NVMe Applications for Enterprise Datacenters
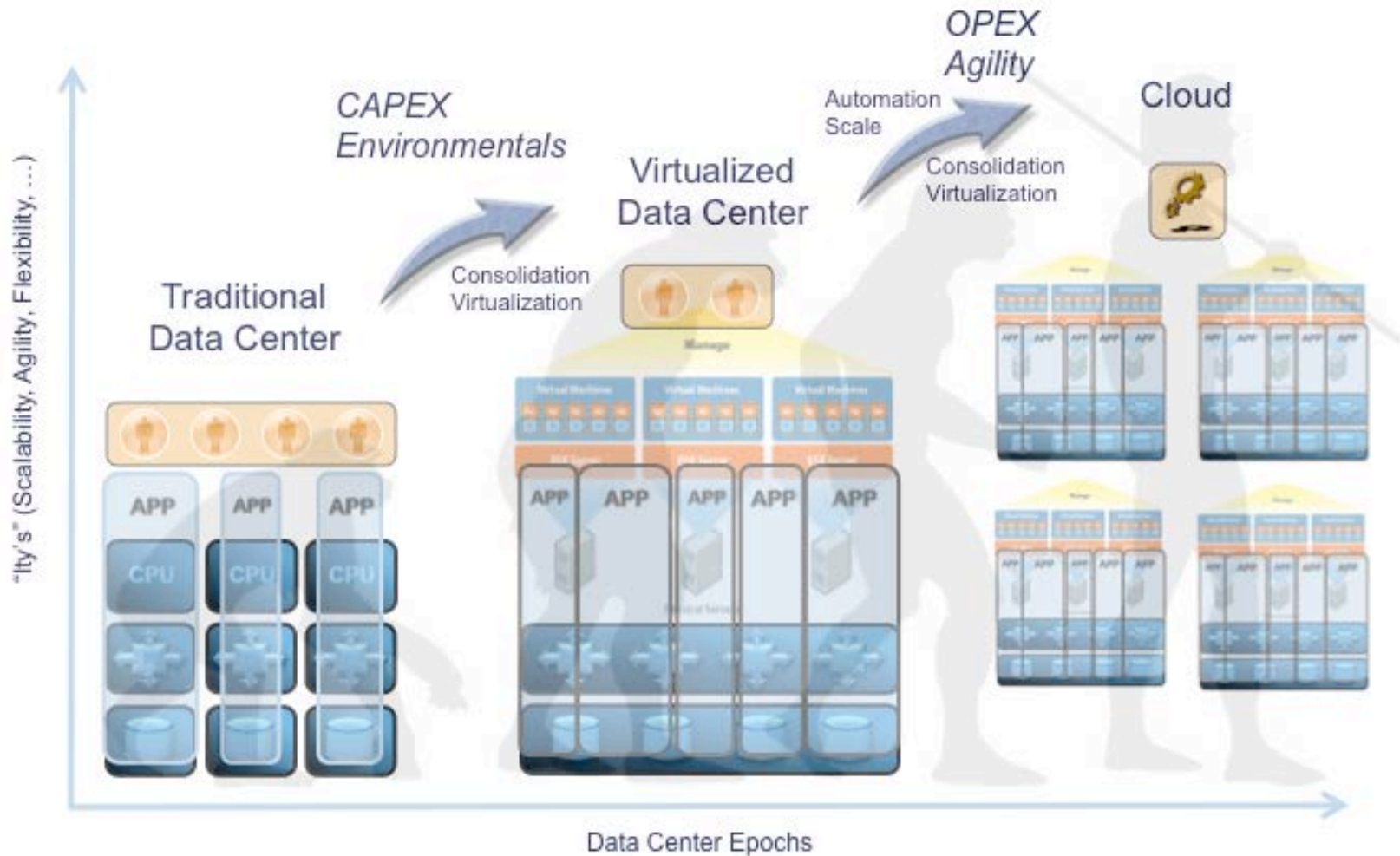