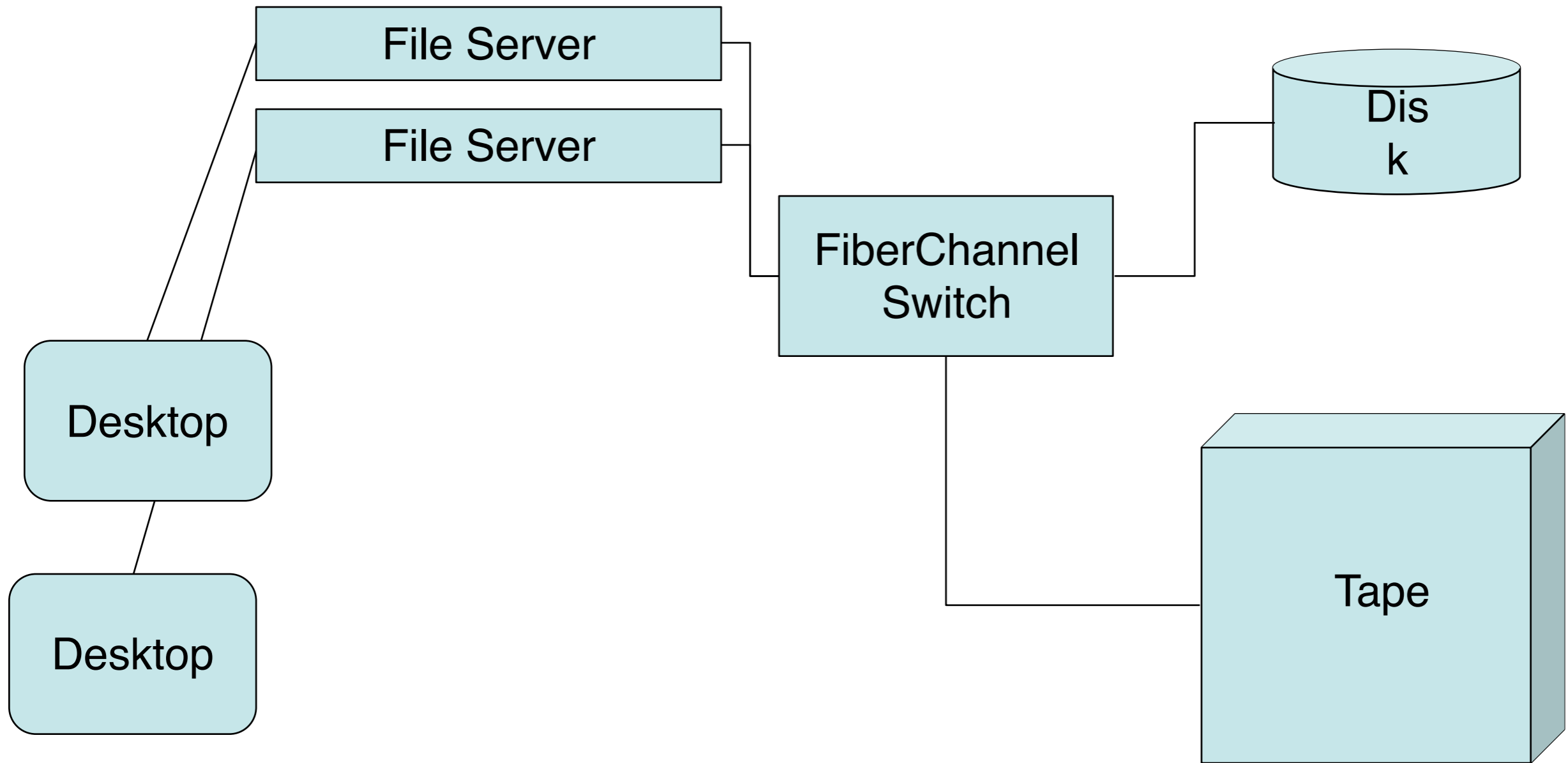


# **Apple SAN at SCI**

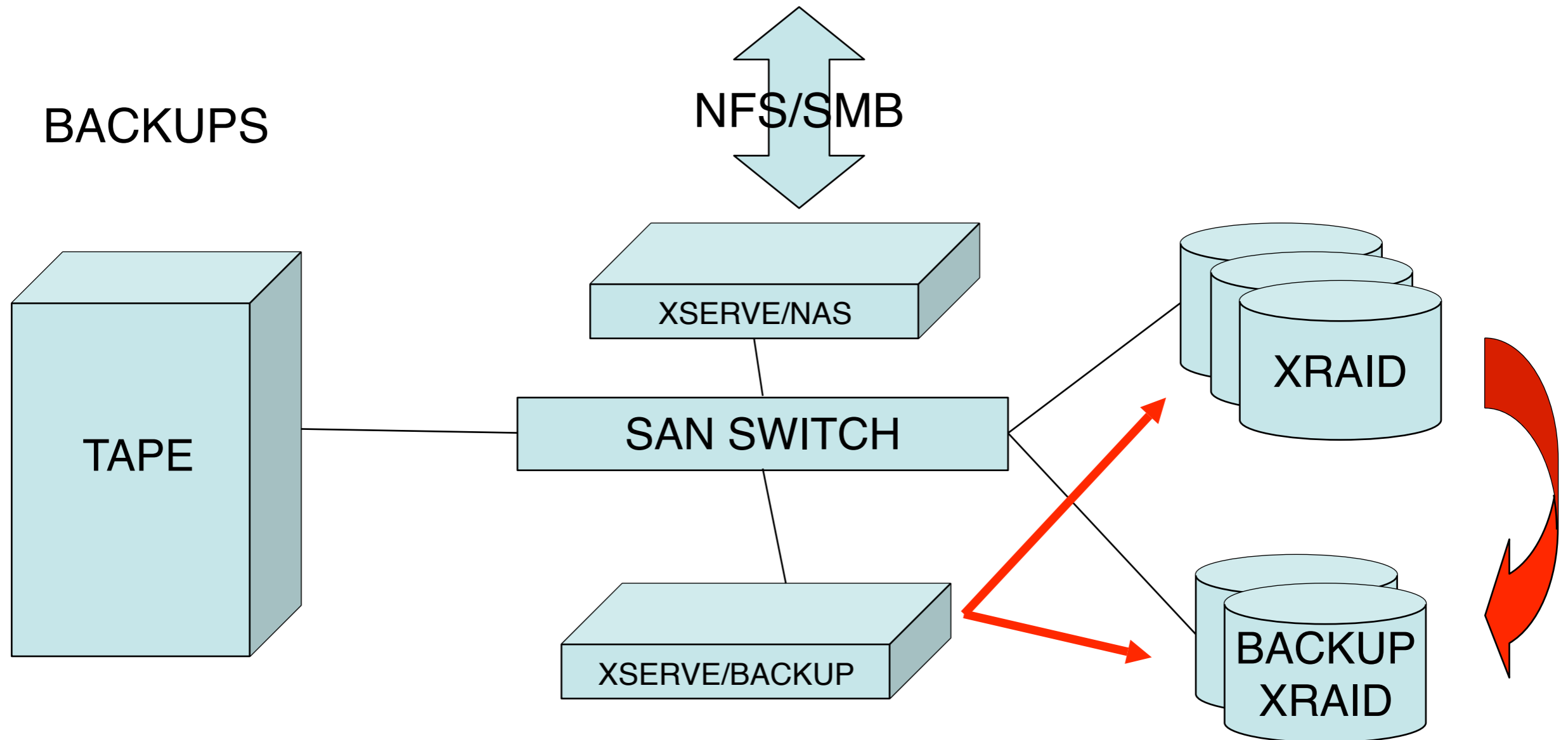
# SAN Architecture



# Apple SAN

- Low incremental cost
  - File server and
  - Disk
- Scalable storage
- COTS = larger user base/common hardware
- Cheap near-line storage
- First iteration with BETA went badly
- Support contracts not as good as SGI/Dell
- Performance limitations compared to more expensive solutions

