



# Flash in the Cloud: A Gentle Introduction

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Forum H-22: Flash and Cloud Computing

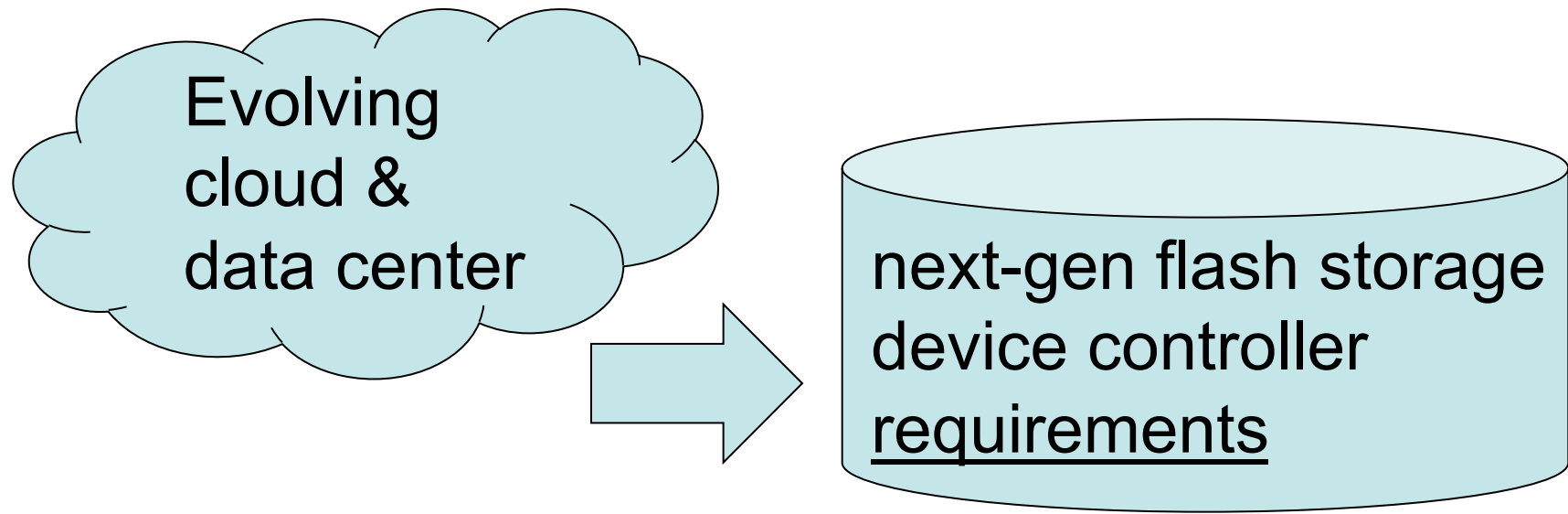


## Quick Overview

- Cloud Computing
- Software Defined Storage (SDS)
- Changes expected to flash storage devices

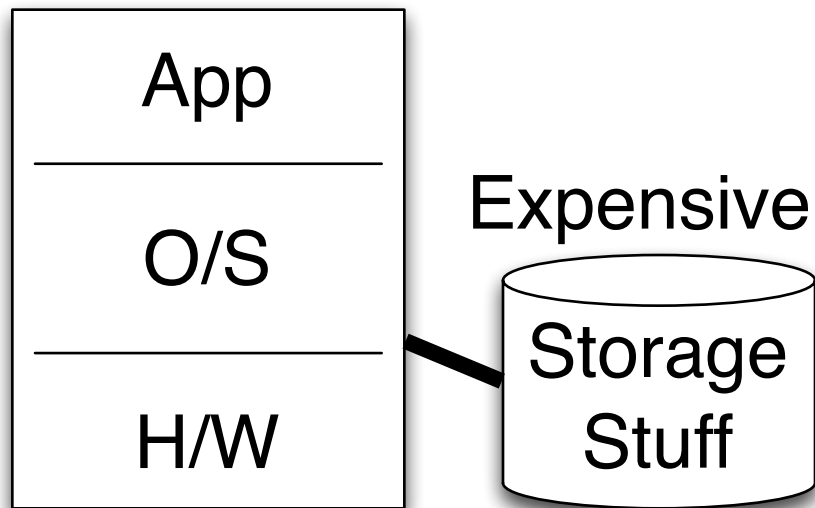
Only a few minutes, so ...

