The Tip of the Iceberg: The Coming Era of Open Source Enterprise Storage

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Defining Open Source & Software Freedom

Free Software Foundation Four Freedoms

- The freedom to run the program as you wish, for any purpose
- The freedom to study how the program works, and change it so it does your computing as you wish
- The freedom to redistribute copies
- The freedom to distribute copies of your modified versions to others

See also: The OSI Open Source Definition
Defining Open Source & Software Freedom

Two Leading Schools of Thought

- **Permissive Licensing:** You may keep your changes to my code if you preserve my copyright notice.
- **Copyleft Licensing:** You must provide your changes to my code to your users with or without *patent* protections/indemnification.

Why would you do that?
Defining Open Source & Software Freedom

Joy’s Law

“No matter who you are, most of the smartest people work for someone else.”

Bill Joy, Sun Microsystems
Defining Open Source & Software Freedom

“A patent is not a business model.”

Tim Kastelle

Technologies alone do not find customers, support them, build a brand, source vendors, manage HR...

Don’t be afraid of sharing or collaborating

timkastelle.org/blog/2010/03/a-patent-is-not-a-business-model
Defining Open Source & Software Freedom

Dexter’s Law

“Only proprietary software vendors want proprietary software. Everyone else will choose software freedom when given the choice.”

Michael Dexter
Open Source In Practice

“Crossing the Chasm” © Geoffrey A. Moore
Open Source In Practice

We’ve *Crossed* the Chasm

**Top 500 Supercomputers**

November 2015

494 or 98.8%

run GNU/Linux

*One* runs Windows

November 1998: One ran GNU/Linux

http://www.top500.org/statistics/details/osfam/1
Open Source In Practice

We’ve Crossed the Chasm

Most Smart Phones
Most Network Infrastructure
Netflix, Yahoo!, Google, Amazon and Facebook Servers
Most Internet of Things

Many Storage Vendors

http://www.idc.com/prodserv/smartphone-os-market-share.jsp
A Brief History of Open Source Storage

- 1983 CSRG: Dr. Kirk McKusick and Bill Joy
  Fast File System, TCP/IP, chroot(2)

- 1988 CSRG: First BSD License

- 2005 Sun: ZFS File System Scale Up

- 2010 Onward: Ceph, Swift, Gluster… Scale Out

“The single Greatest Piece of Software Ever, with the broadest impact on the world, was BSD 4.3.”

www.informationweek.com/d/d-id/1046033
Defining “Enterprise” Open Source

Price?
Performance?
Certification?
Support?
Defining “Enterprise” Open Source
Open Source Storage Generation Gaps

- Fast File System, Fast! Given the constraints…
- ZFS File System, Checksumming and Validating
- Ceph, Swift, Gluster… Catching up

The Fast File System derivatives that dominate Open Source and proprietary computing do not perform any data integrity validations to mitigate bit rot
Scale Up or Scale Out?

Ceph, Swift and Gluster vs. ZFS

You don’t bolt-on data integrity
Back them with ZFS
ZFS Alternatives?

GNU/Linux Btrfs
- Incomplete volume manager added to a file system
- Many legacy conventions such as fstab and fsck
- Strong license obligations
- Not cross-platform

WAFL and ReFS cannot be licensed for modification
bcachefs is an alpha-status Btrfs alternative

We are out of choices
What is ZFS?

- Always-consistent on-disk state
- Continuous data integrity validation
- Unlimited snapshotting, cloning & rollback
- Integrated RAID volume manager
- Snapshot-based replication
- Hybrid SSD/HDD tiering
- Cross-platform, strong community
ZFS Platforms

- OpenSolaris → Illumos reference architecture
  - Intel, Sparc
- OmniOS, SmartOS, OpenIndiana… Illumos derivatives
  - Intel, Sparc?
- FreeBSD
  - Intel, ARM/ARM64, Power, MIPS
- OS X
- GNU/Linux
  - Intel, ARM/ARM64, Power
  - Legal Questions
“It is not enough to require that the combined program be free software somehow. It must be released, as a whole, under the original copyleft license…”

https://www.fsf.org/licensing/zfs-and-linux
Our Logical Conclusions

- Make ZFS Available
  - FreeNAS has been downloaded nearly 9 million times
  - World’s Number One Software-Defined Storage OS
- All Software Requires Hardware
  - FreeNAS Mini/Mini XL, FreeNAS Certified Line
- SDS Separation is the enemy of Hardware Integration
  - Integrated Hardware Platform
  - High Availability Option
  - Vendor Certification
  - Deployment and Maintenance Support
Our Logical Conclusions

TrueNAS Enterprise Storage
Our Logical Conclusions
Thank You!

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