Lustre User Group 2009

Sun Lustre Storage System Cluster Best Practices

Joey Jablonski

Sun Microsystems, Professional Services

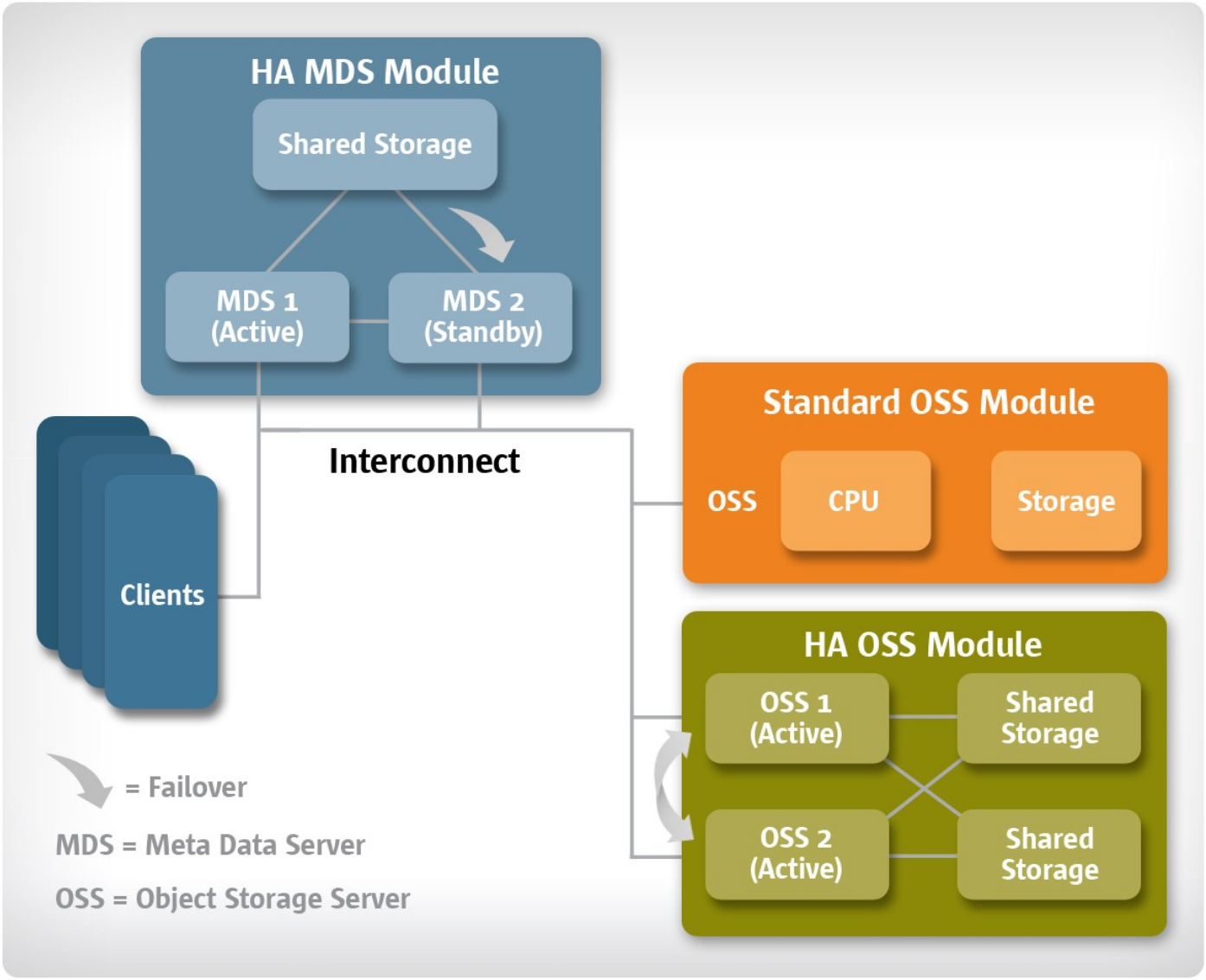
Agenda

- What defines the Sun Lustre Storage System?
- HA-MDS RAID Layout
- HA-OSS RAID Layout
- External Journals/Bitmaps
- Standup Processes
- Failover Testing Process

What defines the Sun Lustre Storage System?

