Critical Role of Flash in Guaranteeing Cloud Storage Quality of Service

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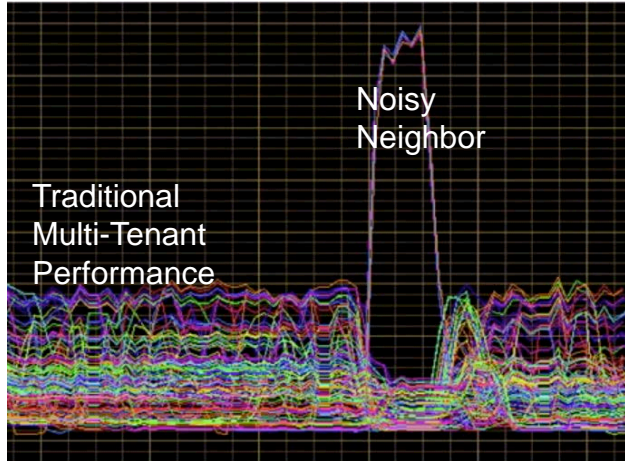
Founder & CEO

What is Guaranteed Quality of Service (QoS)?

- The ability to deliver consistent application performance regardless of <u>system condition</u> or <u>application activity</u>.
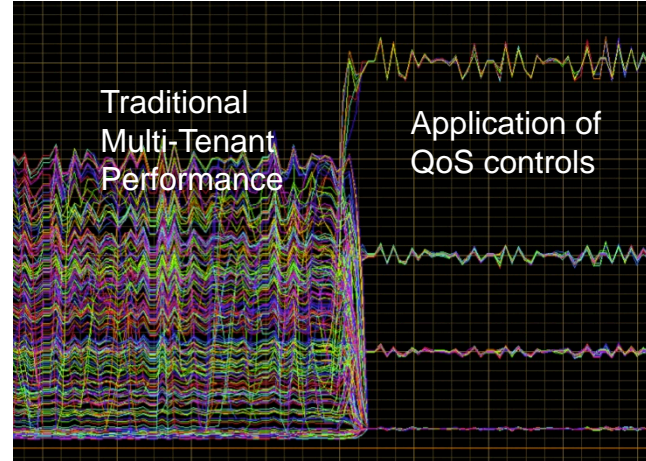
QoS Essential in Multi-Tenant Clouds

The Noisy Neighbor Effect

- Individual tenant impacts other applications
- Unsuitable for performance sensitive apps

Multi-tenant QoS in Practice

- Create fine-grained tiers of performance
- Application performance is isolated
- Performance SLAs enforced

Barriers to Guaranteed QoS in the Cloud

- Multi-application, multi-tenant IO contention: "The IO Blender"

- Dynamic infrastructure, rapid growth

- Hidden infrastructure, no user visibility of hardware & software failures

- Lack of global application visibility and control: "The Noisy Neighbor"

- Wide range of application performance requirements

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Designing an architecture to guarantee QoS

Six key elements identified to address shortcomings in traditional storage architectures.

- ☑ All-SSD architecture
- ☑ True scale-out architecture
- ☑ RAID-less data protection
- ☑ Balanced load distribution
- ☑ Fine-grain QoS control
- ☑ Performance virtualization

