Enterprise Storage Technology Trends

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Key Technology Driving Forces

1. NAND forcing big storage changes
2. Software Defined storage (SDS) – driving an object protocol
3. Moore's law dying – putting a new premium on gates
4. Low cost optical networking (LCON) – a new system architecture?
5. ARM making inroads into data center – putting computing everywhere
6. Storage Class Memories emerging – yea, but when?

Rack Scale Architecture - Evolution

Today

Physical Aggregation

- Shared Power
- Shared Cooling
- Rack Management

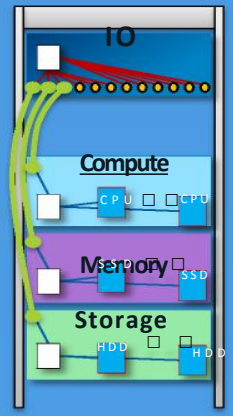
> 2014

Modular Compute Interconnect Integration

- Modular refresh
- Transitioning to Photonic Interconnects
- Local switch silicon

Future

Subsystem Aggregation

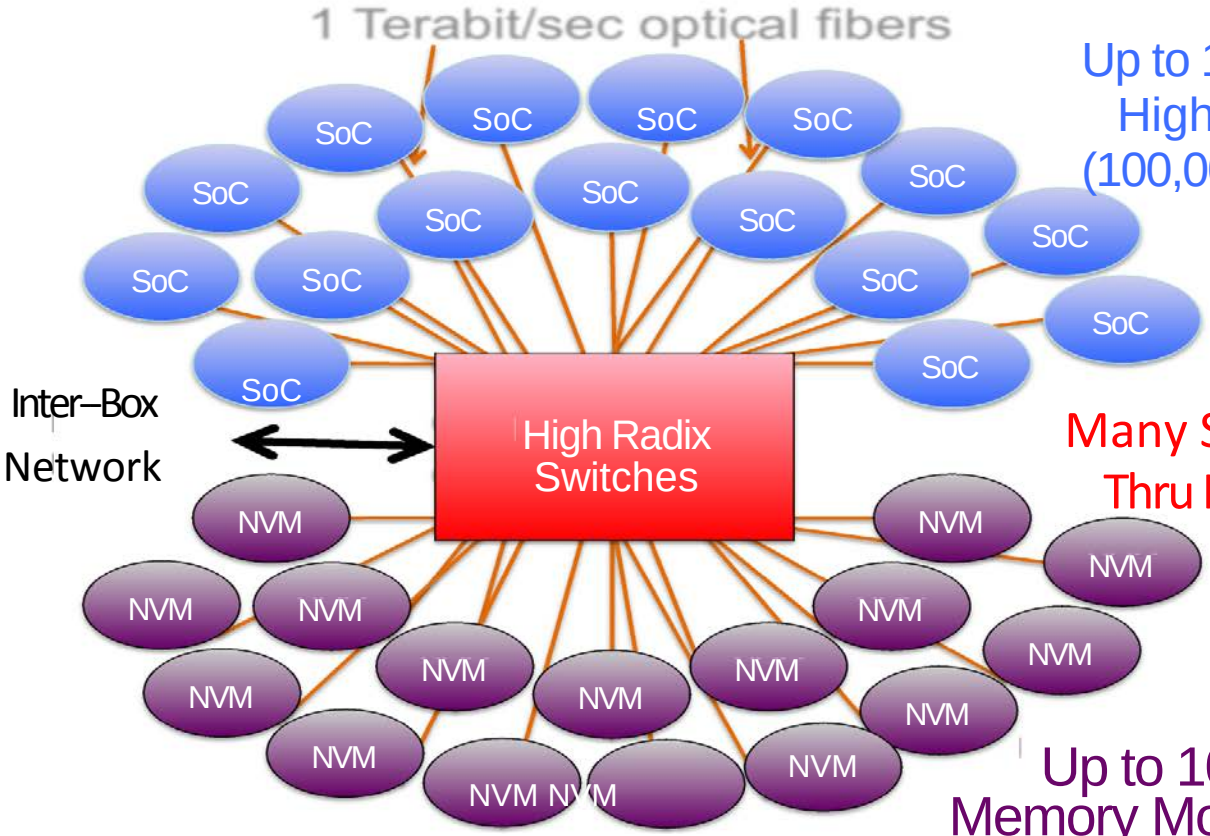


- Pooled compute
- Pooled storage
- Pooled memory
- Shared boot

Increase Capital Efficiency
Decrease cost/transaction

Increase Agility
Decrease TCO

FireBox Overview



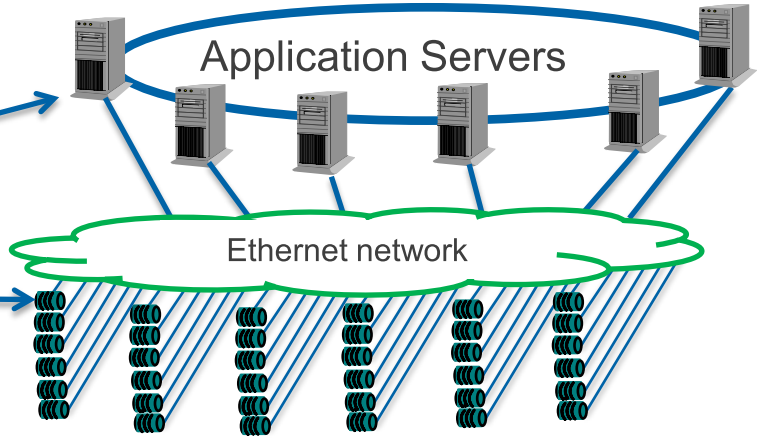
Up to 1000 SoCs +
High-BW Mem
(100,000 core total)

Many Short Paths
Thru High–Radix Switches

Up to 1000 NonVolatile
Memory Modules (100PB total)

NAND + Objects + ASIC Functionality +LCON+ ARM => Active Disks

- **Offload host processing to the disk = massive parallelism:**
  - Parallelize analysis of data
  - Reduce host data transfers
  - Reduce host processing time
- **An application is partitioned:**
  - a host-resident component
  - a disk-resident component
    - Copy goes to all HDDs
    - All HDDs can run app in parallel



Summary

- Technology changes are having a big effect on Enterprise storage
- They also offer opportunities for new value in HDDs & SSDs
- We cannot pretend they are not happening