



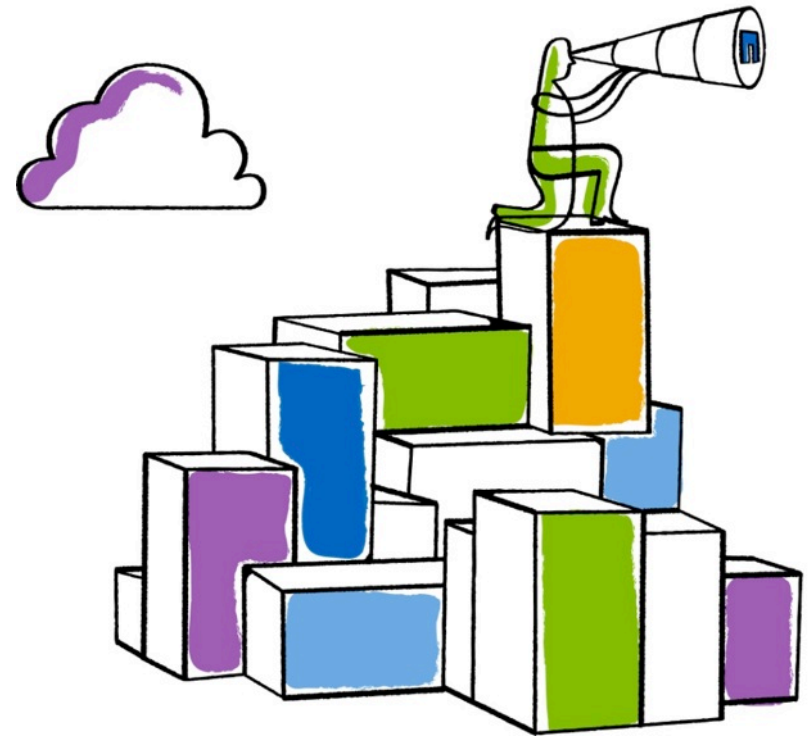
Go further, faster®



Who Moved My Bits?

Val Bercovici

*Technology & Strategy
Office of the CTO*



HELLO

My name is

Val Bercovici

[@valb00](#)



Solid State
Storage

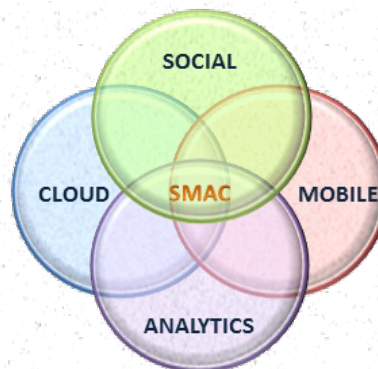


Cloud
Storage



2012
HADOOP
SUMMIT

SMAC



Productivity
increase¹



of the world's
population have
a mobile device²



of CIOs indicate
that Cloud is one
of their Top 5
Priorities³



Competitive
advantage⁴

Sources - 1: McKinsey Global Institute, July 2012 - "The Social Economy: Unlocking Value and Productivity Through Social Technologies."; 2: Mashable study, July 2012 - "75% of World Has Access to Mobile Phones"; 3: IBM Institute for Business Value, May 2011 - "The Essential CIO: Insights from the Global Chief Information Officer Study" ; 4: IBM Institute for Business Value, October 2012 - "Analytics: The real-world use of big data, How innovative enterprises extract value from uncertain data"