Requirement #1: All-SSD architecture

Deliver consistent latency for every I/O

HDD

SSD
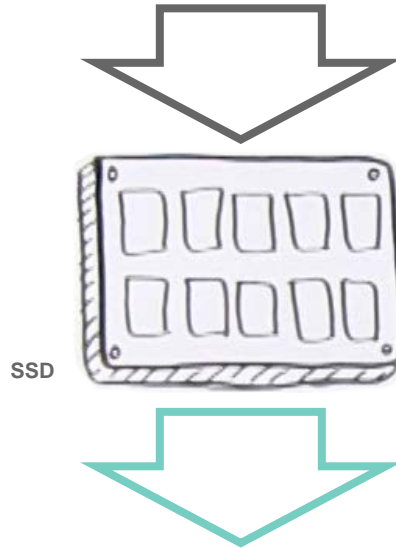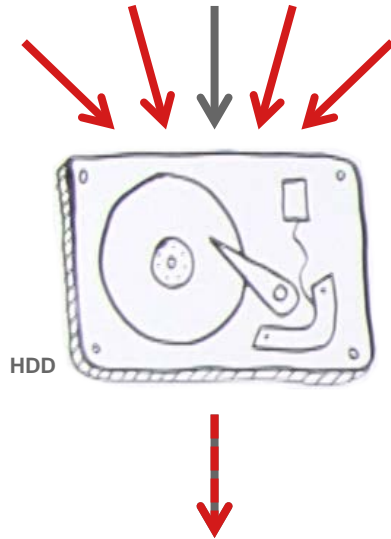
- Spinning disks can serve only a single IO at a time
- Deep queue depths can lead to highly variable latency
- Flash allows for multiple, parallel IOs
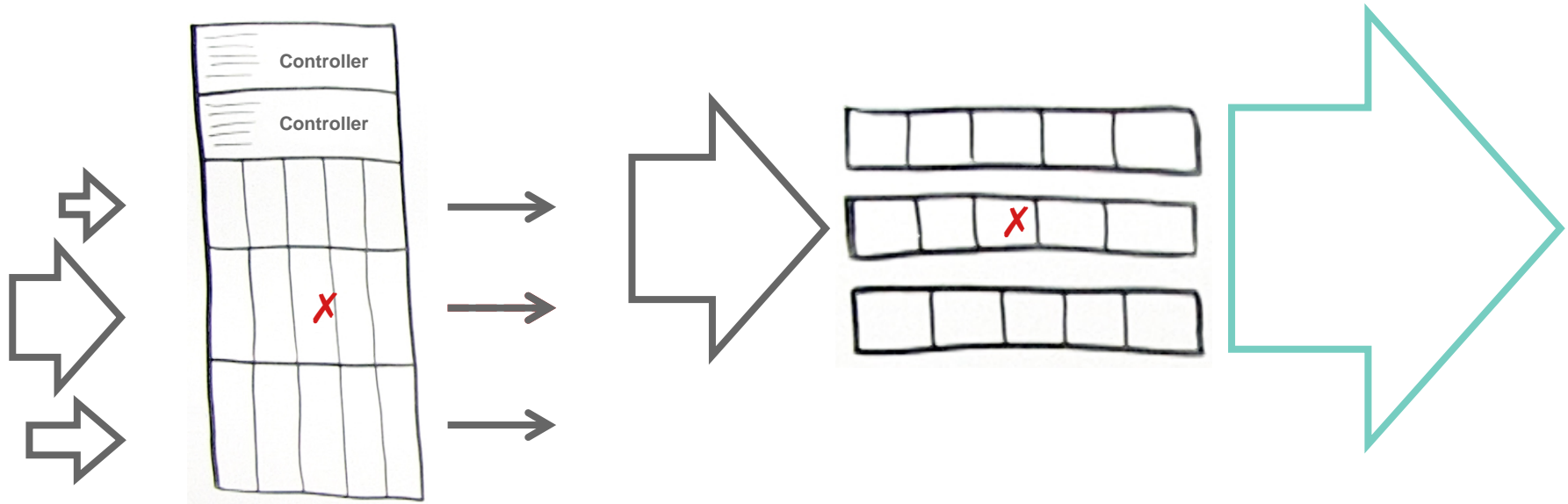- Consistent, low latency for every IO

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Requirement #2: Scale-out architecture

