WIDE AREA STORAGE FROM QUANTUM

Quantum

PRESENTED BY:

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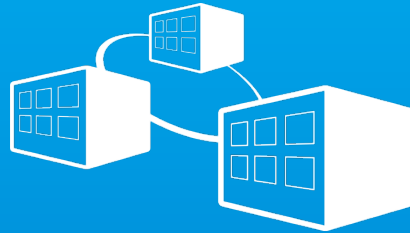
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Quantum Solutions

BIG DATA
"Big File"
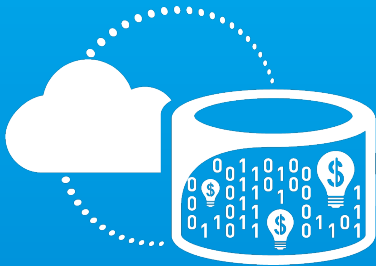
Tiered Solutions and Wide Area Storage

Solutions that help you maximize revenue and results by extracting full value from your data

DATA PROTECTION

Deduplication Systems and Tape Libraries

Systems that optimize backup and recovery, simplify management, and lower cost

Virtual Server Backup and Disaster Recovery

All-in-one solutions that protect virtual environments while minimizing impact to servers and storage

CLOUD

Cloud Software and Services

Technology that enables cloud backup and disaster recovery for physical & virtual servers

Central Management, Professional Services, & Global Support

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Challenges of Big Data

More data generated and available to extract value over time means more data to store and manage indefinitely

- **VALUE** of Big Data
  - Power to analyze.
  - Option to monetize or repurpose

- **VOLUME** of Big Data
  - 'Free' data collection
  - Increasing data granularity
  - Content being stored forever

- **MASSIVE** Data Repositories
  - Expensive to build, manage long-term
  - Siloed, offline and unretrievable

Need a new model that is scalable, affordable–even when online– and manageable and durable for decades to come

Existing Disk Architectures Inefficient at Scale

A new technology is required for large-scale disk archives

- **SCALE to PETABYTES** and beyond
  - Single-site and/or multi-geo

- **PROTECT AGAINST DATA LOSS AFFORDABLY**
  - High-density disks are vulnerable to bit errors
  - Hardware RAID inefficient on TB+ drives
  - Storing multiple full copies of data $$$$

- **REDUCE OPERATION COSTS**
  - Administrative/operational costs going up
  - Need for self-managing, self-healing
  - Need to reduce power and cooling

- **DURABLE FOR YEARS**

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MTBF
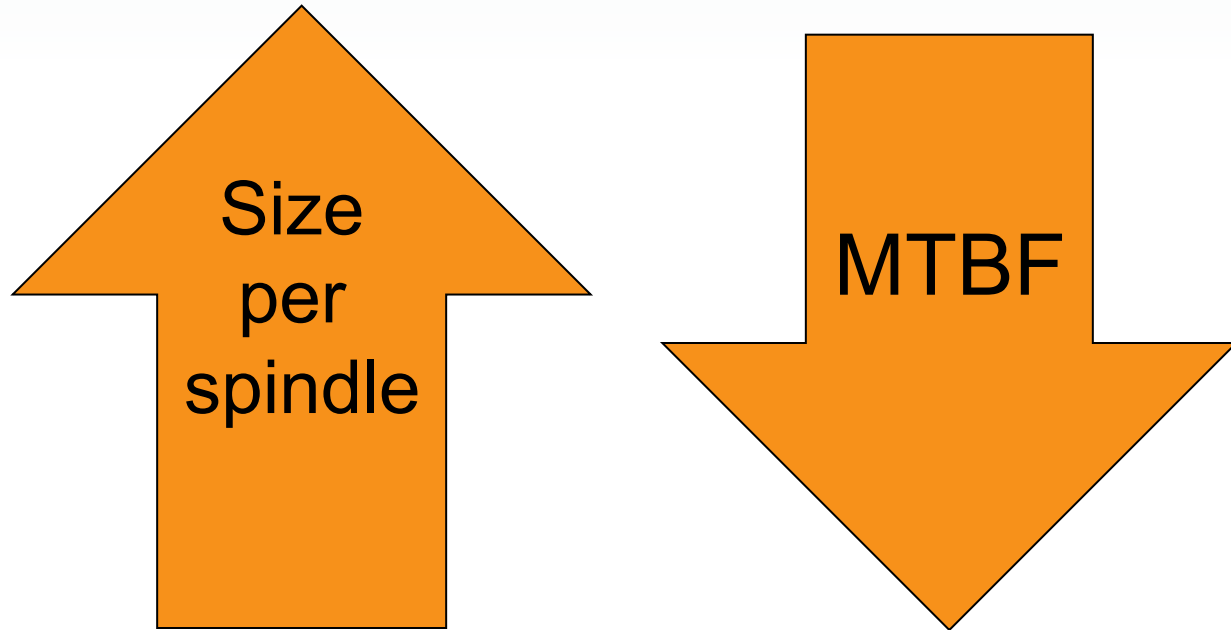
- SATA disk: look at errors/disk capacity
  - 2 TB disk → 16% chance of hard error
  - 4 TB disk → 32%chance of hard error
  - **~2015, disks expected to be 8 – 16 TB → 100% chance of error during whole disk read**

Source: Steve Hetzler, IBM FAST'11

What is Wide Area Storage?

