SAN Target Mode Boot Server

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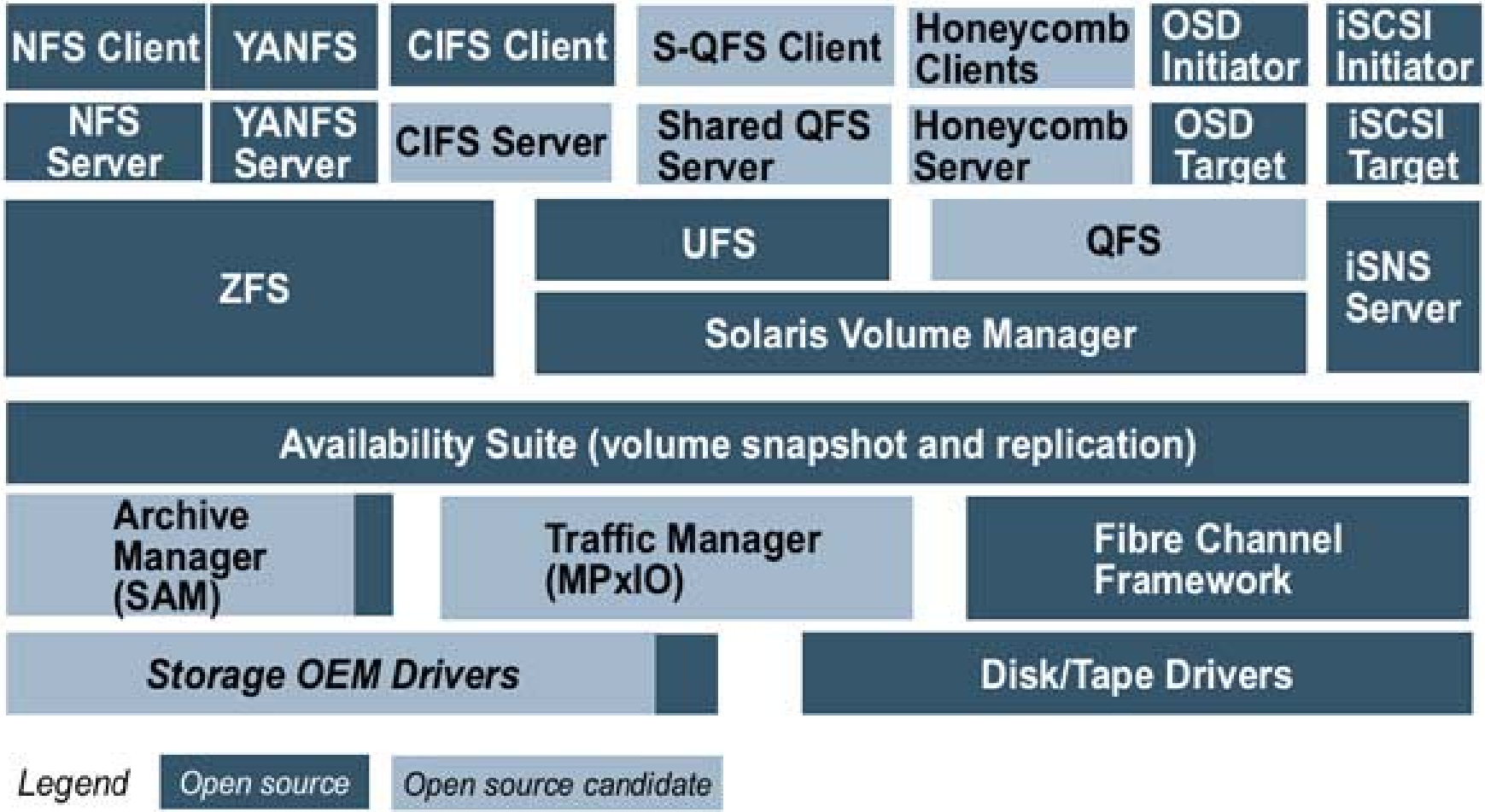
OpenSolaris Storage Operating System