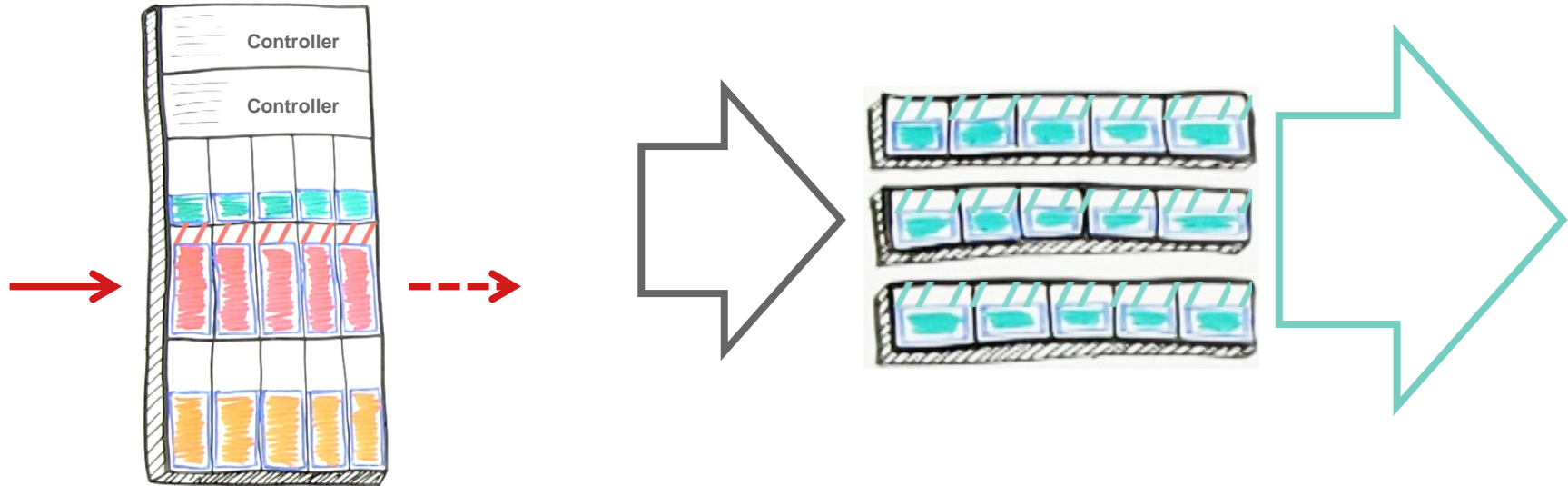Linear, predictable performance gains as system scales
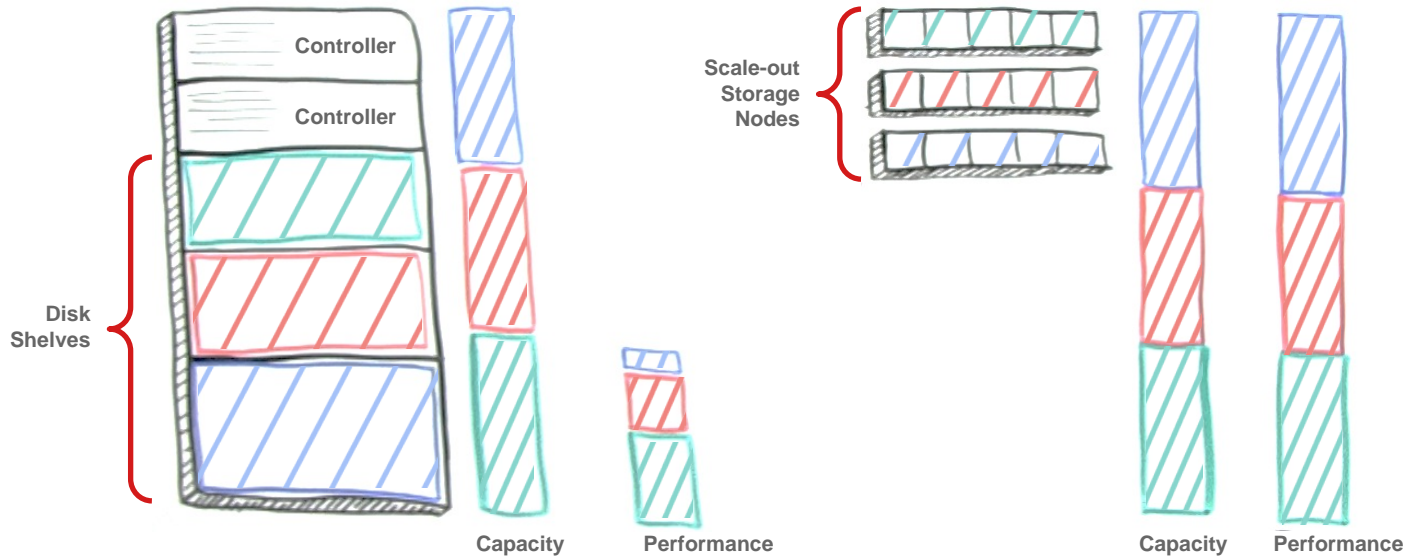
Requirement #3: RAID-less data protection