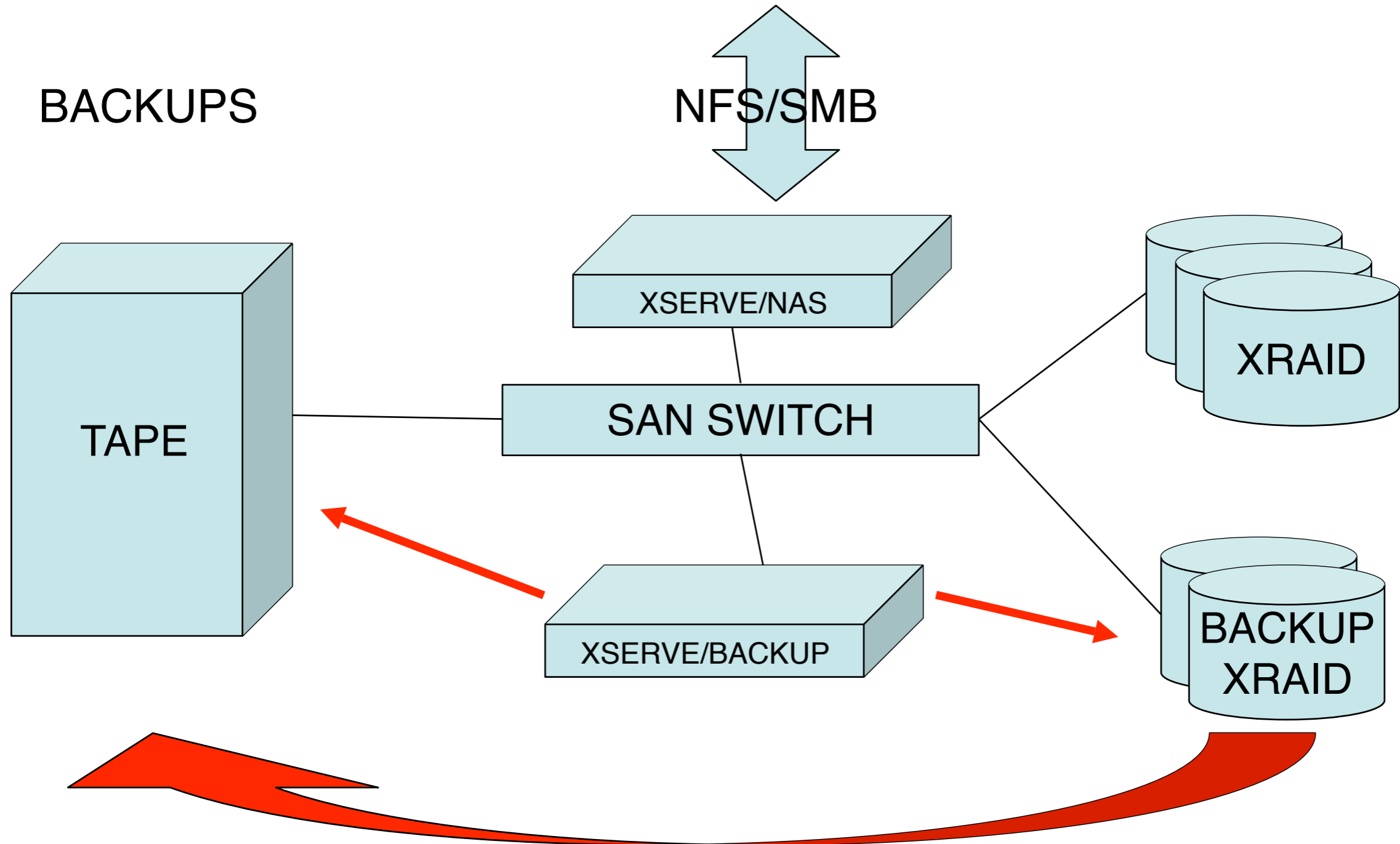
# How to deal with bottlenecks



Incrementals to secondary ATA storage via Fiber Channel Copy

# How to deal with bottlenecks

BACKUPS



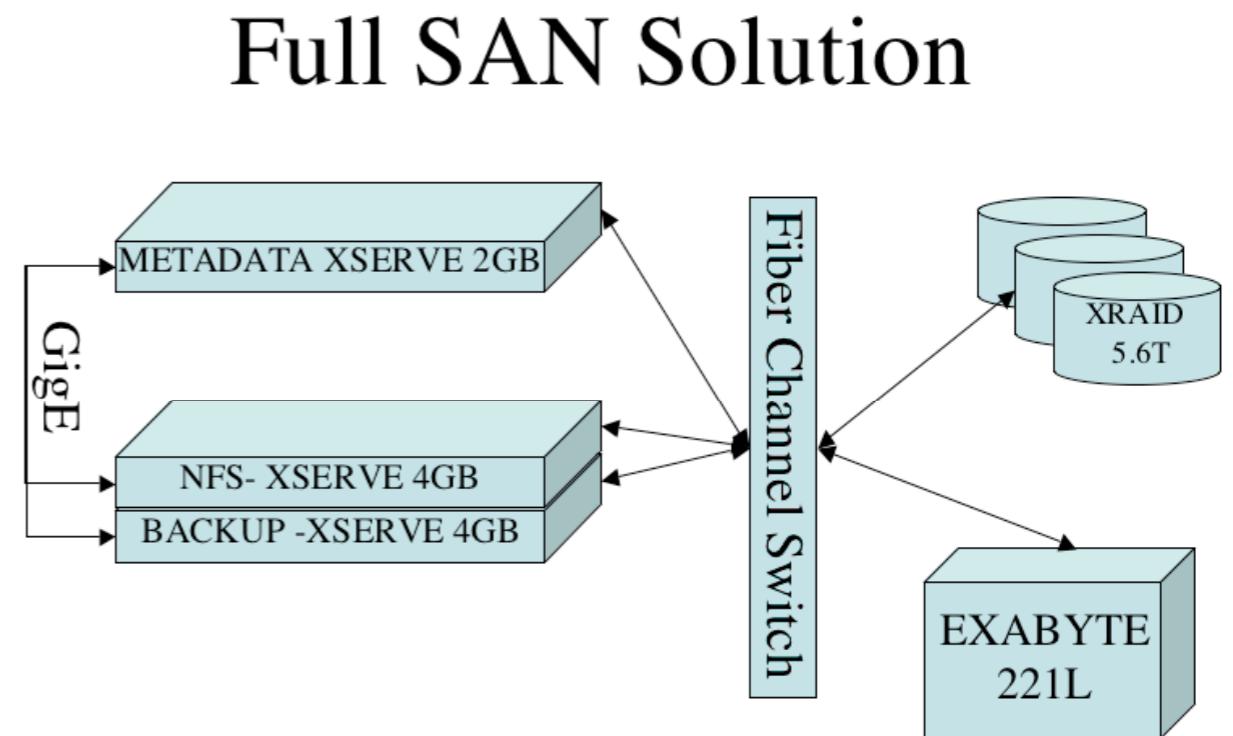
Full backups from series of incrementals on ATA storage

