Seagate Kinetic Open Storage Platform

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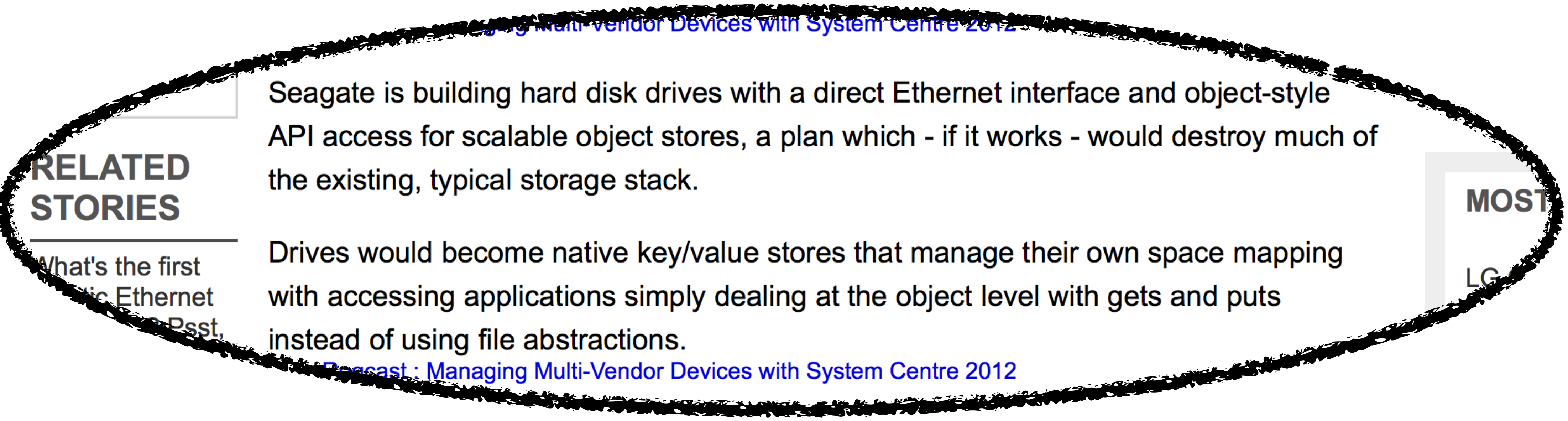

...ging Multi-Vendor Devices with System Centre 2012

Seagate is building hard disk drives with a direct Ethernet interface and object-style API access for scalable object stores, a plan which - if it works - would destroy much of the existing, typical storage stack.

Drives would become native key/value stores that manage their own space mapping with accessing applications simply dealing at the object level with gets and puts instead of using file abstractions.

Podcast : Managing Multi-Vendor Devices with System Centre 2012

RELATED STORIES

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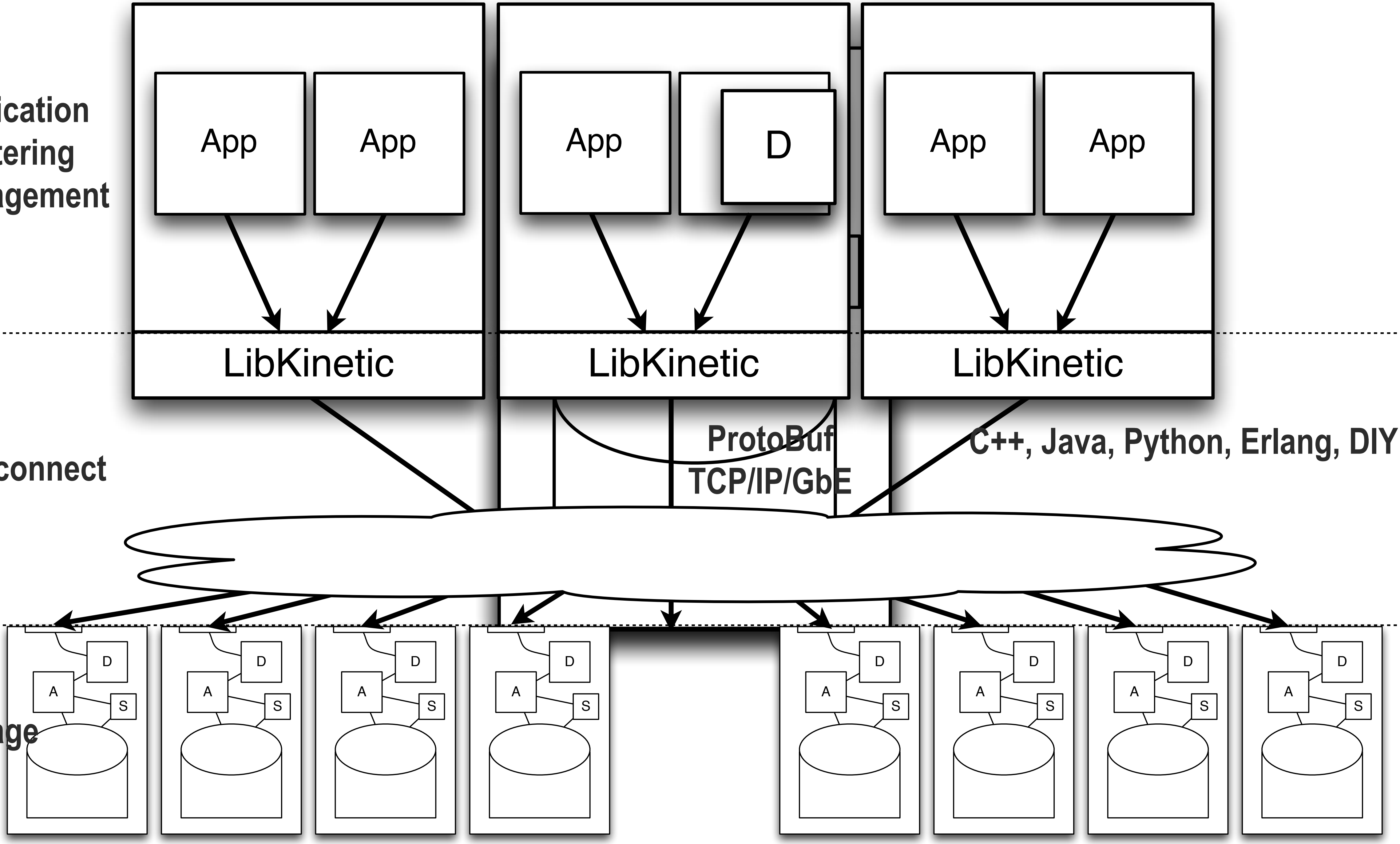
- Application
- Clustering
- Management