A new disk archive with advanced architectures & algorithms

- **Next Generation Object Storage**
  - Flat namespace scales indefinitely
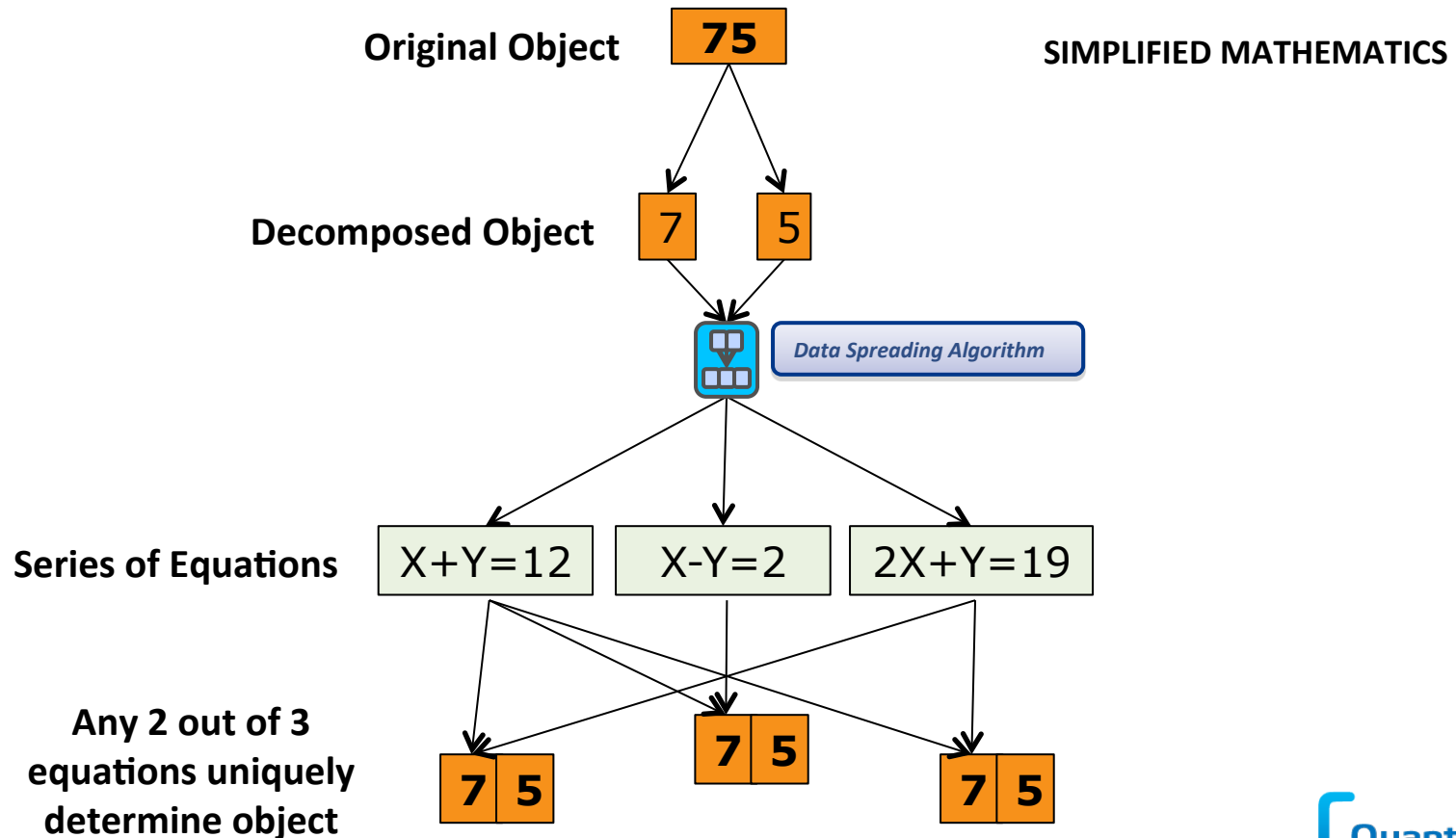 - Both HTTP REST + file system access

- **Fountain Coding Algorithm**
  - A type of Forward Error Correction (FEC)
  - Mature technology used in communications (e.g. space missions, cell phones)
  - Designed with failure in mind – assumes components WILL fail
  - Multiple copies of encoded data distributed across object storage nodes

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How it Works: Data Spreading Algorithm

- Algorithm encodes data in encoded chunks (equations)
- Distributes equations across disks, storage nodes, racks, data centers
- Original data can always be uniquely derived from subset of equations

Original Object 75 **SIMPLIFIED MATHEMATICS**

Decomposed Object 7 5

Data Spreading Algorithm

Series of Equations | $X+Y=12$ | $X-Y=2$ | $2X+Y=19$

Any 2 out of 3 equations uniquely determine object 7 5   7 5   7 5

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How it Works: Durability Policies

Durability policies are configurable to give facilities choice

- Durability Policy Example: 20/4
  - 20/4 means: files are spread across 20 drives/nodes/racks
  - Data protected even with as many as 4 failures

