

Open Backup Solution

Proof of Concept

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Common Solutions

Basic

- ufsdump/tar direct to local or remote tape drive
- Tape drives in various locations

Intermediate

- ufsdump/tar to central storage area
- Backup to tape drive or tape library from central server

Advanced

- Central tape library with expensive server software (e.g. Veritas NetBackup)
- Client software on all systems to manage backup remotely

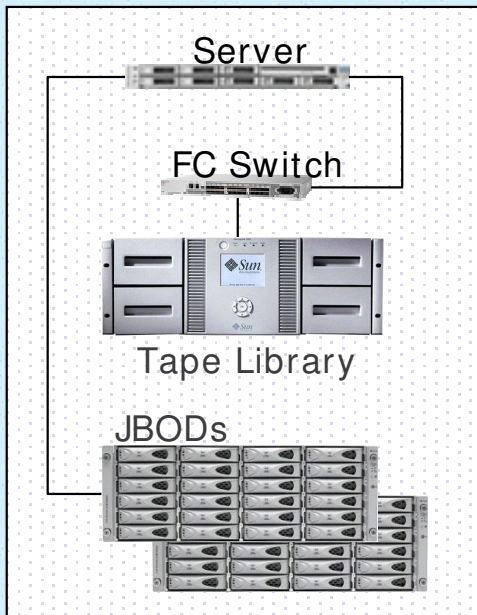
Problem?

- Advanced type
- Open Solution
- Scalable
- Simple
- Cheap
- ZFS Support



Proposed Solution

Fidessa Archive & Retrieval Module (FARM)



Client

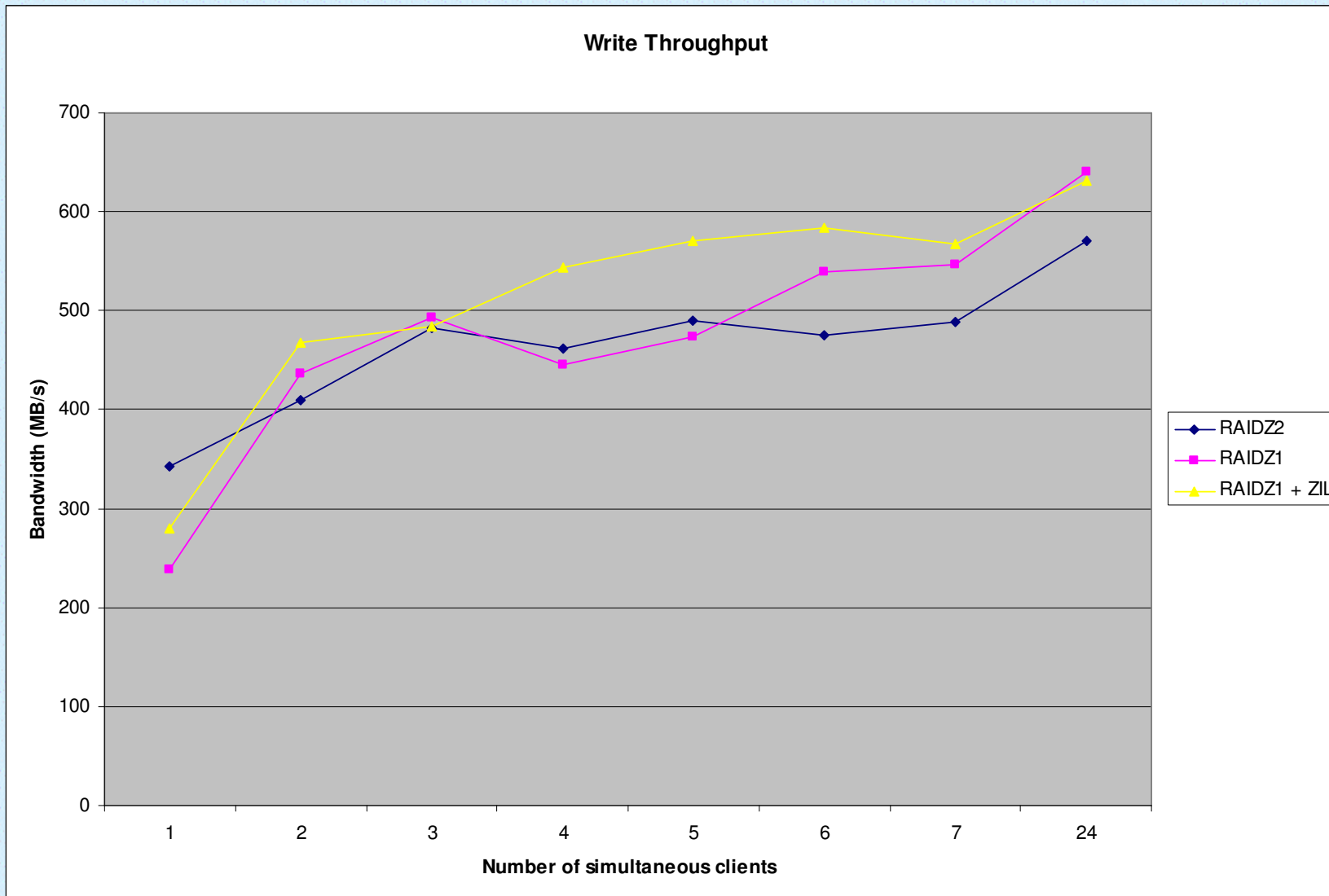
- Backup script under application control
- Legacy Support for UFS: `rsync --inplace`
- Migrate to ZFS: `snapshot, then send & receive`
 - Application back up sooner