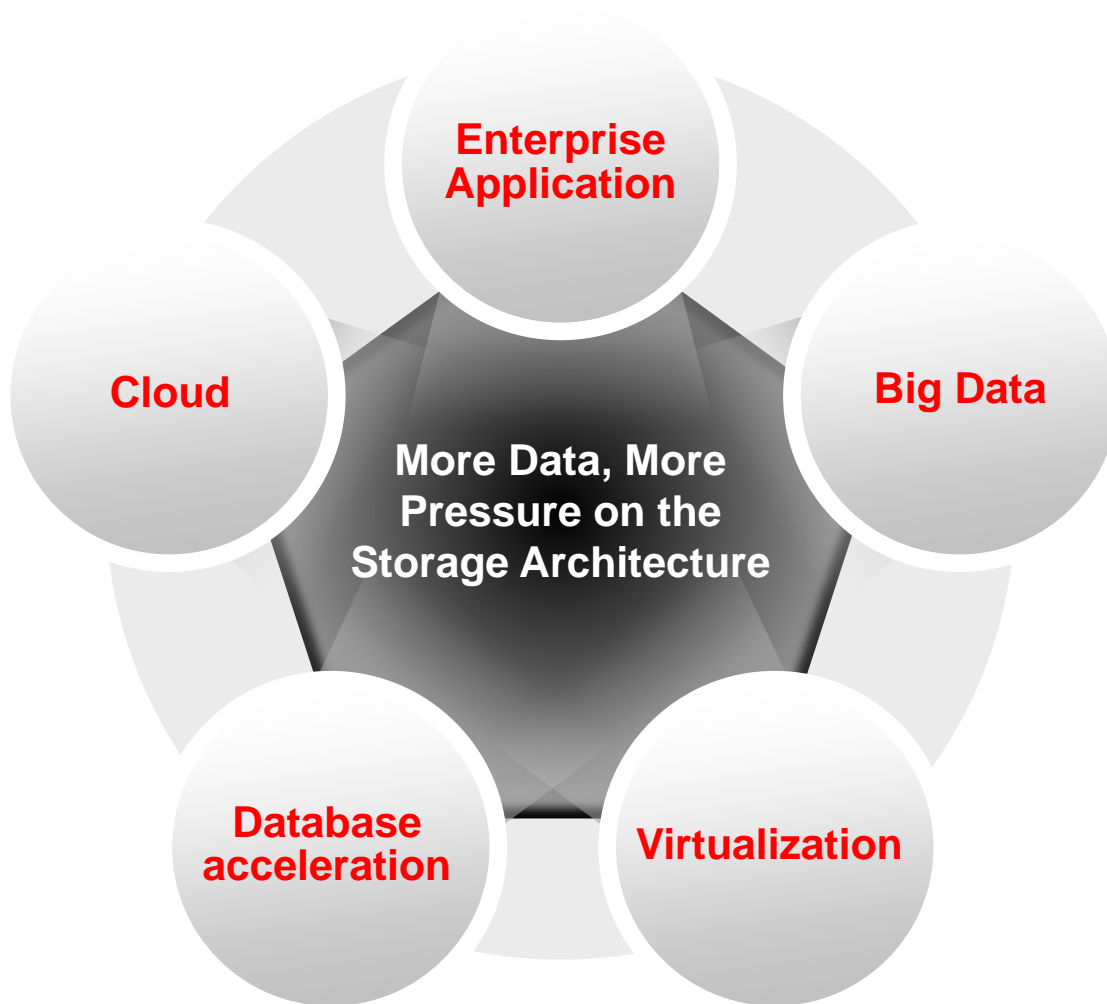
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Aug 13th, 2013