- 20/4 policy delivers
  - Five drive failures must occur before any probability of data loss
  - Bit error corruption probability reduced to 0%

- Example durability policies

| 20/4 | 20/10 | 18/6 |
| 16/4 | 20/11 | 18/7 |

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Wide Area Storage: The Forever Disk Archive

Scales indefinitely

Scales from 500 TB to 100s of PBs via global object namespace

High speed file access (GB/sec)

Data easily spread across multiple geographically dispersed sites

Lower operating & capital costs

Off-the-shelf drives for lower initial cost, less power & cooling required

Lower maintenance costs due to higher redundancy

TCO reductions of 50-70%
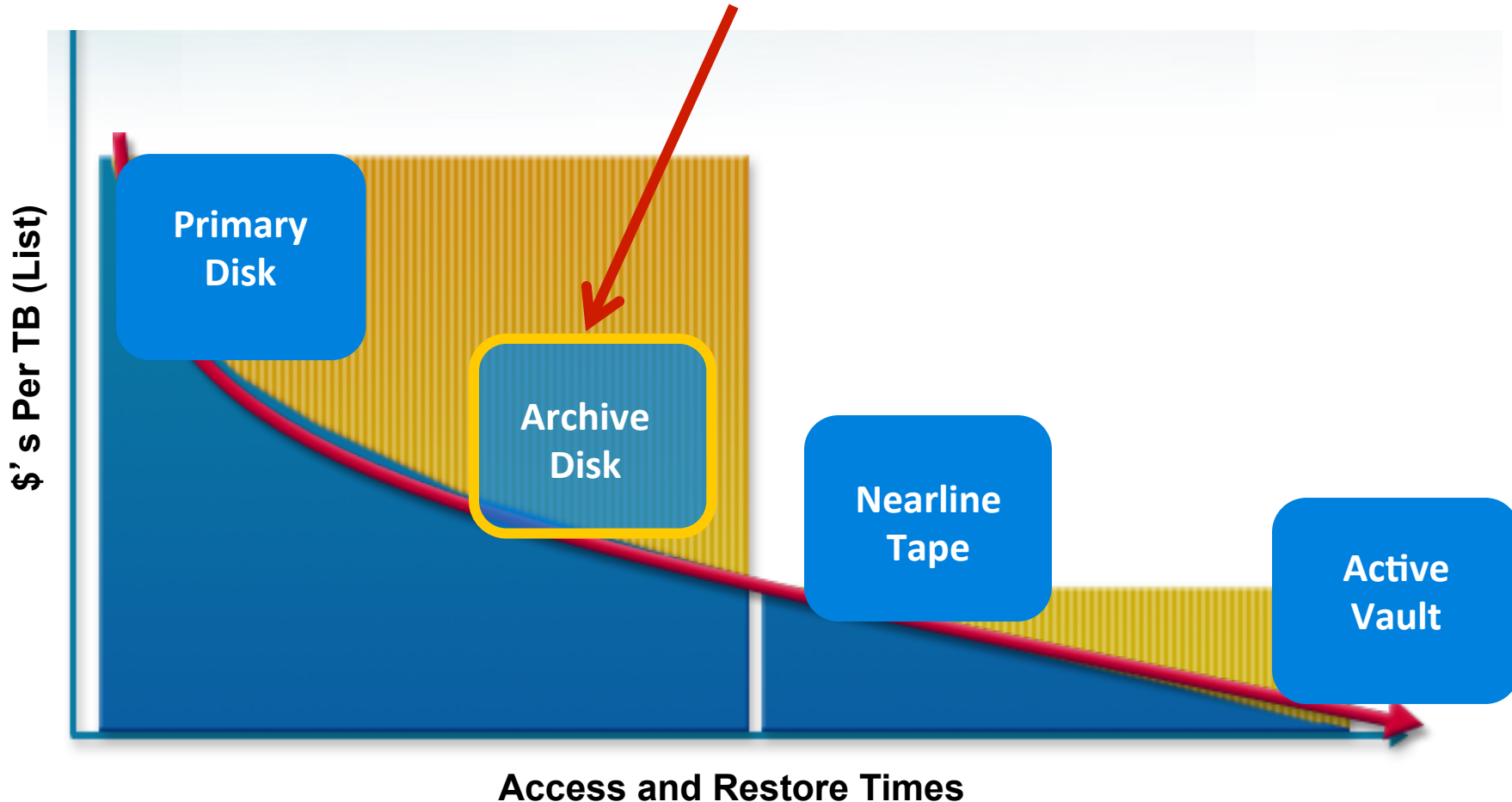
Self-healing & self-migrating

Self-healing: Fifteen 9's of durability ensure data is never lost (better than RAID)