# Business Objectives Drive Technology Requirements



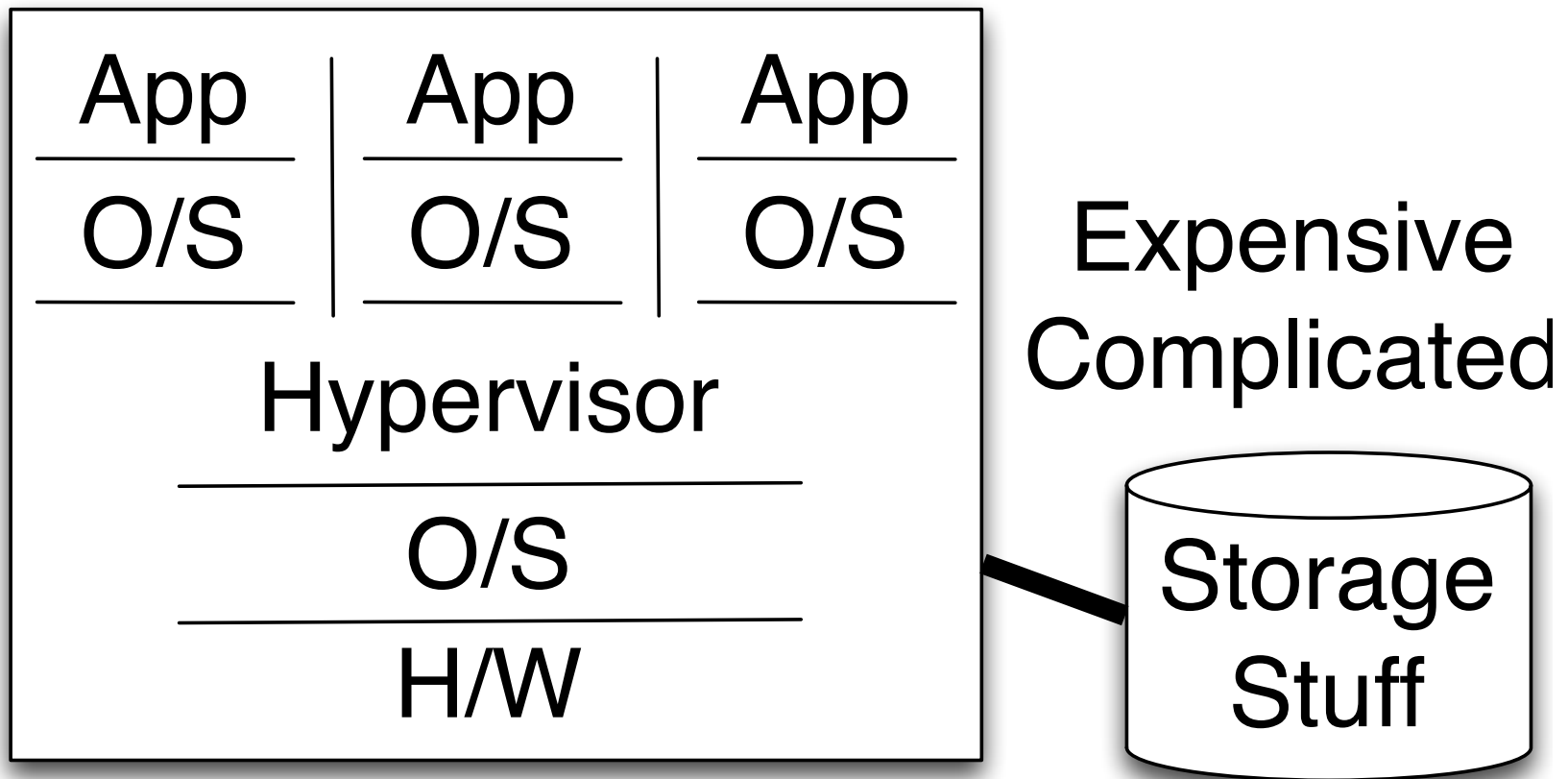
- New requirements include features to support hypervisor integration, parallelism, security, data integrity, etc.

