Key Technology Trends, Marketplace Drivers, & AFA Rankings

By

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Key Drivers in the AFA Marketplace

What Businesses Want From Their Technology Investments

- Create more revenue
- Reduce expenses

... with an “Easy” button
Key Drivers in the AFA Marketplace

HARDWARE

- Increasing density
- Power consumption
- Increasing bandwidth
- Lower latency
## Technology Advancements

<table>
<thead>
<tr>
<th>3D NAND</th>
<th>CPU &amp; GPU</th>
</tr>
</thead>
<tbody>
<tr>
<td>TLC &amp; QLC</td>
<td>FC &amp; Ethernet</td>
</tr>
<tr>
<td>Storage Class Mem.</td>
<td>PCIe Gen4/5</td>
</tr>
<tr>
<td>NVMe</td>
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<td>NVMe-oF</td>
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</tbody>
</table>
## PCIe Advances

<table>
<thead>
<tr>
<th></th>
<th>RAW BIT RATE</th>
<th>LINK BW</th>
<th>BW/LANE/WAY</th>
<th>TOTAL BW X16</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCIe 1.x</td>
<td>2.5GT/s</td>
<td>2Gb/s</td>
<td>250MB/s</td>
<td>8GB/s</td>
</tr>
<tr>
<td>PCIe 2.x</td>
<td>5.0GT/s</td>
<td>4Gb/s</td>
<td>500MB/s</td>
<td>16GB/s</td>
</tr>
<tr>
<td>PCIe 3.x</td>
<td>8.0GT/s</td>
<td>8Gb/s</td>
<td>~1GB/s</td>
<td>~32GB/s</td>
</tr>
<tr>
<td>PCIe 4.0</td>
<td>16GT/s</td>
<td>16Gb/s</td>
<td>~2GB/s</td>
<td>~64GB/s</td>
</tr>
<tr>
<td>PCIe 5.0</td>
<td>32GT/s</td>
<td>32Gb/s</td>
<td>~4GB/s</td>
<td>~128GB/s</td>
</tr>
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Key Drivers in the AFA Marketplace

SOFTWARE

- Software-defined Storage
- Automation frameworks
- Proactive support
- Predictive analytics
Key Drivers in the AFA Marketplace

NON-TECHNICAL

- Usage-based costing
- Evergreen support agreements / refreshes
- All-inclusive licensing
AFA Architectures

Mainstream Enterprise

- Dual-controller scale-up
- Scale-out
- Scale-up and scale-out
Key Drivers in the AFA Marketplace

- “The right tool for the right job.”
  ... but a multiprotocol AFA with good QoS and data management features is a very versatile tool

- It’s a big world out there
  ... with room for many solutions
  ... and many paths to market
AFA Architectures

Other Approaches

- All-flash Appliance
- Converged Infrastructure
- Hyper-converged
- JBoF / NVMe JBoF
AFA Architectures

Market Opportunities

- AI, IoT, Edge
- ISV vertical integration
- Government/Military
AFA Architectures

Scale-up vs Scale-out
Scale-up Remains Predominant

60 percent of enterprise AFA models are scale-up.

Source: DCIG; N=109
AFA Architectures

Scale-up Remains Predominant

- Apps cannot yet push performance capabilities of flash
- Corporate IT staff consolidation
- NVMe accelerates reads/writes w/o CPU overhead
- Simplified data migrations
- Companies still deploy relatively small amounts of flash
AFA Architectures

Scale-out Remains Promising

- Facilitates non-disruptive:
  - Array-based data migrations
  - Firmware updates
- Predominantly found on high end AFAs
- More desirable in physical environments
AFA Architectures

Scale-out Challenges

- Cable management
- Still complexity in scaling out – just different
- Stability of scale-out technology
- Increased performance of NVMe technologies
Optimization Focus
Optimization Focus

Focus Areas

- Capacity
- Data Management
- Performance
Optimization Focus

Capacity

- High Capacity SSDs
- 15+ TBs
- Purpose-built
- SSDs with TLC/QLC Technology
- SAS connectivity
- Read Use Case
Optimization Focus

Data Management

- Enterprise Data Services
- Mature software
  - 10+ years
  - Multi-protocol support
- Origins in HDD Arrays
- Predictive analytics
Optimization Focus

Performance

- Designed for flash/SSDs
- NVMe/NVMe-OF support
- 10M IOPS
- Sub-millisecond response
Emerging Trends

- Feature gaps narrowing
- Hybrid cloud – multiple approaches
- Containerized apps on the array
- Composable infrastructure
DCIG AFA Rankings
Enterprise General Purpose

Inclusion Criteria

- All-flash configuration
- Dual Controller Arrays
  - FC Connectivity
- Scale-up architecture
DCIG Buyer’s Guide Rankings

Enterprise General Purpose Characteristics

- Concurrent FC/iSCSI connectivity
  - Data reduction
- Persistent storage for containers
- Upload telemetry data automatically
DCIG Buyer’s Guide Rankings

Enterprise General Purpose
Recommended

Dell EMC VMAX
Hitachi Vantara VSP F-Series
HPE 3PAR StoreServ
Huawei OceanStor Dorado / V5
NetApp AFF A-Series
Pure Storage FlashArray //M, //X
DCIG Buyer’s Guide Rankings

Overall

Inclusion Criteria

- All-flash configuration
- 2+ controllers
- 100+ products evaluated
DCIG Buyer's Guide Rankings

Overall

Characteristics

- Enterprise General Purpose Features++
  - Multiple PBs of capacity
  - Scale-out architecture
  - 100+ storage networking ports
DCIG Buyer’s Guide Rankings

Overall Recommended

HPE 3PAR StoreServ
Hitachi Vantara VSP F-Series
Huawei OceanStor Dorado
NetApp AFF A-Series
Questions??

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