Self- migrating: Innovative algorithms simplify upgrades to new storage technologies
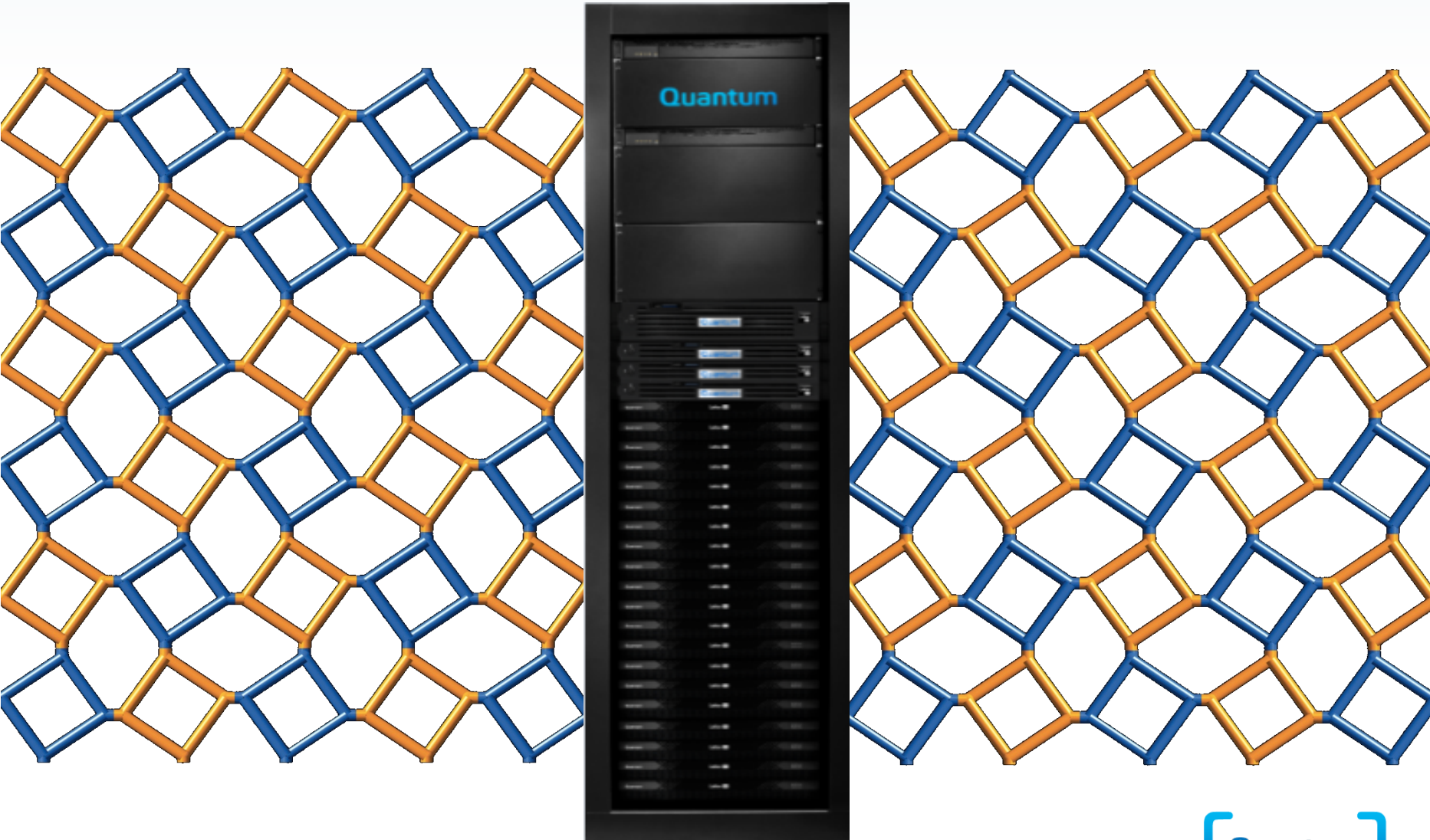
Disk-Based Archives – Where they Fit

*More demand for **predictable restore times** of disk archives. But with **reliability** and **scalability** at a **low price***
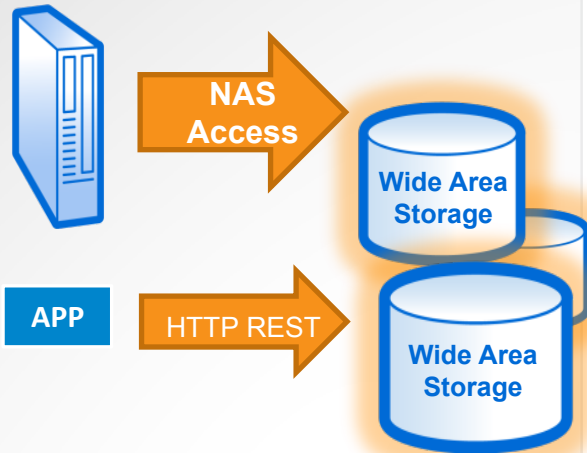
Introducing Quantum Lattus Wide Area Storage
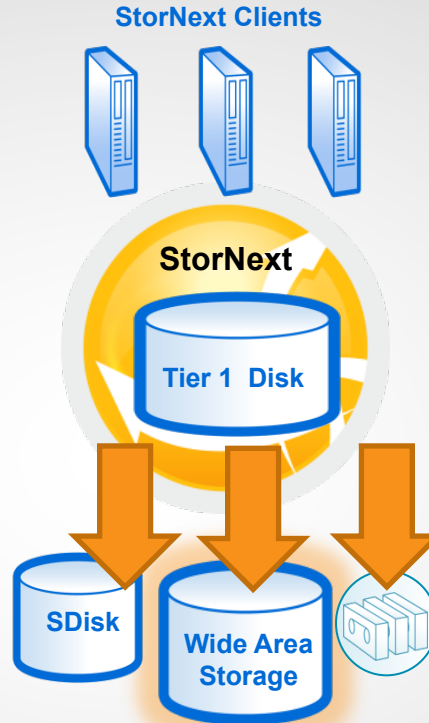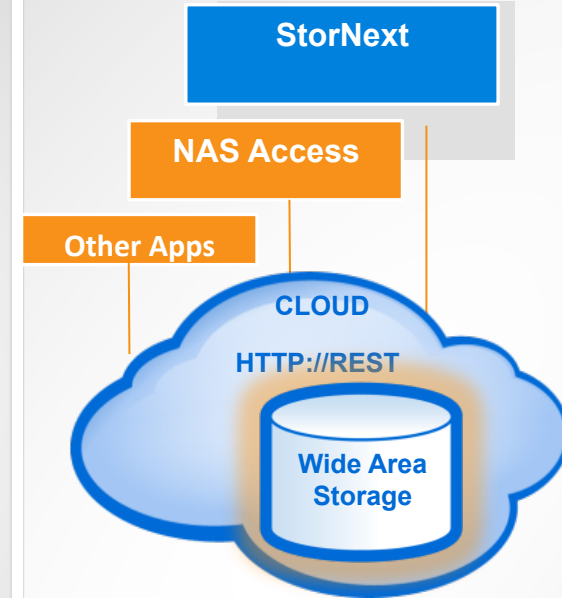
Quantum Lattus: Product Roadmap