## Pre-cloud (Remember?)



- High costs
- Data silos
- Barriers to entry
- Performance ceilings
- Risk avoidance redundancy

# Then Came Virtualization

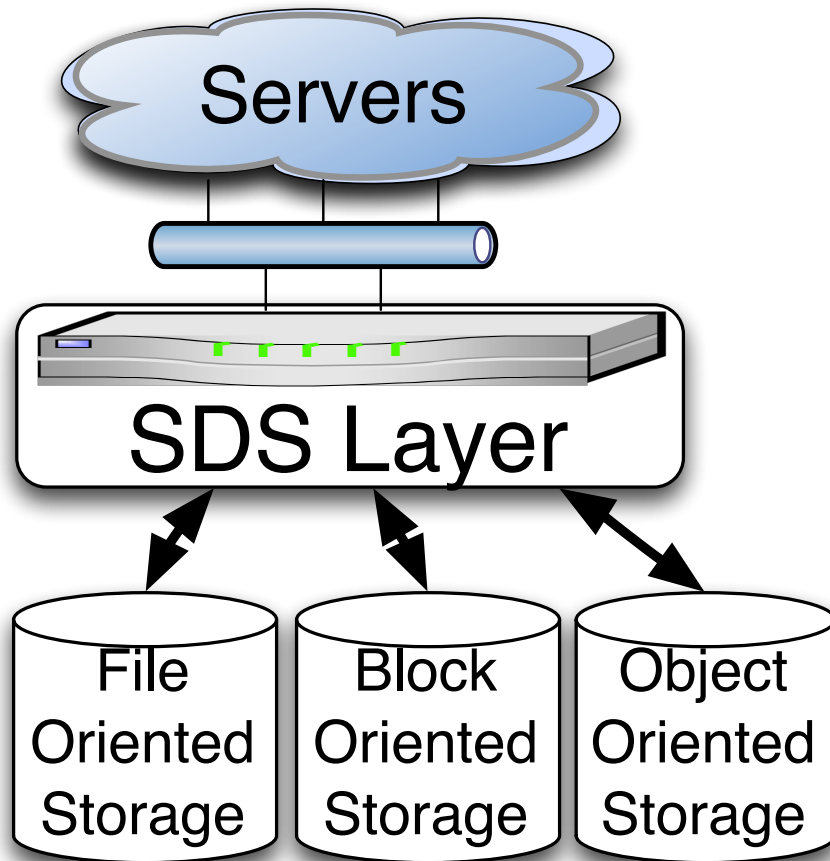




## Cloudy situation ...

- Cloud business model requires flexibility
  - Yet inflexible storage architectures
- Flash evolution also driving change
  - Controllers change too slowly, controllers are obstacles to faster Flash performance
- Storage architectures have to evolve
- Software Defined Storage may be the answer

# Software Defined Storage



- Reduced data center chaos
- Unified management
- Storage pools
- Easier data integrity & security



## SDS Changes In Storage Devices

- Some functionality moves to the SDS layer
- Simpler SSDs, so faster reads from Flash?
- Simpler (and maybe cheaper) SSD controllers built on COTS chips, maybe FPGAs or some combo of FPGA and processor
- Maybe easier *update* of controller software?
- Maybe frequent mods to controller s/w as SDS supports virtual environments' apps?





# Next-gen Storage Device Controller

A few next-gen data center SSD highlights:

- Fit into SDS
- Performance!!!! Reduced read latency, etc.
- Hypervisor integration
- Parallelism
- Data security and integrity
- On-the-fly enhancements



## Conclusion

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- Slides will be available as part of the conference proceedings, look on web site
- I am available to discuss changes to flash storage devices and storage architectures