- Interconnect

- Storage



Proprietary to System Vendor

GPL Standard

Proprietary to Seagate

SAS versus Kinetic Open Storage

- Standard form factor
- 2 SAS ports
- SCSI command set
  - data = read (LBA, count)
  - write (LBA, count, data)
  - LBA :: [0, max]
  - data :: count * 512 bytes
  - CRC on cmd and PI on block

- Standard form factor
- 2 Ethernet ports (same connector)
- Kinetic key/value API
  - value = get (key)
  - put (key, value)
  - delete (key)
  - key :: 1 byte to 4 KiB
  - value :: 0 bytes to 1 MiB
  - HMAC on cmd and SHA on value

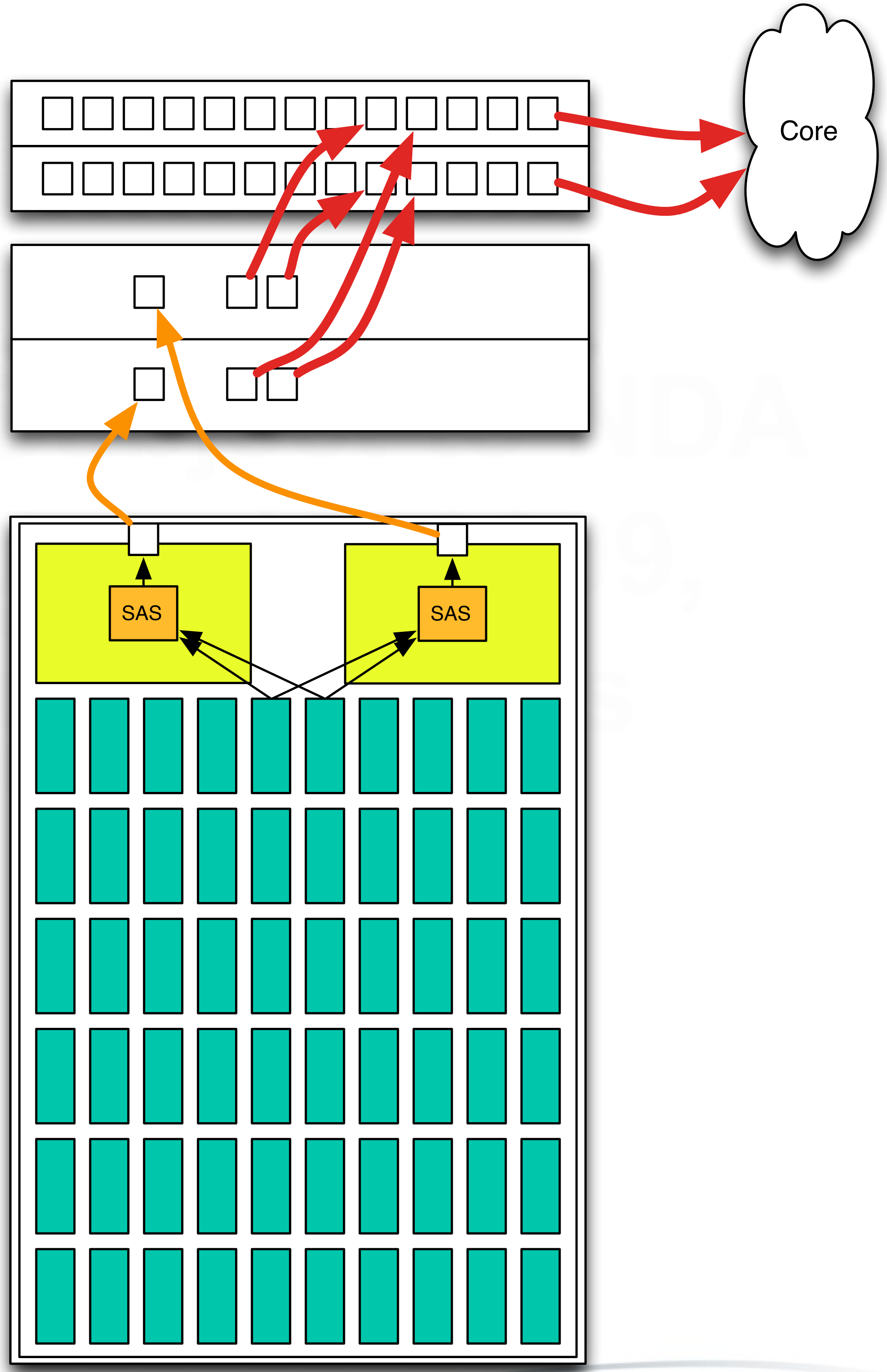
Typical HA High Density

Intel server

- Double Socket
- 48GB Ram
- 1000w

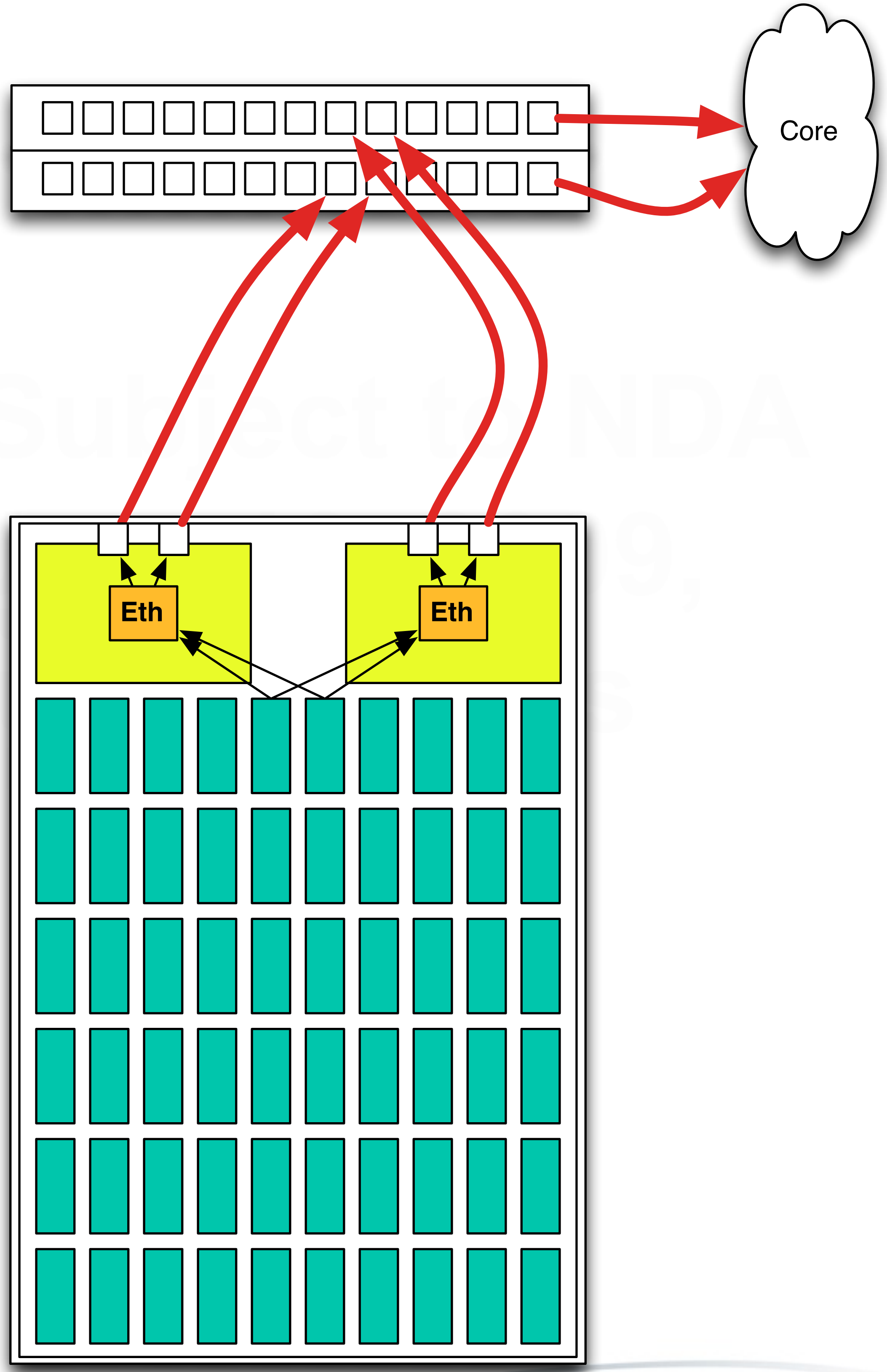
SAS tray

- Connected to the server



Low cost HA Configuration

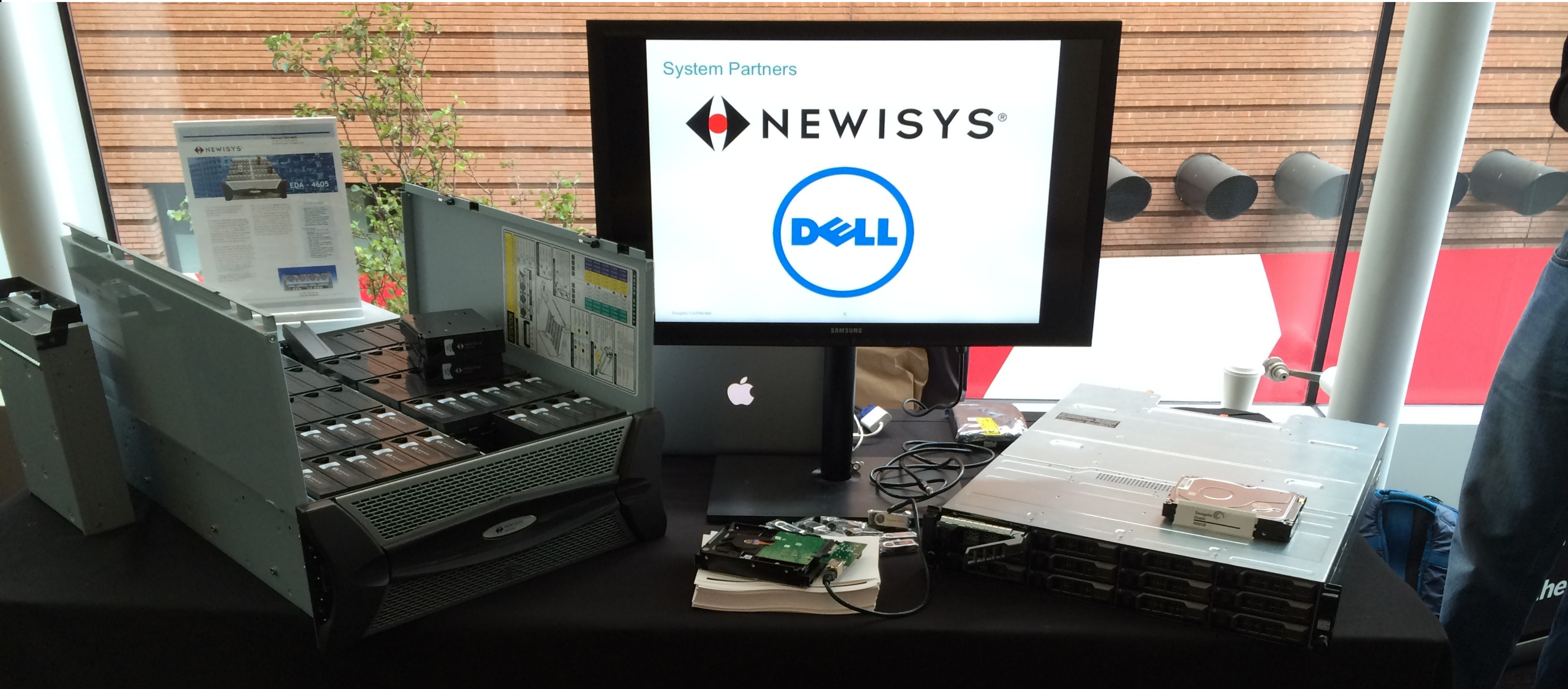
- Each drive talks to both switches
- Each switch has 2 by 10Gb/s Ethernet
- Kinetic Tray talks directly to ToR
- No servers