NAS Access

StorNext Managed

Cloud Archive

StorNext Clients

NAS Access

HTTP REST

APP

Wide Area Storage

Wide Area Storage

StorNext

Tier 1 Disk

SDisk

Wide Area Storage

StorNext

NAS Access

Other Apps

CLOUD

HTTP://REST

Wide Area Storage

Lattus-X
December 2012

Lattus-M

TBD

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Lattus-X — NAS Access (December 2012)

Flexible Access to Durable Wide Area Storage

- Multi-petabyte green **ARCHIVE**
- CIFS/NFS access via A10
- http REST for apps
- Fast ingest & retrieves
- Low latency
- In memory cache for fast writes
- Limitless scalability per system
  - 400m files per access node
- Archives start at ½ PB

Lattus-M — StorNext Managed (1H 2013)

WIDE AREA STORAGE is next-generation object storage—a perfect fit for StorNext

- StorNext policy-based tiering
- Lower latency than tape
- More efficient than mirrored RAID
- Includes Storage Manager license
- 1 Billion Files (per MDC)
- Archive starts at ½ PB
- Virtually unlimited scalability

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Wide Area Storage: The Forever Disk Archive

Scalable, durable & cost-effective disk archives for Big Data

- **Scales indefinitely**
  - Scales from 500 TB to 100s of petabytes
  - Data easily dispersed across multiple sites

- **Lower operating & capital costs**
  - Lower maintenance due to high durability
  - Less power & cooling required

- **Self-healing & self-migrating**
  - Fifteen 9's of durability so data is never lost
  - Redistribution algorithms simplify upgrades to new storage technologies

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QUANTUM WIDE AREA STORAGE – USE CASES
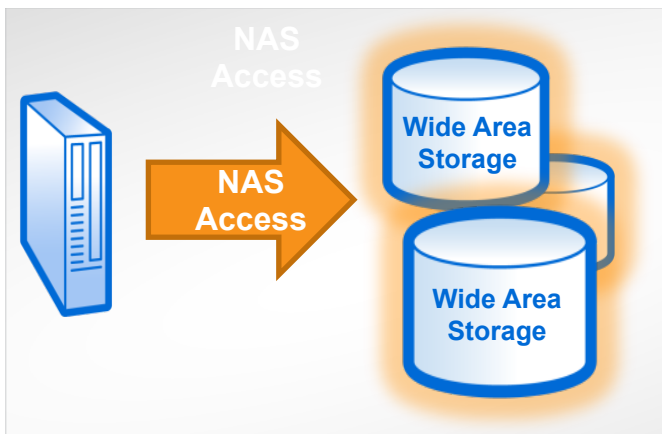
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Use Case #1: Affordable, Productive NAS

Global movie producer with masses of NAS clients

Issues:
- **Painful/costly data protection**
- **Growing cost – capital and operating**
- **Administrative headaches of RAID rebuilds and managing replication**