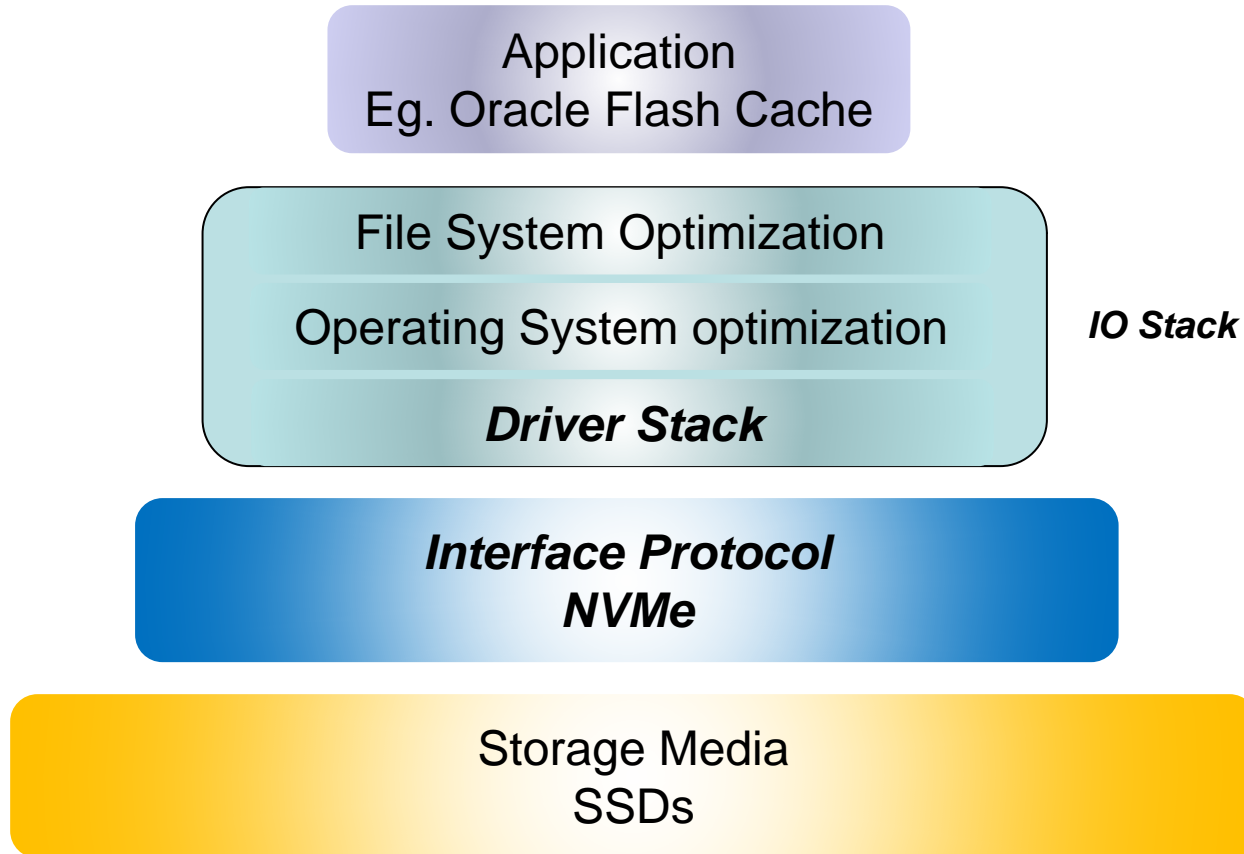# Data Center Evolution

Pressure on Storage architectures

Enterprise Application

Cloud

Big Data

More Data, More Pressure on the Storage Architecture

Database acceleration

Virtualization

Traditional Architectures Can't Keep Pace

Application
Eg. Oracle Flash Cache

File System Optimization