System Hardware

Typical JBOD architecture

- Does not require a server, just JBODs to the ToR Switch
- 10 JBODS × 60 drives × 4TB = 2.4PB/Rack



Kinetic *Drive*

Provides RPC to Key/Value database

- Data is pre-indexed

P2P (Drive to Drive) copy of key ranges

Communicate using existing Data Center Plumbing (TCP/IP)

Multiple masters - Data sharing between machines

Configurable caching per command

- Async, Sync, Flush

Local space management

Kinetic *Systems*

Clustering (performance, reliability, management)

Compatibility with large scale applications (S3, etc.)

Centralized Management

- Reliability, availability, durability

Goals of API

Data movement

- Get/put/delete/getnext/getprevious
- Versioned (== for success), options

Range operations

Multiple masters

- Authentication/Integrity/Authorization

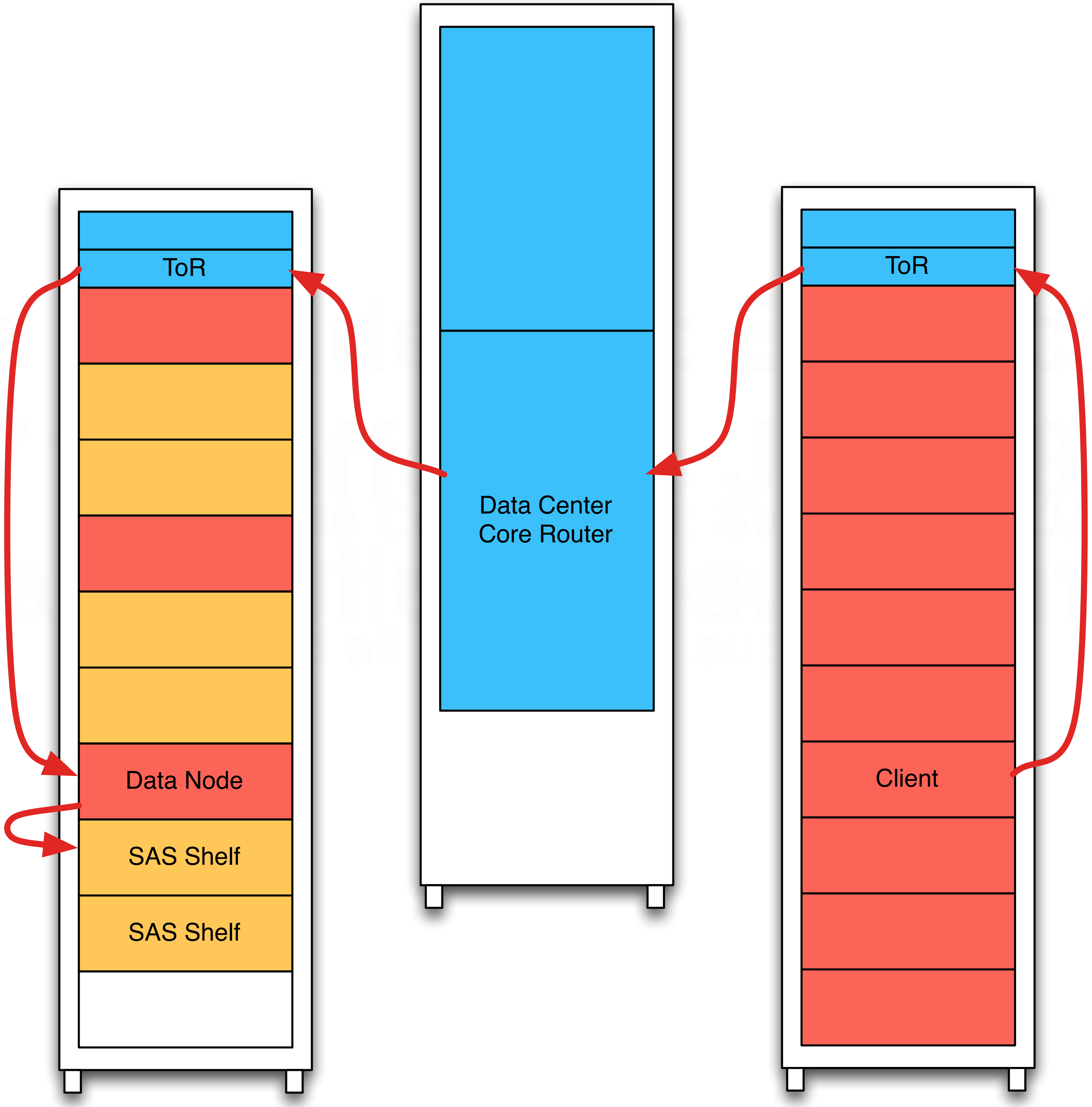
Cluster-able

- Simple cluster configuration version enforcement

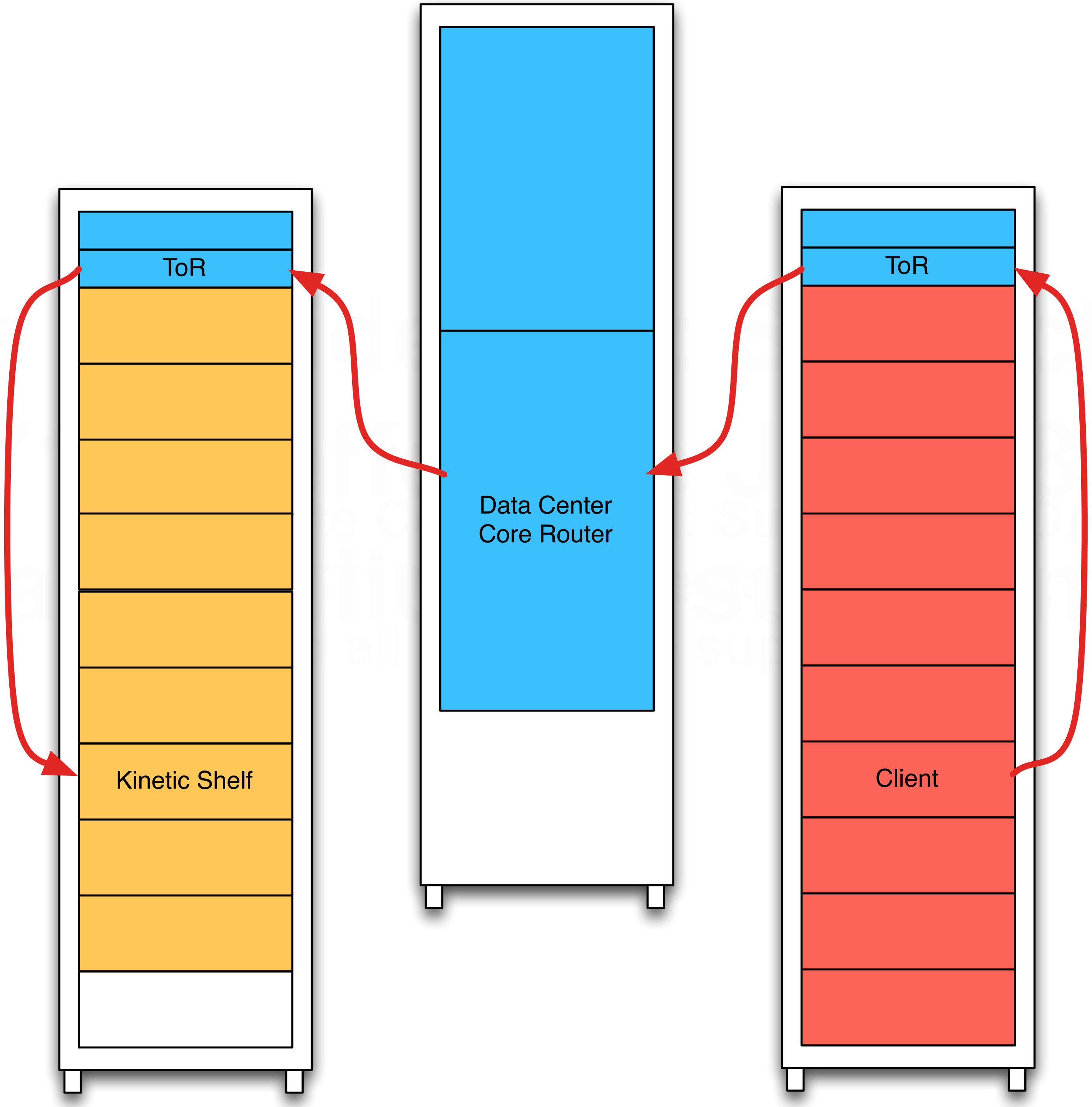
3rd party copy

Management

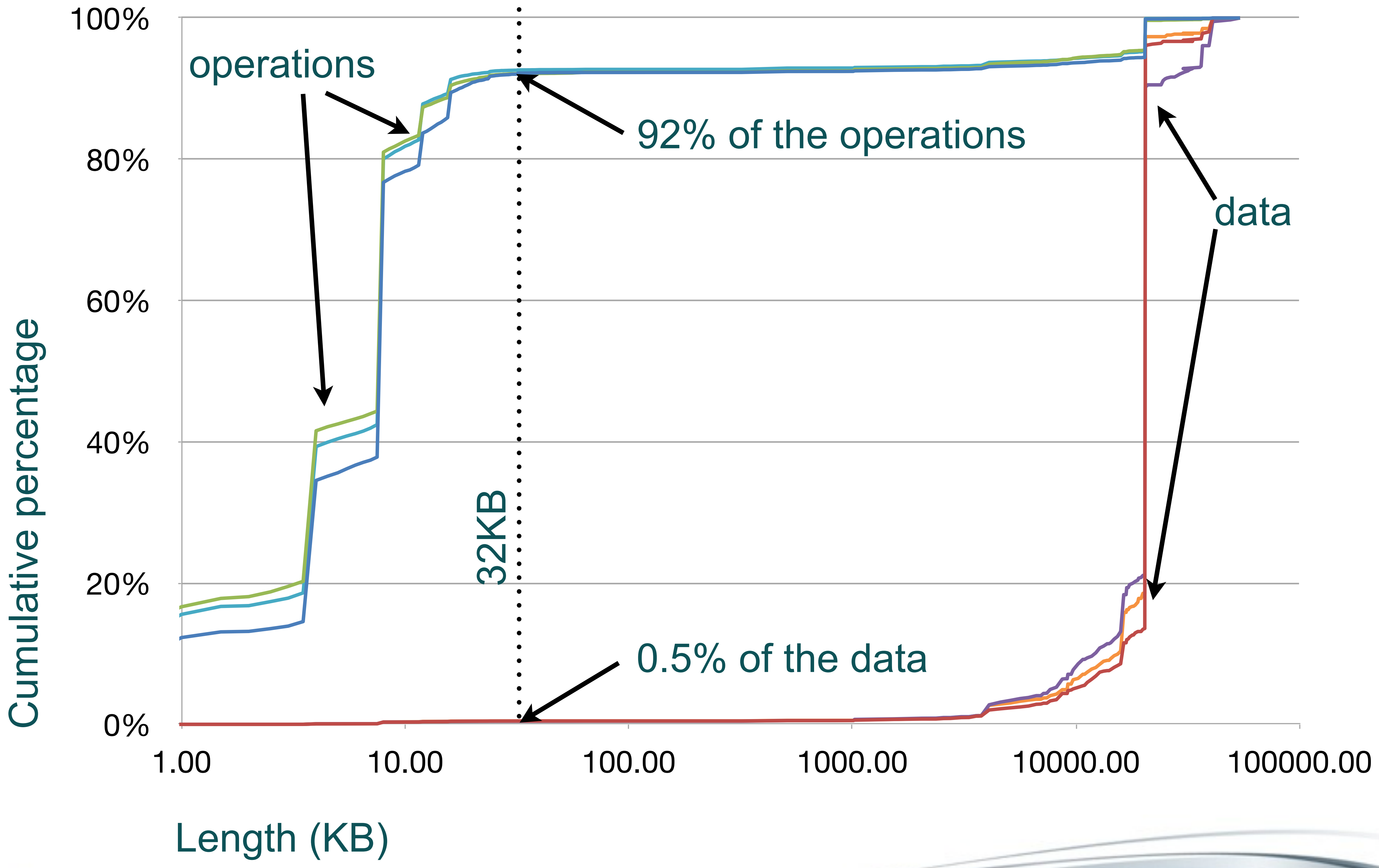