Why Quantum Wide Area Storage?
- Assured data protection
- <u>Measurably</u> lower cost – less storage, lower maintenance, lower power & cooling, lower labor
- Up to fifteen 9s of data availability with no RAID rebuilds; no need for replication
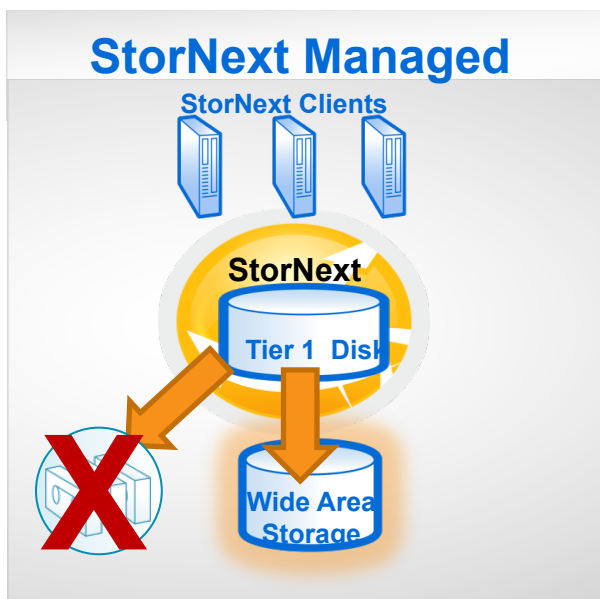
Use Case #2: 100% Policy-Managed Disk

Predictably fast restore times for time-critical mission support

StorNext Managed

Issues:

- **100% of content must be quickly accessible**
  - *Need nearline solution without tape latency*
- **Data growth = unaffordable storage $$$**
  - *Growth driven by increased data collection*
  - *Must policy-manage tiers of storage for affordability*
- **Video assets need to be stored indefinitely**
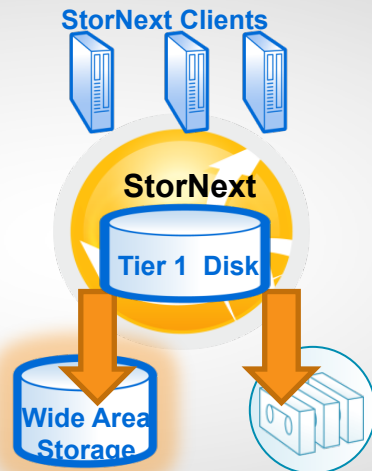

Why Quantum Wide Area Storage?
- **100% near line content at affordable cost**
- **Affordable even to move from tape to disk**
  - *capital, operating, power & cooling costs*
- **Data availability and integrity for long-term**
- **Proven StorNext policy-based management**

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Use Case #3: Disk Active Archive + Tape Vault

Massive, economical, long-term repositories of geospatial data

StorNext Managed

Issues:

- **Data growth = unaffordable storage $$$**
  - *Growth driven by increased higher resolution formats*
  - *Must policy-manage tiers of storage for affordability*
- **Video assets need to be stored indefinitely**
  - *Slower tape speeds for less used content is acceptable*
- **Digital capture = automatic data protection**
 - *Data must be backed up immediate to tape*

Why Quantum Wide Area Storage?

- **Active archive at affordable cost**
  - *90% Wide Area Storage archive*
  - *10% active file system on disk*
- **Proven StorNext policy-based management**
- **Tape protects from user/application error**
  - *Tape also used for offsite vaulting*

Use Case #4: Multi-site with Disaster Recovery

Global Film Animation and Visual Effects Studio

StorNext Managed

StorNext Clients

StorNext

Tier 1 Disk

SDisk

Wide Area

Wide Area Storage
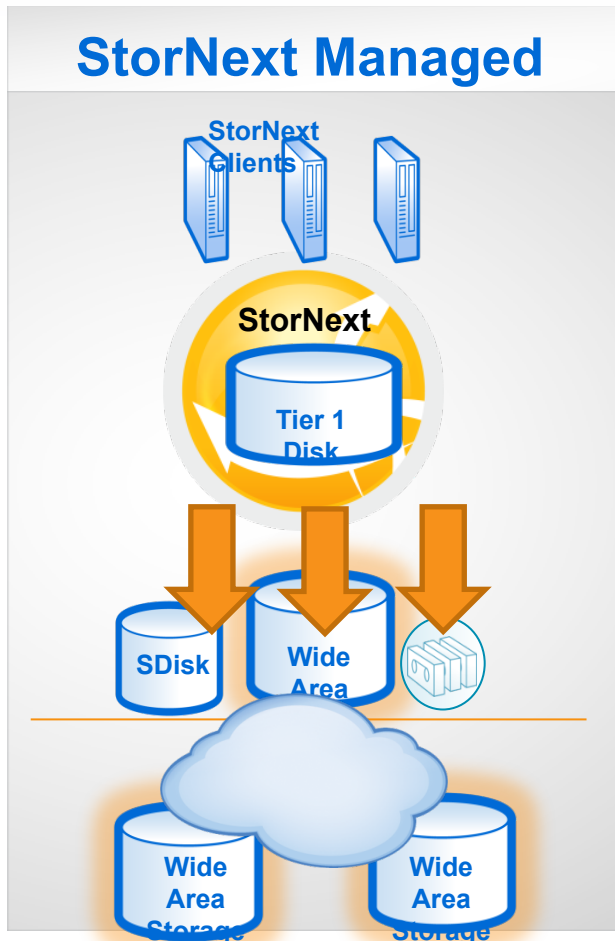
Wide Area Storage

Issues:
- Replication is expensive, painful to manage
- Data storage $$$$
- Need assured data integrity – across years of data
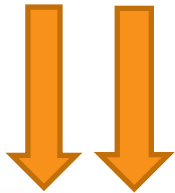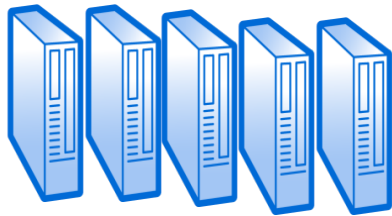
Why Quantum Wide Area Storage?
- Automatic multi-site protection without replication
- 100% near line content at affordable cost
- Up to fifteen 9s of data availability-durability
- Managed by SN policy for easy administration