Operating System optimization

Driver Stack

IO Stack

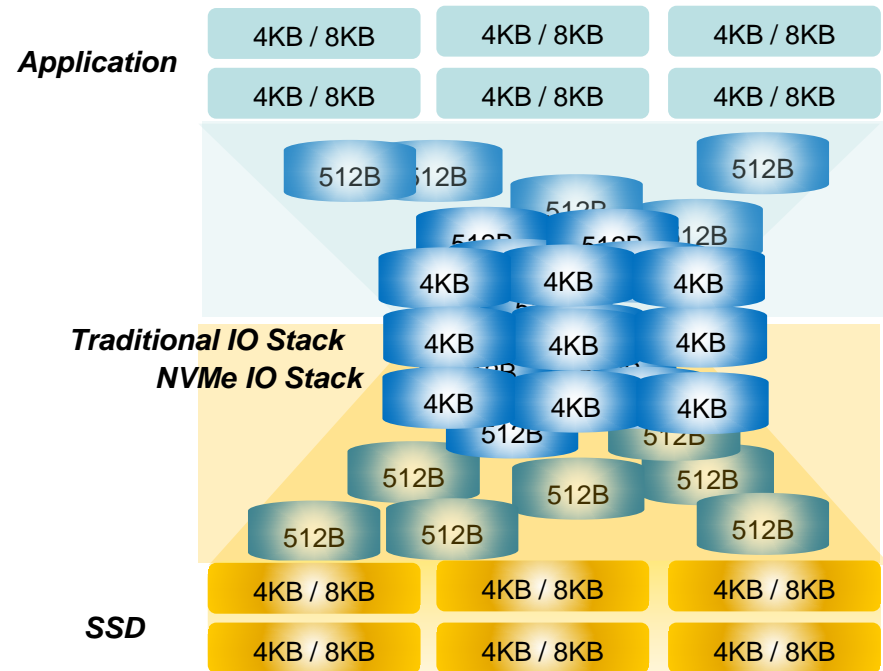**Interface Protocol**
NVMe

Storage Media
SSDs

NVMe built to accelerate enterprise applications

Databases

- **Traditional IO stack optimized for rotational media**
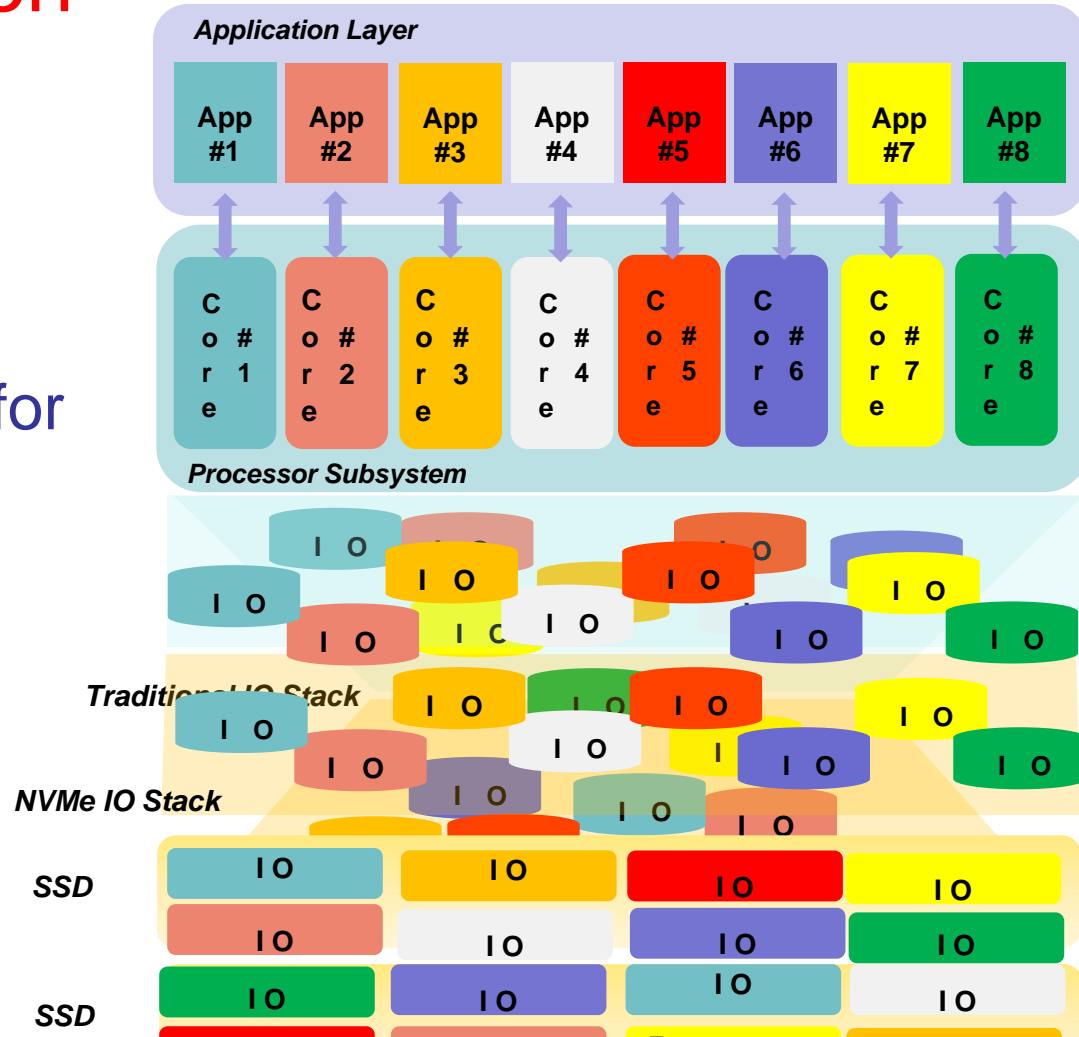 - Eg. 512B block size transfers