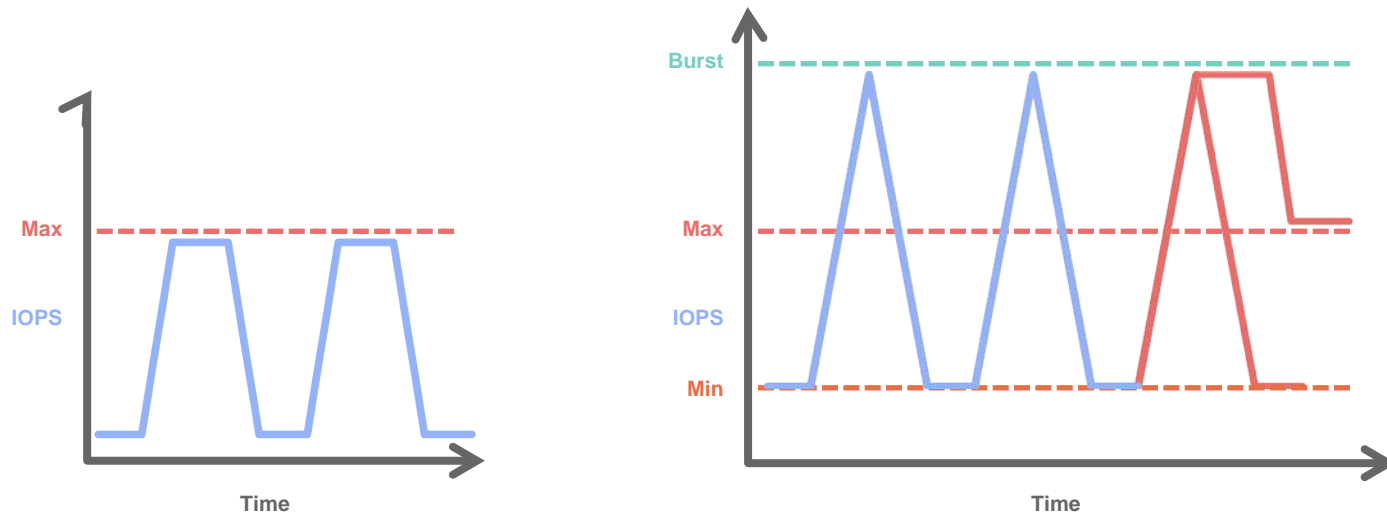Predictable performance in any failure condition

Requirement #4: Balanced load distribution

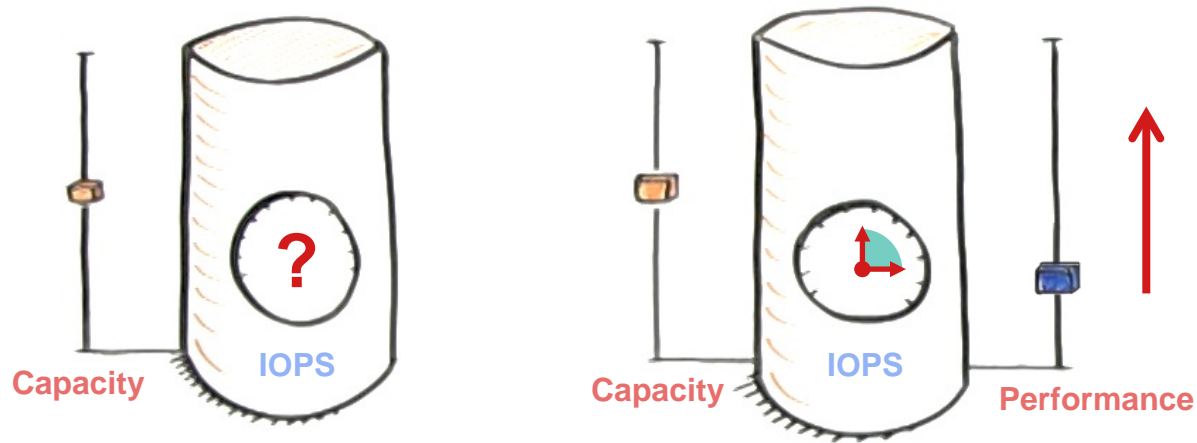Eliminate hot spots that create unpredictable I/O latency

Requirement #5: Fine-grain QoS control

Completely eliminate noisy neighbors, and guarantee volume performance

Requirement #6: Performance virtualization

Deliver performance resources independent of capacity and on demand

Summary

- Flash is a key component in an architecture to deliver QoS to the cloud

- Disk and hybrid systems will never be able to deliver consistent performance

- However, delivering Guaranteed QoS requires a complete architecture, not just flash