- Known/Consistent HW Platform
- Known/Consistent RAID Layout
- Known performance characteristics
- Simplified deployment
- Streamlined Support

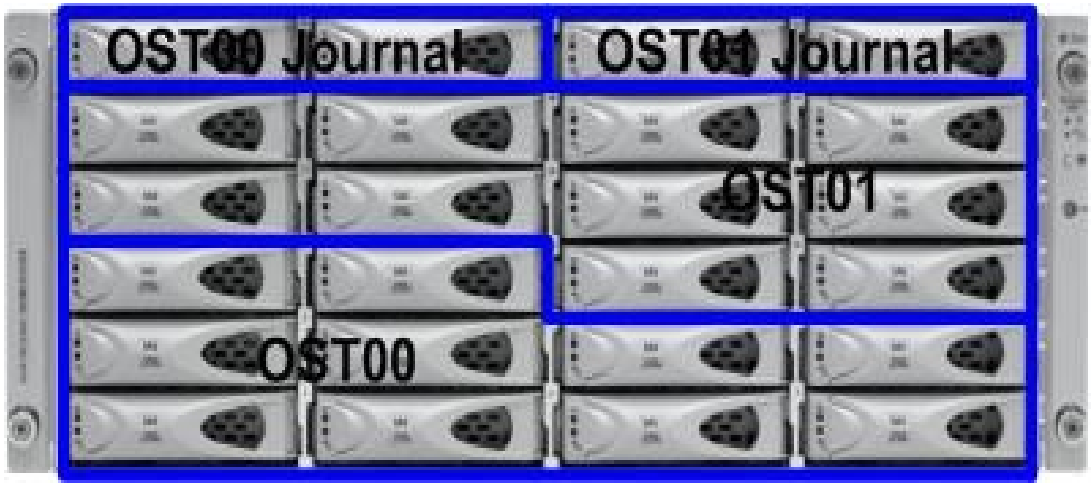
Key Modules & Architecture



HA-MDS RAID Layout

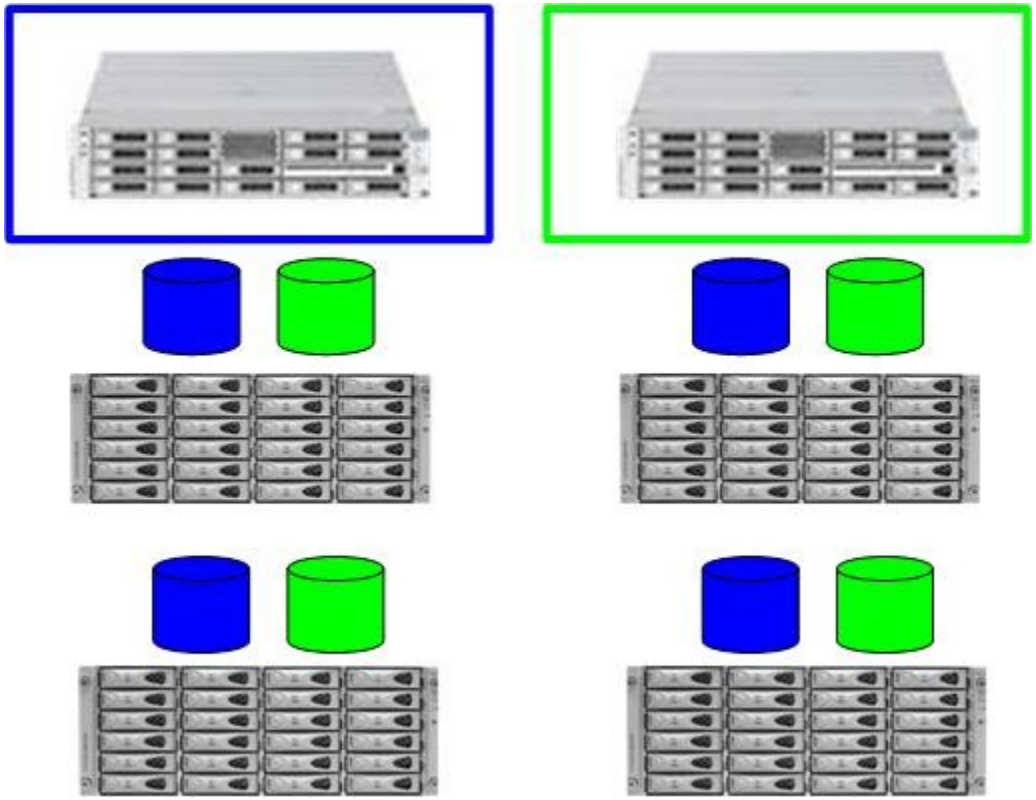
- Allows easy separation of MGS and MDT functionality
- Allows easy additions of MDTs and new filesystems
- Allows use of both systems within MGS failover-pair