- **Database applications tuned for larger IO granularities**
  - Oracle 4KB block granularity
  - MySQL 8KB block granularity

- **NVMe provides native atomic IO size affinity for databases**

Enable faster and more efficient database performance
NVMe matches the natural application IO granularities to solid state media

Virtualization

- NVMe has affinity to multi core architecture

- End to End parallelism for improved VM performance

- Balanced QoS per VM application

Application Layer

| App #1 | App #2 | App #3 | App #4 | App #5 | App #6 | App #7 | App #8 |

| Core #1 | Core #2 | Core #3 | Core #4 | Core #5 | Core #6 | Core #7 | Core #8 |

Processor Subsystem

Traditional IO Stack

NVMe IO Stack

SSD

SSD

Extend parallelism inherent in virtualization IO stack all the way to storage media
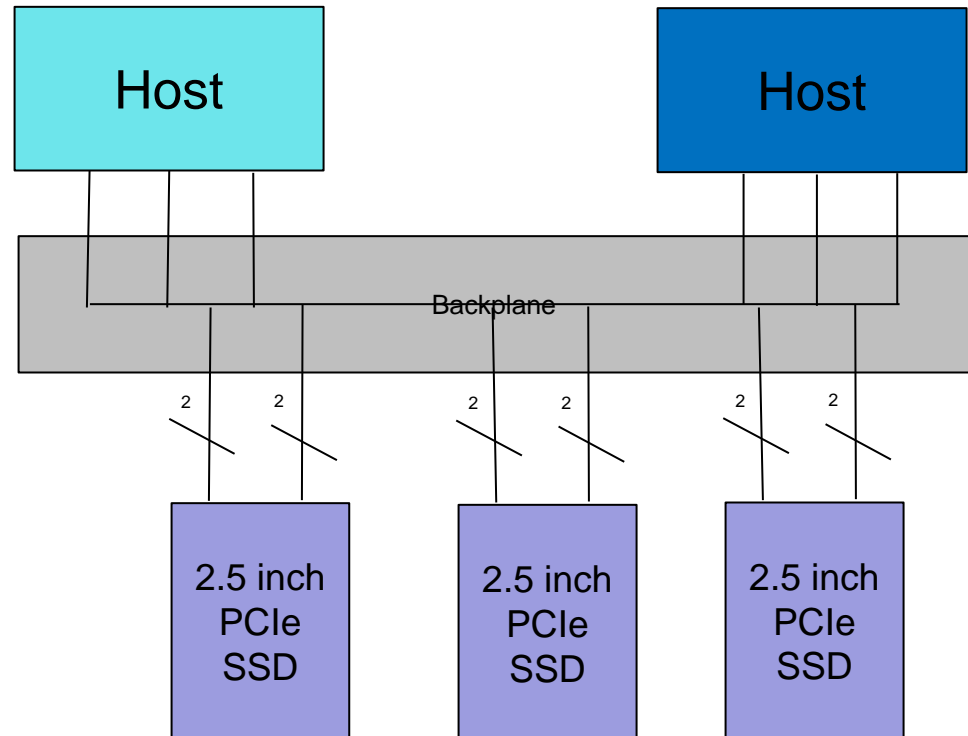
Cost-effective storage system acceleration

- Single device – multi- workload optimization
- Modern flash aware file systems require write log and read cache devices
- Single NVMe device enables workload optimized per domain performance

Eliminate wasted SSD capacity;
Lower operating costs

PCIe in Enterprise Applications

- Active-active shared storage combined with high speed PCIe and low latency

- SFF 8639 2 x2 PCIe interface connectivity plus NVMe enabled multipath IO

Host   Host

Backplane

2   2   2   2   2   2

2.5 inch PCIe SSD   2.5 inch PCIe SSD   2.5 inch PCIe SSD

Path to highly available PCIe deployments

Deployment Efficiency

- Cross platform standardized drivers
  - Windows, Linux, Unix, Solaris, VMware

- Industry sponsored inter-op
  - Plugfest, standardized test suites, compliance

- Faster test and easy deployment

How does it help the IT manager?

NVMe delivering on Enterprise Requirements

- ✓ Higher Performance
- ✓ Scalable Architecture
- ✓ High availability
- ✓ Deployment Efficiency
- ✓ Lower Operating Costs
- ✓ Serviceability

NVMe's Technology Showcase at Booth #215

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