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Use Case #5: Shared Multi-Site Storage

Defense contractor as service provider for multiple departments

NAS Access

StorNext Managed

StorNext Clients

StorNext

Tier 1 Disk

Wide Area Storage Site 1

Wide Area Storage Site 2

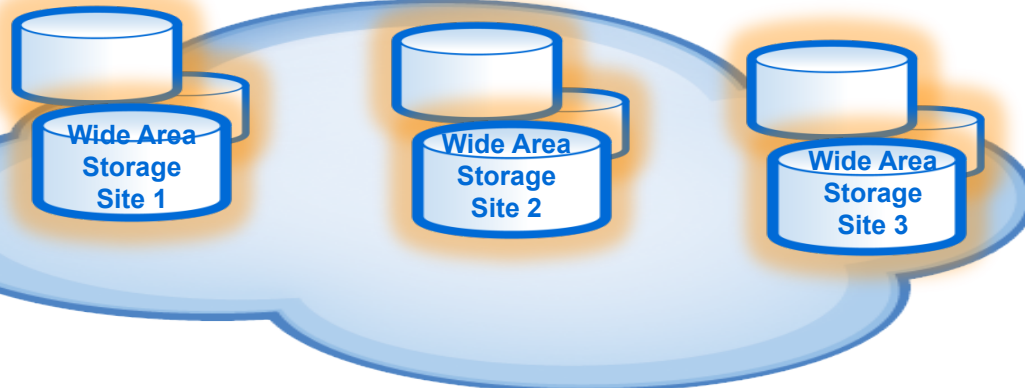Wide Area Storage Site 3

- Combines value of NAS and Policy-Managed Disk
- Shared storage = lowest cost for all multiple sites
- Automatic backup removes need for replication
- Option for NAS, StorNext Managed or private cloud

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Use Case #6: Multi-Site/Application Shared **Data**

Shared data access across multiple intelligence applications

StorNext Clients

StorNext Clients

StorNext

Tier 1 Disk

StorNext

Tier 1 Disk

Site 1

Site 2

Site 3
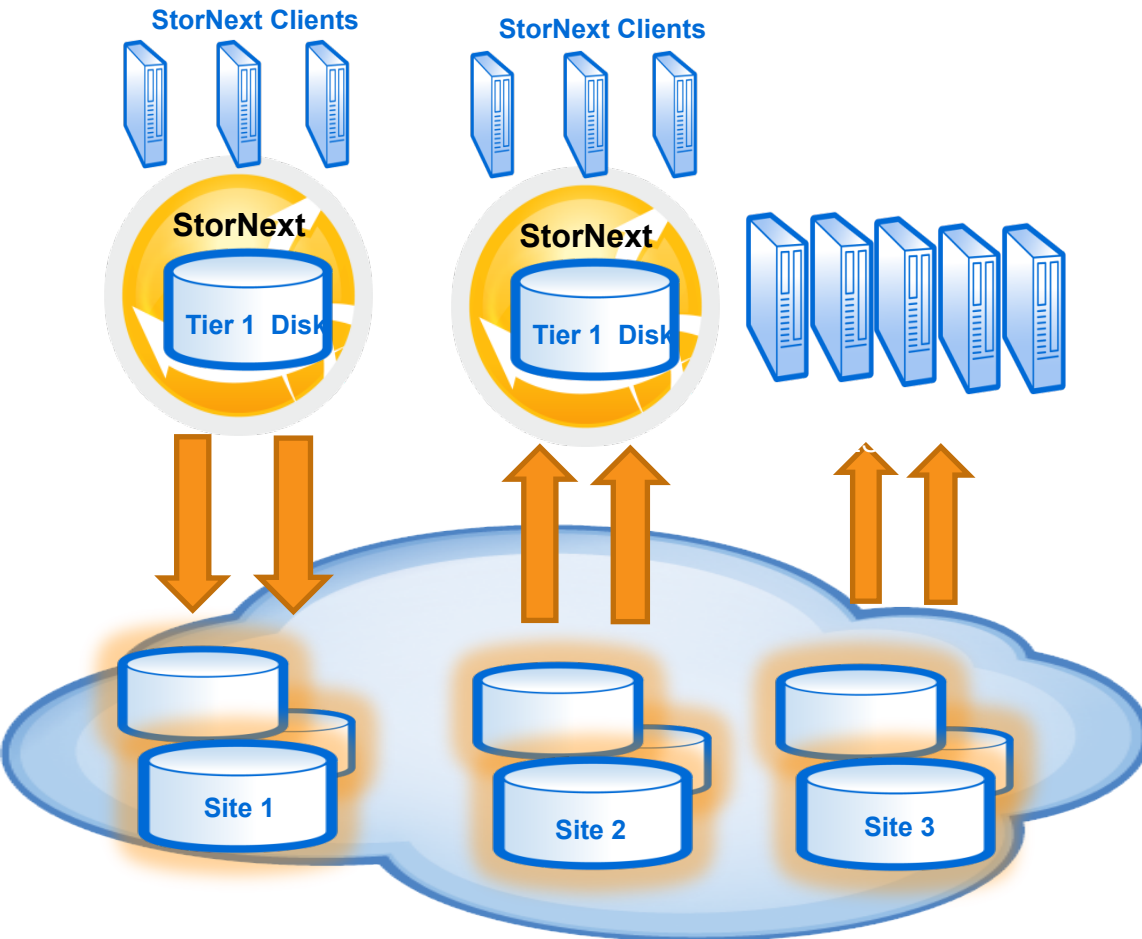
- Shared data access extends value of shared storage