# Our Options

- Full SAN Solution
- Incremental Step

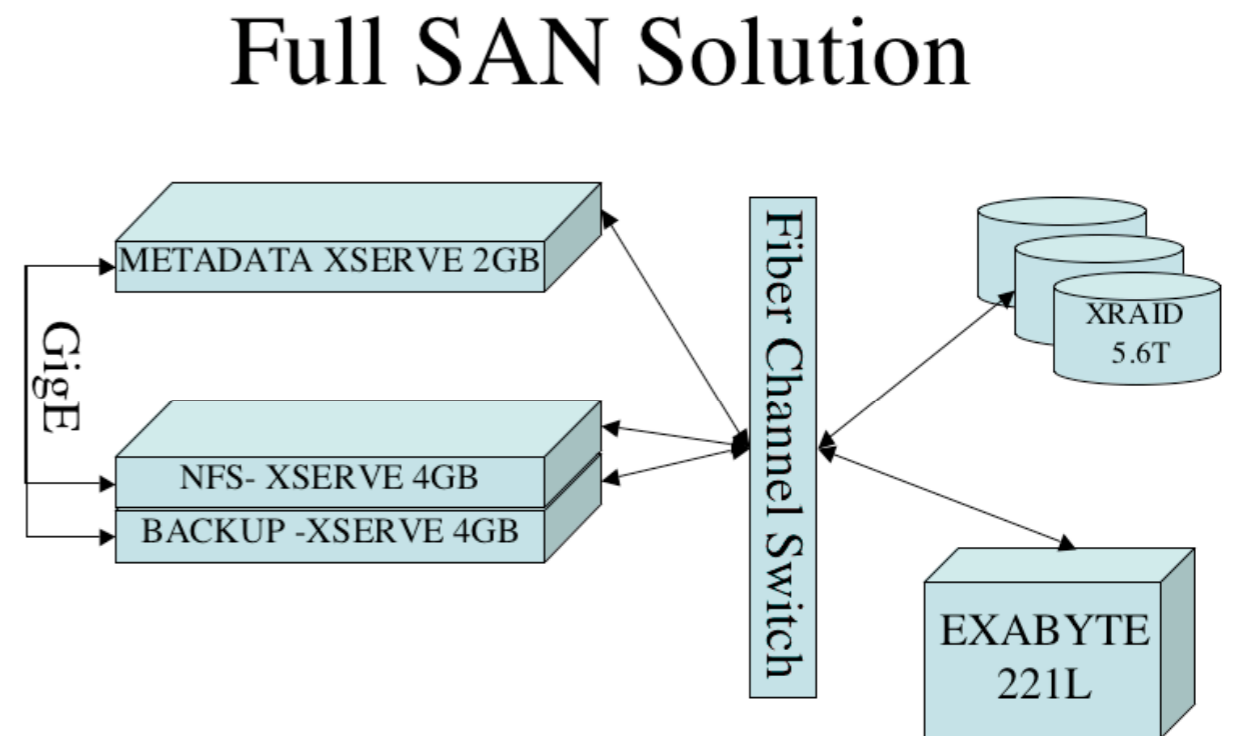
# Full SAN Solution

- Pros:
  - Able to add five (5) more devices (disk servers) on demand
  - XSAN in place, and ready to grow
  - no downtime to expand services
  - separation of services
  - higher performance



# Full SAN Solution (cont.)

- Cons:
  - higher initial cost
  - XSAN could delay project
  - higher complexity
  - Unknown upgrade path to Tiger
  - NFS performance less than Tiger

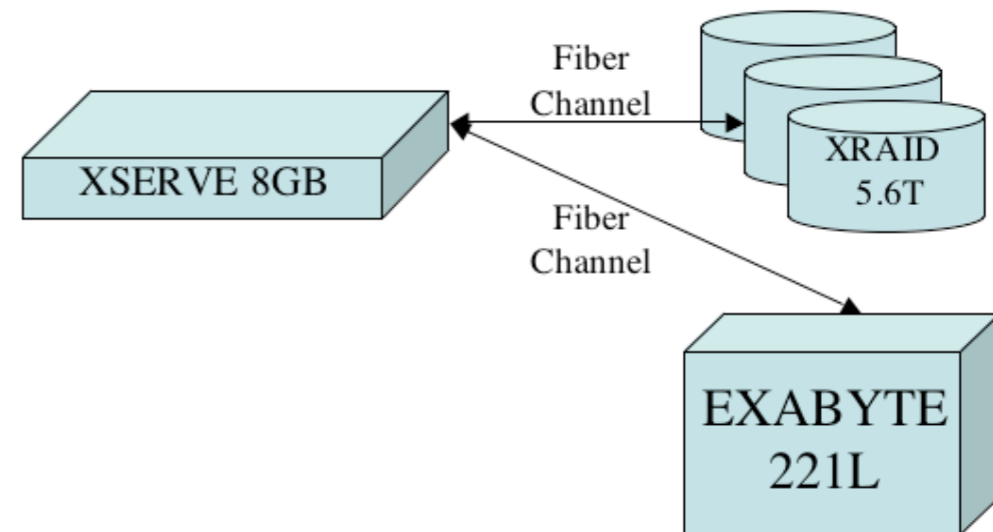




# Incremental Step

- Pros:
  - simple architecture
  - rapid deployment
  - All hardware reusable in a full SAN solution