SAN Target Mode Boot Server

- OpenSolaris - SPARC or x64/x86 Platform
- FC HBA
  - OpenSolaris can be an initiator to FC SAN attached storage, and a target to FC SAN attached clients
- Network HBA
  - OpenSolaris can be an initiator to IP SAN attached storage, and a target to IP SAN attached clients
- SCSI / SATA HBA
  - OpenSolaris can be an initator to DAS (direct attached storage) being SCSI and/or SATA

SAN Target Mode Boot Server

- iSCSI Target mode support
  - Provided by a Solaris process-based daemon
  - Was developed as an OpenSolaris project
    - http://www.opensolaris.org/os/project/iscsitgt
  - iSCSI targets use the following backingstore
    - raw SCSI disks – USCSI command interface
    - raw block devices (/dev/rdsk/...) slices, zvols
    - cached block devices (/dev/dsk/...) slices, svm
    - files in any Solaris supported filesystem
  - ZFS ease of use extended to zvols and iSCSI targets by the option: shareiscsi=on

SAN Target Mode Boot Server

- FC Target mode support
  - Provided by a framework called COMSTAR
  - Under development as an OpenSolaris project
    - http://www.opensolaris.org/os/project/comstar
  - FC targets use the following backingstore
    - raw block devices (/dev/rdsk/...) slices, zvols
    - cached block devices (/dev/dsk/...) slices, svm
    - files in any Solaris supported filesystem
      - ZFS, UFS, TMPFS, even NFS
  - Re-development of iSCSI target in near-term

SAN Target Mode Boot Server

- SAN Targets or LUNs are provisioned out of the target server's own storage
- Target servers storage can be any OpenSolaris storage: DAS, FC SAN or IP SAN
- Target server can be both an initiator and target at the same time
- Target storage and inititor storage need not be the same
  - Key if server is performing LUN provisioning and control, all from a single server

SAN Target Mode Boot Server

- As an SAN target mode boot server we can now create individual LUNs covering all forms of Solaris block-based storage, and serve these LUNS out to either FC SAN or IP SAN initiators
- Although quite functional as it stands, the SAN target mode boot server has within it other OpenSolaris data services, services which can add valuue to each of these LUNs

SAN Target Mode Boot Server

- Solaris file based backingstore
  - ufs, zfs, qfs, nfs, tmpfs, yanfs
- Solaris block based backingstore
  - raw SCSI disk
  - VTOC or EFI labeled disks
  - Solaris Volume Manager
  - ZFS ZVOLs
  - Loopback file drive (lofi)

SAN Target Mode Boot Server

- Solaris Volume Manager
  - Supports RAID 0, 1, 10, 5
    - Volume can be SAN targets
  - Volume mirroring allows
    - Mirrors can be broken
    - Volume can exported from tripple mirror
    - Mirrors can be SAN targets

SAN Target Mode Boot Server

- ZFS
  - Supports snapshots, plus cloning of snapshots
    - Work with either ZFS files or zvols
    - SAN targets can be snaped, then accessed as read-only targets
    - SAN targets can be cloned, then accessed as read-write targets
  - Supports send / recv for filesystem replication
    - Replication is time-fixed, based on snapshot
    - Replicated ZFS files and zvols can be SAN targets

SAN Target Mode Boot Server

- AVS - (Availability Suite)
  - Supports snapshots, no need for clones
    - Works with any Solaris block storage
    - SAN targets can be snapped, then accessed as read-write targets
    - Supports independent, dependent and compact dependent snapshots
  - Supports block-based replication
    - Replication is either time fixed, synchronous or asynchronous
    - Replicated block storage can be SAN targets

SAN Target Mode Boot Server

- AVS
  - Additional snapshots capability
    - Multiple shadows of a single master
      - Allows single master volume to source read-only data to multiple shadow volumes, which are read / write
      - Shadow volume can be compact dependent, often a small percentage of per initiator writes
  - Additional replication capability
    - Synchronous replication establishes a zero MTTF
      - MMTF = Mean Time To Failure
    - On-demand reverse sync establishes a zero MTTR
      - MTTT – Mean Time to Recover

SAN Target Mode Boot Server

OpenSolaris – Storage Operating System

SAN Target Mode Boot Server

Questions?