- Shared data access = applications across multiple sites have read and write access to shared files

- Option for NAS, StorNext Managed or private cloud

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Use Case #7: 2nd or 3rd Tier in the Cloud (2013)

NAS Access

StorNext Managed

StorNext Clients

StorNext

Tier 1 Disk

Quantum®

Wide Area Storage Site 1

Wide Area Storage Site 2

Wide Area Storage Site 3
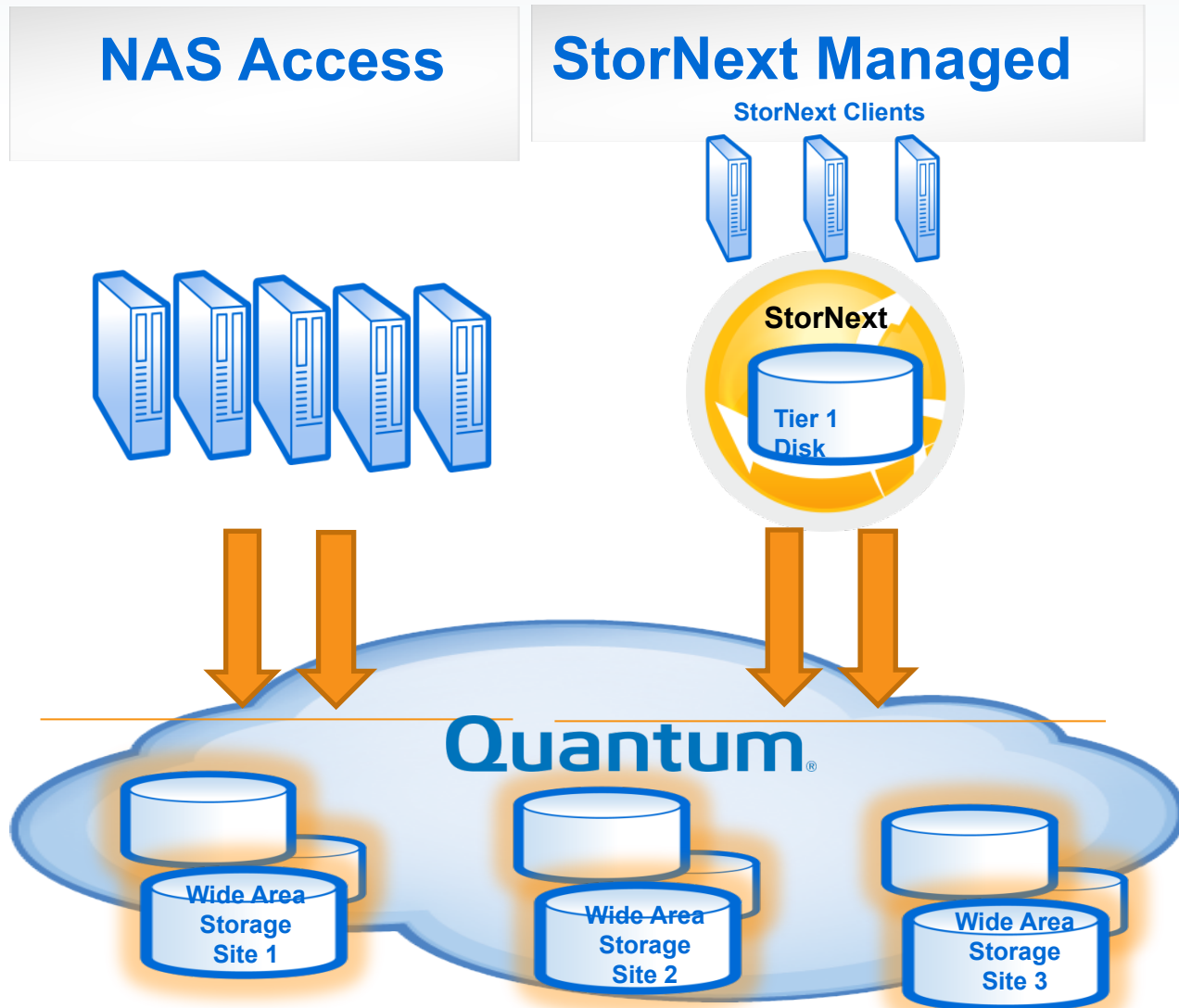
- Shared multi-tenant, encrypted storage = lowest cost secure storage

- Automatic disaster copy. No need for replication

- Option for NAS, SN Managed or native Cloud interface

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