FARM

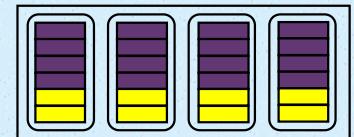
- ZFS hierarchy per Client
- User account per Client
 - rsh/ssh access
 - ZFS delegated admin
 - ZFS snapshot control
- Small/Medium: zpool per JBOD
- Large: zpool striped across JBODs



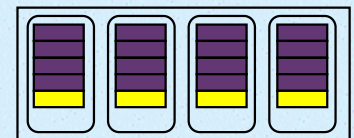
JBOD Layouts?



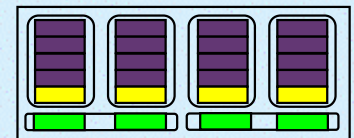
RAIDZ2



RAIDZ1



RAIDZ1 + ZIL





Backup Server Load

Measured on X4140:

- Gigabit: CPU load peaks up to 50%
- 2-Gig: CPU load peaks up to 90%
- Gig/2-Gig: Network fully loaded (limited by Clients)
- Testing on 24 clients - simultaneous

Possible Upgrades:

- Aggregate more network interfaces
- Use a 10Gb/s card (requires infrastructure)
- Upgrade System / CPUs
- “Argos” effect



Backup Window

Based on testing of 24 test hosts
Cumulative Sizes: full= 150GB, incr= 5.5GB

Consecutive Backups...

- Total time for 24 hosts (full): 3h 54m
- Total time for 24 hosts (incr): 1h 00m
- * Example host runs in minutes;
 - * gigabit: dedicated @ 00:24, simultaneous @ 04:29
 - * megabit: dedicated @ 20:09, simultaneous @ 39:47

Simultaneous Backups...