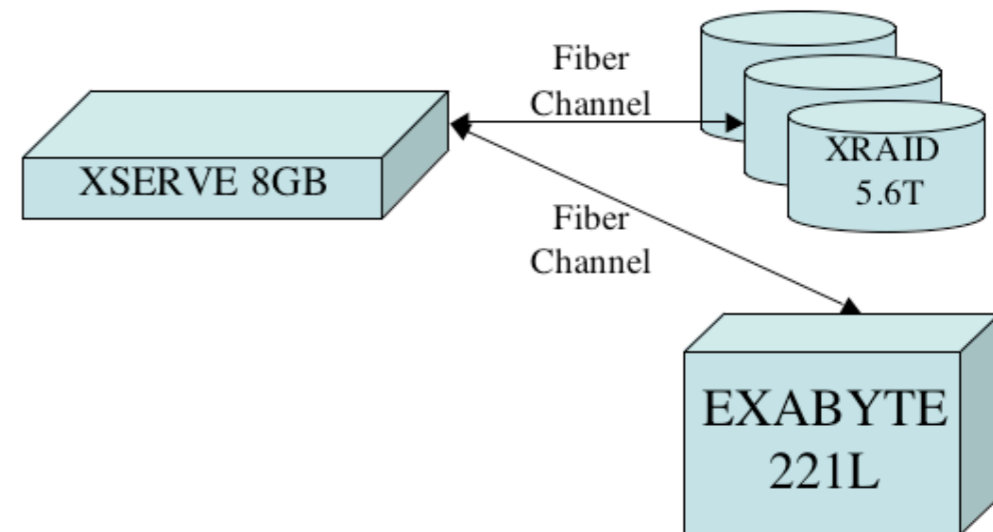
## Incremental Solution



# Incremental Step (cont.)

- Cons:
  - Unknown performance impact of full backups
  - Unknown upper limit on total simultaneous users
  - No upgrade path because not a true SAN
  - Migration hit when we go fully SAN
    - 1 day of downtime during SAN copy
    - \$13,000+ incremental cost to go SAN