Existing Traffic Flow



Kinetic Traffic Flow



Cumulative operations ordered by length



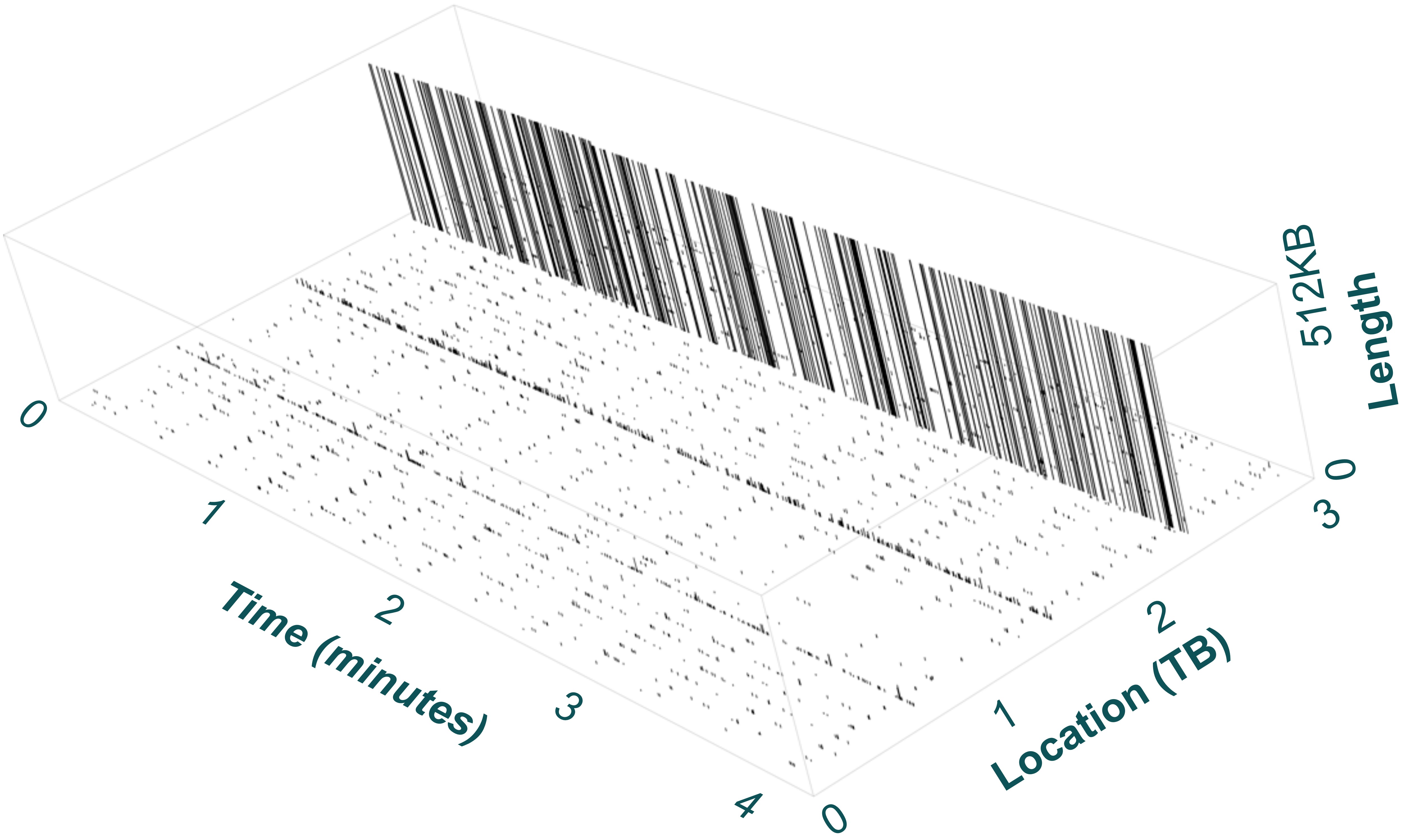
operations

92% of the operations

data

0.5% of the data

Map of Operations

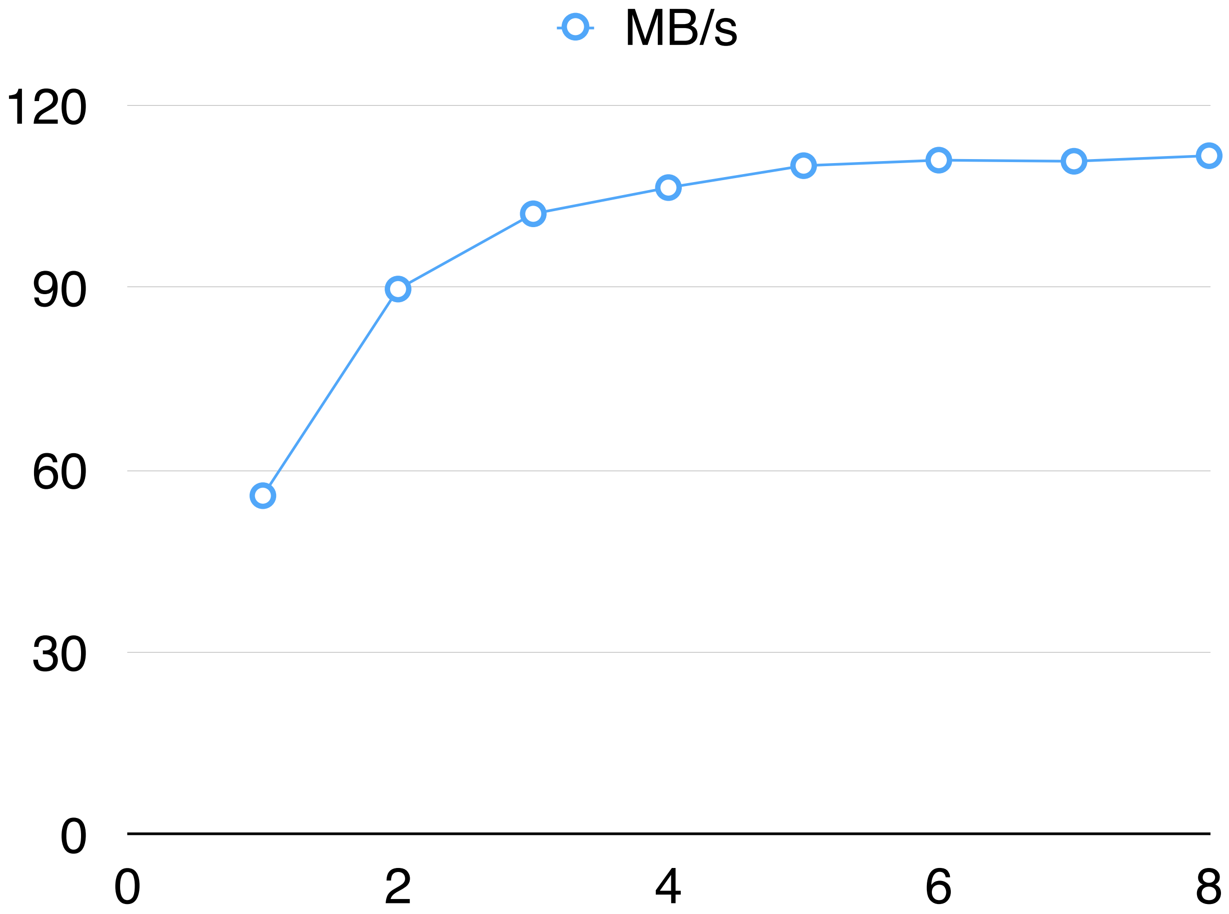


Performance Metrics

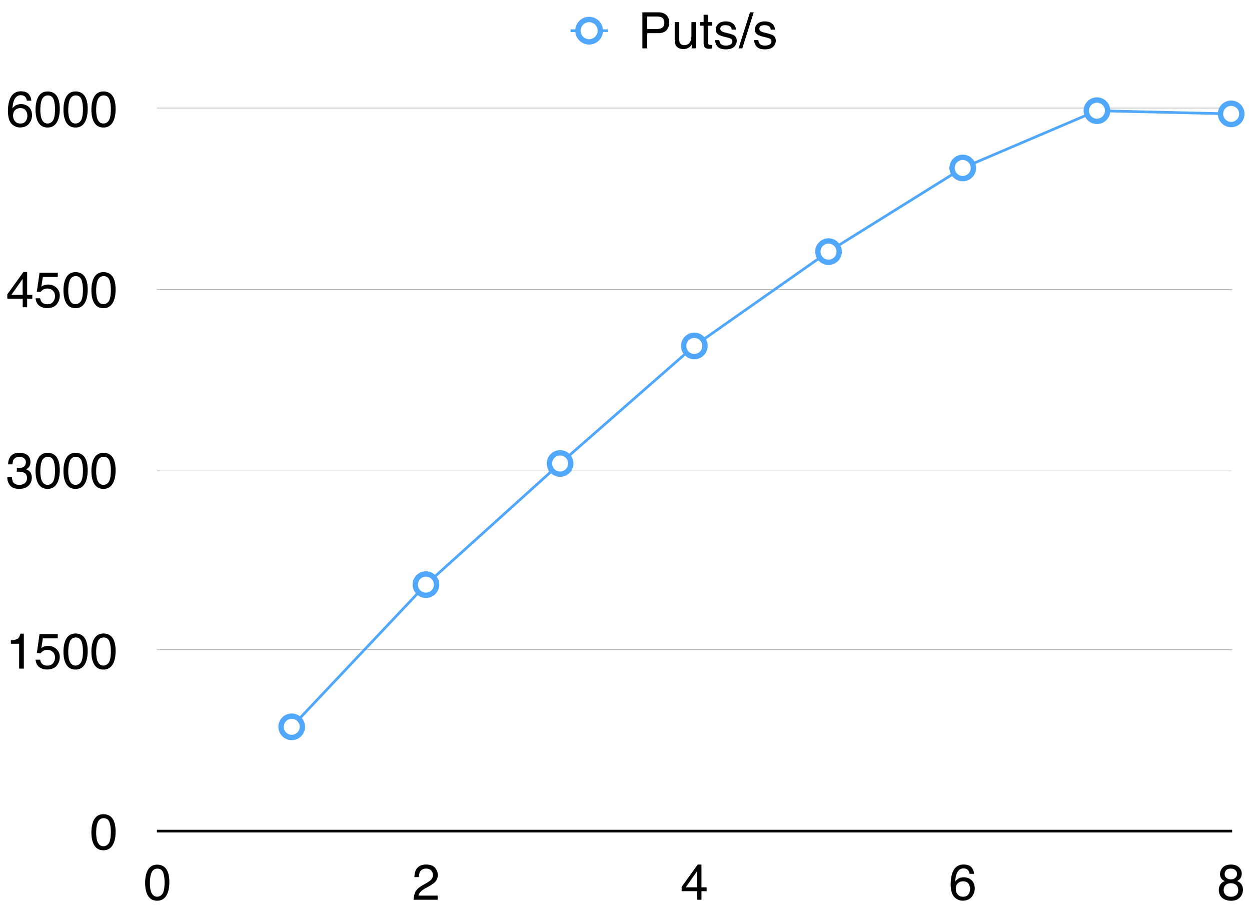
Same normal performance expectations

- Sequential Write: 50MB/s
- Random Write: 50MB/s
- Sequential Read: 50MB/s
- Random Read: 1.2x slower than traditional drives

Write Performance Results