HA-OSS RAID Layout



- 2 OSTs per J4400 (RAID6 8+2)
- 1 External Journal + 1 External Bitmap per OST
  - > Separate RAID 1 Devices

HA-OSS OST Association



Standup Process

- Stress testing all disks
  - `dd if=/dev/zero of=/dev/md10 bs=512k count 500k`
  - `dd of=/dev/null if=/dev/md10 bs=512k count 500k`
- Stress testing the SAS connections
  - Failed SAS cables show as continuous HD rebuilds
- Stress testing the nodes
- Rebuild Bandwidth
  - /proc/sys/dev/raid/speed_limit_min
  - /proc/sys/dev/raid/speed_limit_max

External Journals/Bitmaps

- Example Command Assumptions
  - 3 MD devices per OST
    - /dev/md10 – OST
    - /dev/md11 – External Journal
    - /dev/md12 – External Bitmap
- Bitmaps
  - Significantly decreases SW RAID recovery time
  - mdadm -C /dev/md10 –bitmap-/dev/md12/md10.bitmap /dev/dsk/c0t0d{0,1,2,3,4,5,6,7,8,9}
- Journals
  - mkfs.lustre --ost –mkfsoptions “-J /dev/md11” /dev/md10

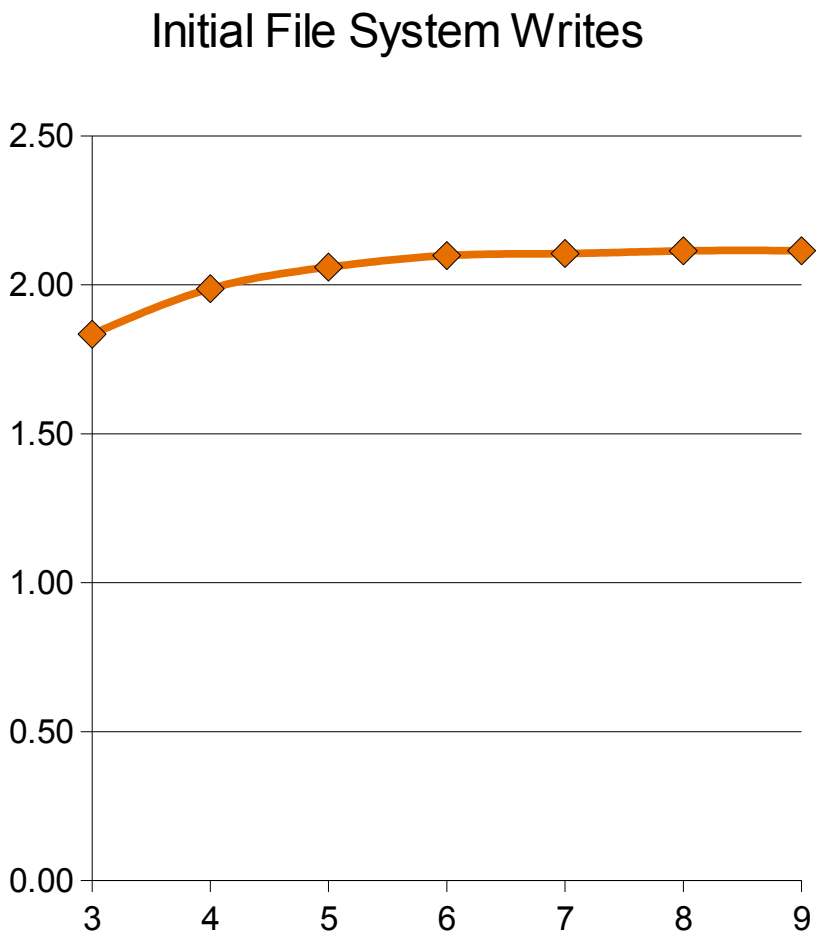
Failover Testing Process

- Completed for each HA-pair
- Functional Testing
  - `hb_takeover`
- “Real” Testing
  - `echo 1 > /proc/sys/kernel/sysrq`
  - `echo c > /proc/sysrq-trigger`

HA-OSS Module Performance

IOZone Benchmark Results

- Sustained write performance observed to be ~2.1 GB/sec
- 16GB file size used to defeat client side caching
- Peak performance was reached at 96 threads; plateau effect observed at ~72 threads
- Varying block sizes 256K, 512K, 1MB did not significantly alter results



Additional Resources

- Sun Lustre Storage System Blueprint
  - http://www.sun.com/offers/details/820-7664.html
- External Product Page
  - http://www.sun.com/servers/hpc/storagecluster/

THANK YOU

joeyj@sun.com
+1 505.407.8001