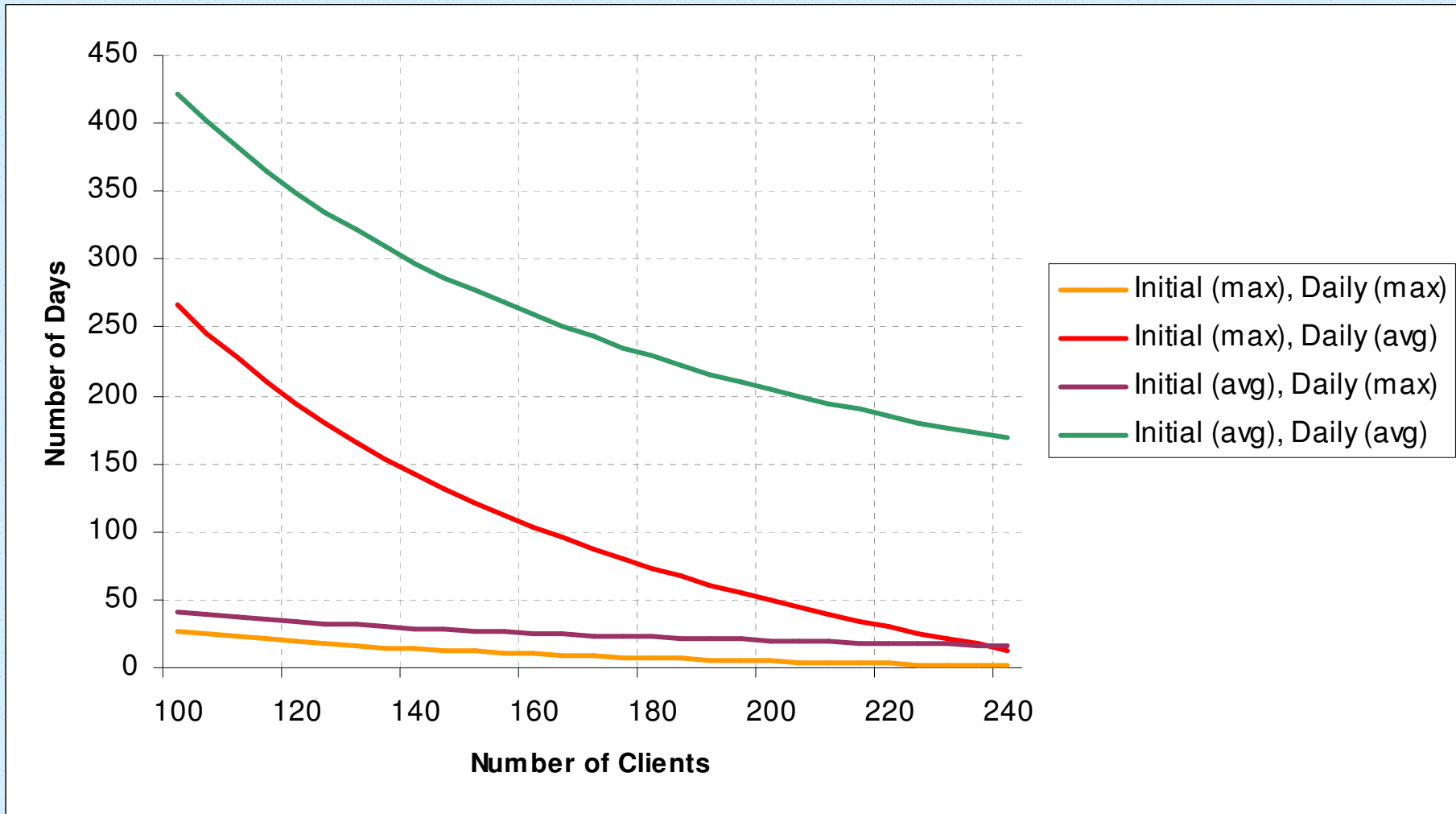
- Total time for 24 hosts (full): 1h 18m
- Total time for 24 hosts (full) – FARM @ 2Gpbs: 0h 22m 411 GB/hr
- Total time for 24 hosts (incr): 31m 11 GB/hr
- Total time for 24 hosts (incr) – FARM @ 2Gpbs: 28-40m 18-46 GB/hr
- * time taken to determine incremental difference

Predicted for 240 hosts..daily incremental

- Backup Server @ 1Gb/s: **5h** *(compared to ~ 12h!)*
- Backup Server @ 2Gb/s: **1-3h**



Storage Retention - two arrays



For 240 hosts: Max size: 1-13 days.

Average Size: 17-168 days.

Restore Requests: Average = 89 days, Median = 23 days, Mode = 14 days



Tape Backup

Software

- Zmanda
- Veritas NetBackup
- EMC Networker

Alternatives

- FARM to FARM
 - ZFS send and receive
 - Offsite full backups for the price of incremental
- Optical Storage



FARM Costing

- From ~ May 09, £60k list for
 - 1 x X4140 backup server
 - 1 x SL48 tape library with 2 drives and Silver Support
 - 2 x J4400 with 1TB disks and Bronze Support
 - Switch (to cope with more tape libraries)
- Multiple FARMS
 - one per network segment
 - one per business unit
- Open Solution
 - re-use existing kit
 - re-use existing software
 - *Your control!*



Links

Similar Solutions

- <http://wikis.sun.com/display/BigAdmin/How+to+use+ZFS+and+rsync+to+create+a+backup+solution+with+versioning>
- <http://milek.blogspot.com/2009/02/disruptive-backup-platform.html>
- <http://wikis.sun.com/display/OpenSolarisInfo/How+to+Manage+the+Automatic+ZFS+Snapshot+Service>
- <http://kenai.com/projects/zfs-backup-to-s3/pages/Home>

ZFS

- <http://opensolaris.org/os/community/zfs/>
- http://www.solarisinternals.com/wiki/index.php/ZFS_Best_Practices_Guide
- http://www.solarisinternals.com/wiki/index.php/ZFS_Evil_Tuning_Guide
- <http://uk.sun.com/sunnews/events/2008/sep/zfsdiscoveryday/>

Zmanda

- <http://www.zmanda.com/>

SSDs

- Overview: <http://www.sun.com/storage/flash/index.jsp>
- Analyzer: <http://www.sun.com/storage/flash/resources.jsp>
- <http://uk.sun.com/sunnews/events/2009/may/ssd/>