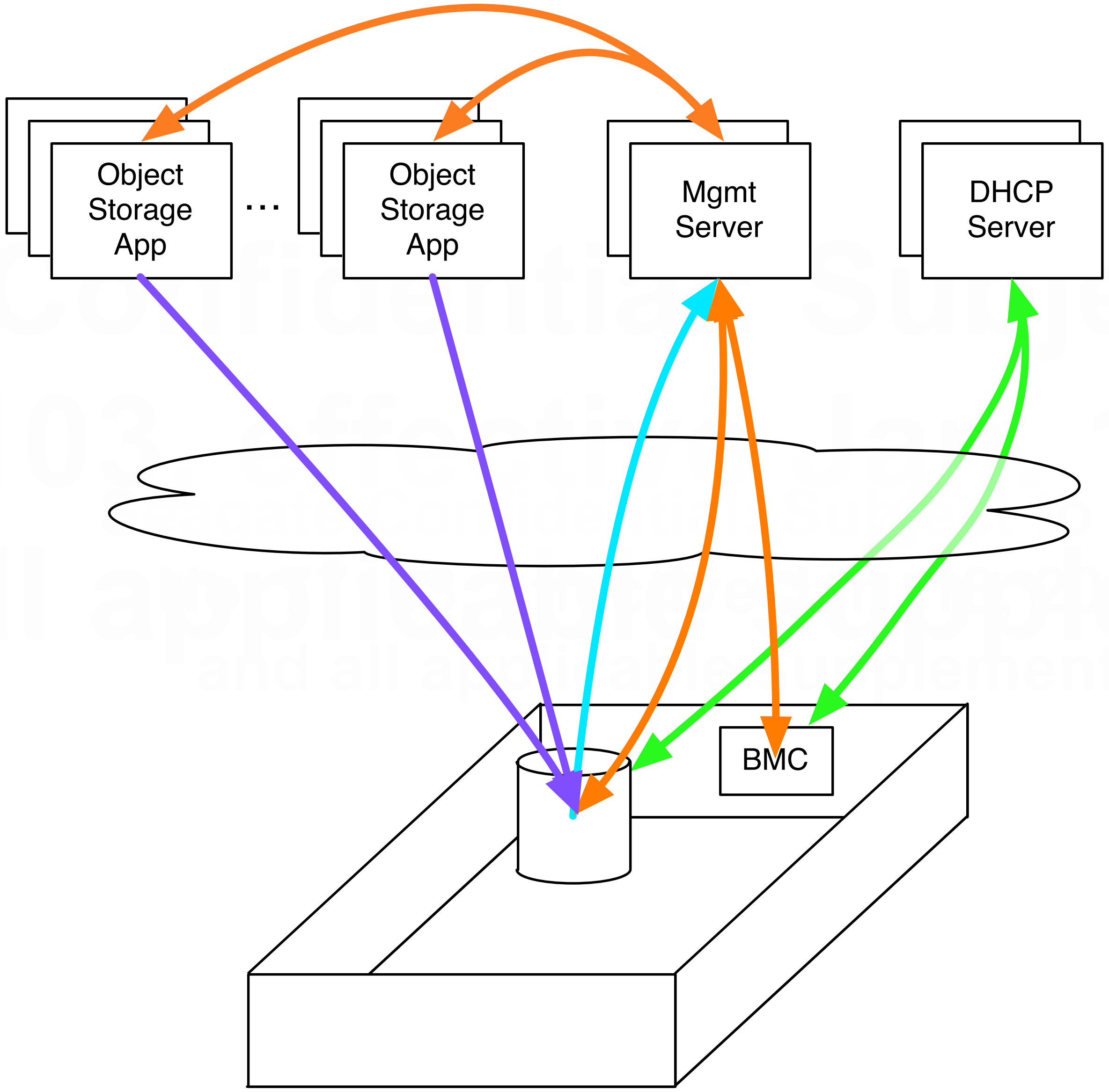


1MB values put rate (MB/s)



1KB values put rate

Bootstrapping devices



Kinetic Security Deep Dive

Kinetic Protocol

Transports

Drive Security

Kinetic Protocol

- Authentication
  - Identity of Client
- Integrity
  - Command and data
  - Requests and responses
- Roles
  - Get/put/management/security
- Replay prevention
  - Messages inside a session
  - Messages between sessions

Transports

Cleartext (Port 8123)

- Normal Client (not recommended for configuration)

TLS (Port 8444)

- Admin Client or normal client

Drive Security

ISE

- Erase all customer information and configuration
- quick return factory “remanufacture”

SED

- Pin Unlock at power on
- Over the TLS port

Conclusion

Next Generation Storage Devices

- Disaggregates storage from compute
- Enable innovation in hardware and software ecosystem
- Lower TCO

Integration with:

- Swift
- HDFS
- Scality
- Basho Riak
- Ceph

More information

- http://seagate.com/www/kinetic
- https://developers.seagate.com
- http://github.com/Seagate