Is your databases consistent when snapshotted?

Integrity through OpenZFS Checksumming

- All blocks written are checksummed and verified
- All checksums are verified when blocks are read
- All checksums are verified with a periodic scrub/scan
- OpenZFS *will not return corrupt data*

Data Protection: Resilience

- “Your disks are plotting against you” – Lucas/Jude
- How do you outsmart them?
- OpenZFS Software RAID
- Flexible redundancy model
- Btrfs is a viable alternative to consi… D’OH!

Resilience through Software RAID

- Individual blocks or whole devices can be replaced
- Optional “spare” devices
- Added features such as volume growth
- Watch S.M.A.R.T. and ‘zpool status’ repair information
- `smartctl -a /dev/da3 | more`

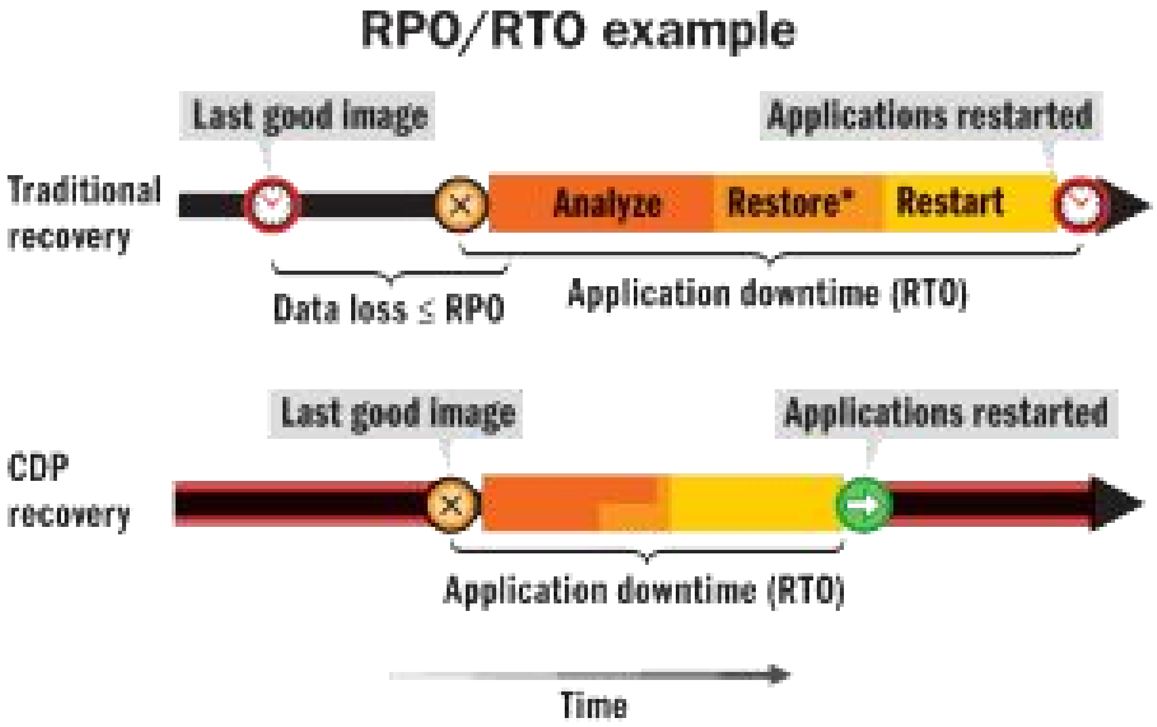
Data Protection: Versioning

- A “backup” represents a known-good *Point in Time*
- How much data can you lose or time replacing it?
- Are you mitigating human error and ransomware?
- OpenZFS Snapshots
- Do you really want a true replicating file system?

Versioning and Snapshots

- File system *Points in Time* serving as *Restore Points*
- Every snapshot is an efficient *delta* of changes
- *Excellent* strategy to undo the damage of ransomware
- Provide the foundation for OpenZFS Replication

Restore Point Objective/Restore Time Objective



Data Protection: Replication

- No NAS is a backup
- How safe do you need your data to be?
- Can you mitigate local physical theft or a natural disaster?
- OpenZFS Replication, optionally removable media
- Open ZFS Replication is based on Snapshots

Versioning and Replication

- The 3-2-1 Rule of “Backups”:
    - Three copies of your data
    - Two different media
    - One copy of your data off-site
    - Primary, Secondary, DR Tertiary and Cloud

Data Protection: Archiving

- Replication is not a backup and a backup is not an archive
- What must you retain and for how long?
- Know your Legal and Regulatory Obligations
- Ultimately a matter of Policy

Data Protection: Security

- You have good reason to be paranoid
- Identify theft is a very real threat
- Consider FreeNAS encryption-at-rest
- RMA devices with confidence
- Are you protected if your storage hardware is stolen?

Data Protection: Privacy

- Security can exist without Privacy
- First line of defense: User and Group access
- Same as Security concerns if online or RMAing a disk
- Think long-term: Will descendants receive your data?
- Will museums receive your data?

Data Protection: Availability

- Your data is useless if not accessible in a timely manner
- What is your primary means of data access?
- Your secondary means?
- What is your *Recovery Time* to arrive at a *Recovery Point*?
- Restore from replica or promote a replica?

Data Protection: Usability

- Legacy data, legacy applications?
- Can you open data you saved a decade ago?
- Do you use portable archival formats such as PDF?
- Are you thinking about these issues before it is too late?

Data Protection: Compliance

- Are you obliged to retain data for a certain period?
- Is your data subject to Privacy requirements by law?
- Are all users aware of these requirements?
- Is this a question of Policy or Technology, or both?

When I get home, I will...

(Discussion)

Thank You

SNIA Later!