## Incremental Solution

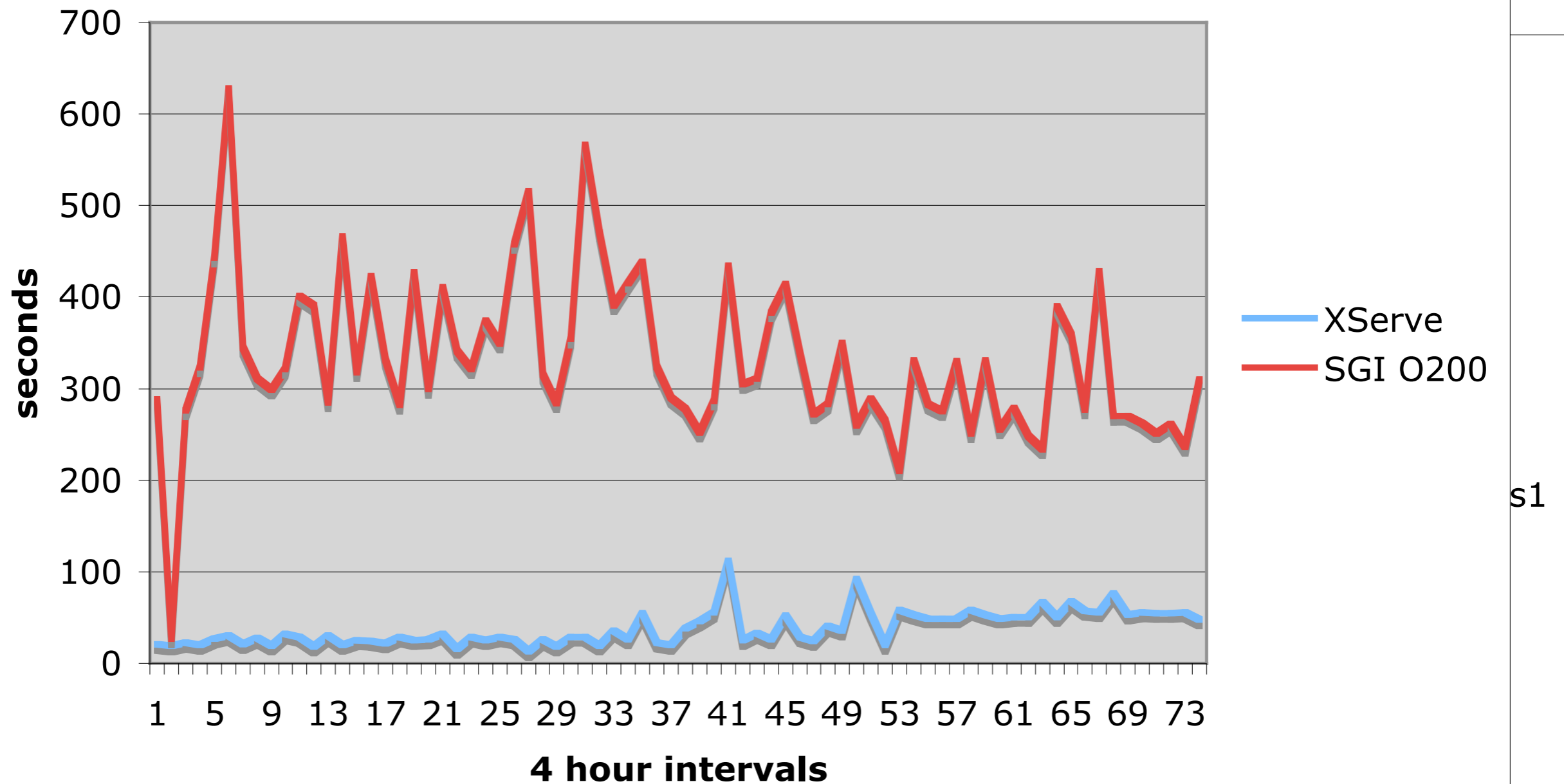


**What happened?**

**Well, we deferred...**

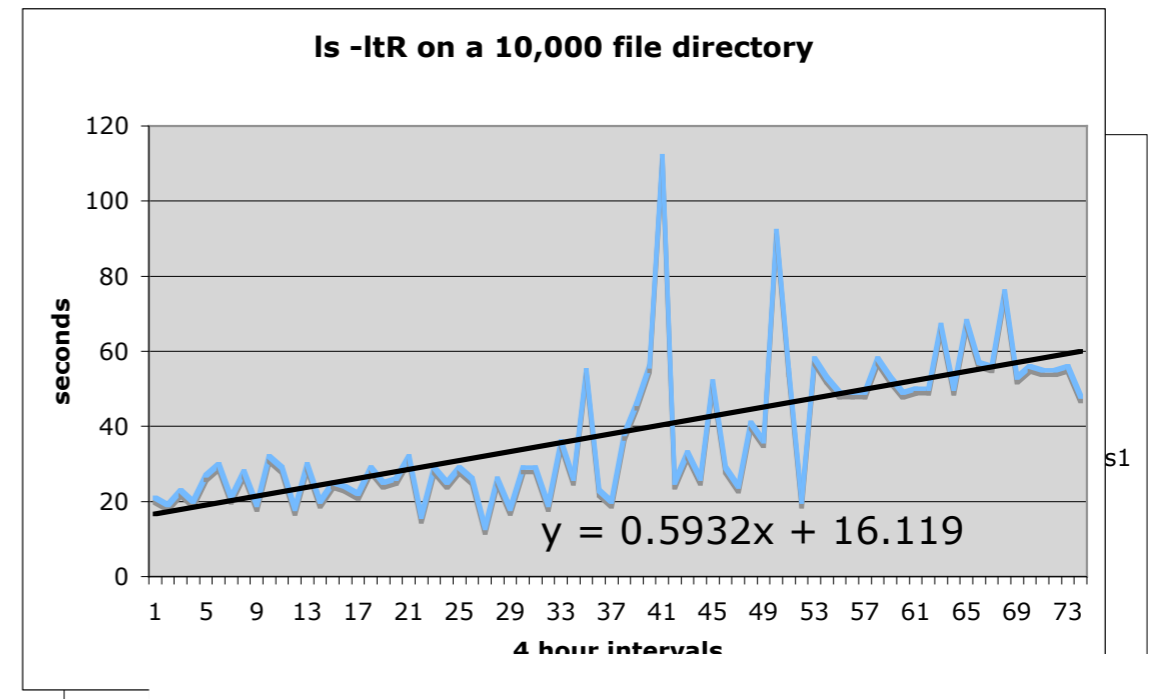
# How's the performance?

time for ls -ltR to run on 10,000 files



# How's the performance? (cont.)

- Charaterization
  - 73 Users
  - ls -lTR on 10000 files
  - 0.6 seconds/  
additional user



# Future Work

- Gather data for other tests
  - Linux compile
  - SCIRun compile
  - VTK compile
  - RTRT demo load

# Questions for Apple

- When will XSAN be released for Tiger?
- When will you support 4GB fiber channel for XRAID?
- How does XSAN deal with the fact that controllers are not redundant?
- Apple said 128 NFS connections too many, what are they basing that on?