Research Layer Cake

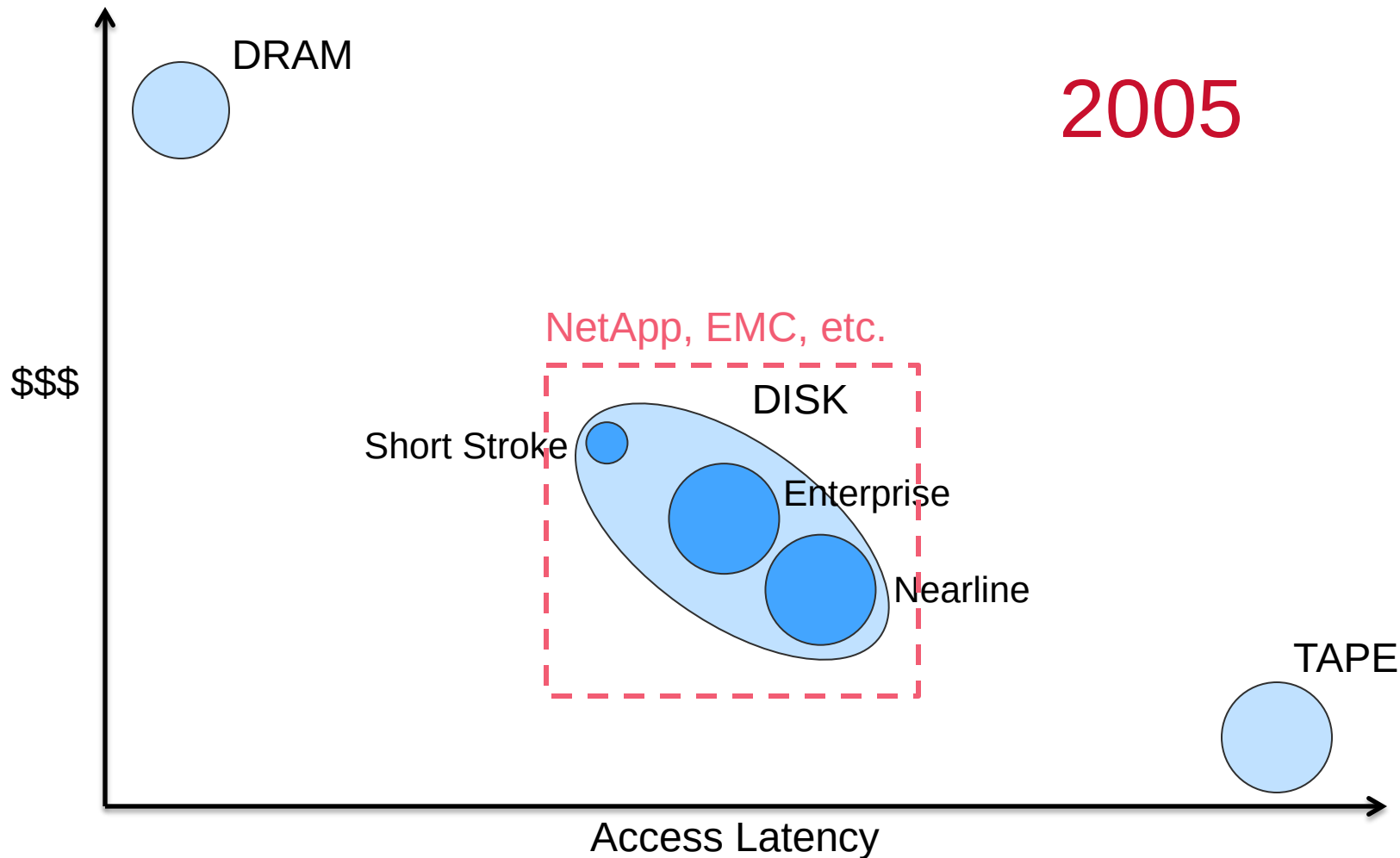
Social
Mobile
Analytics
Cloud

Storage Ramifications

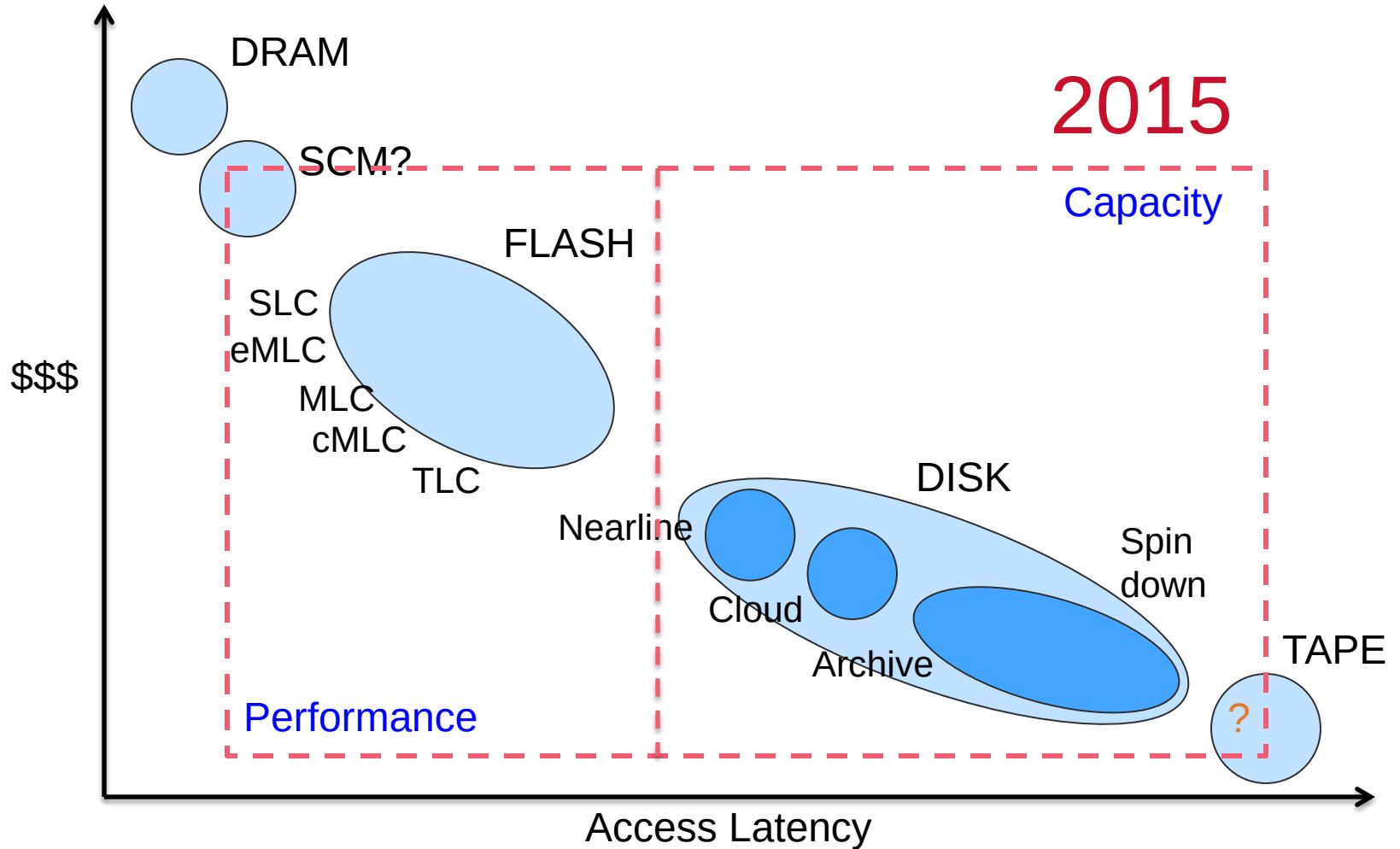
Supply Chain Trends



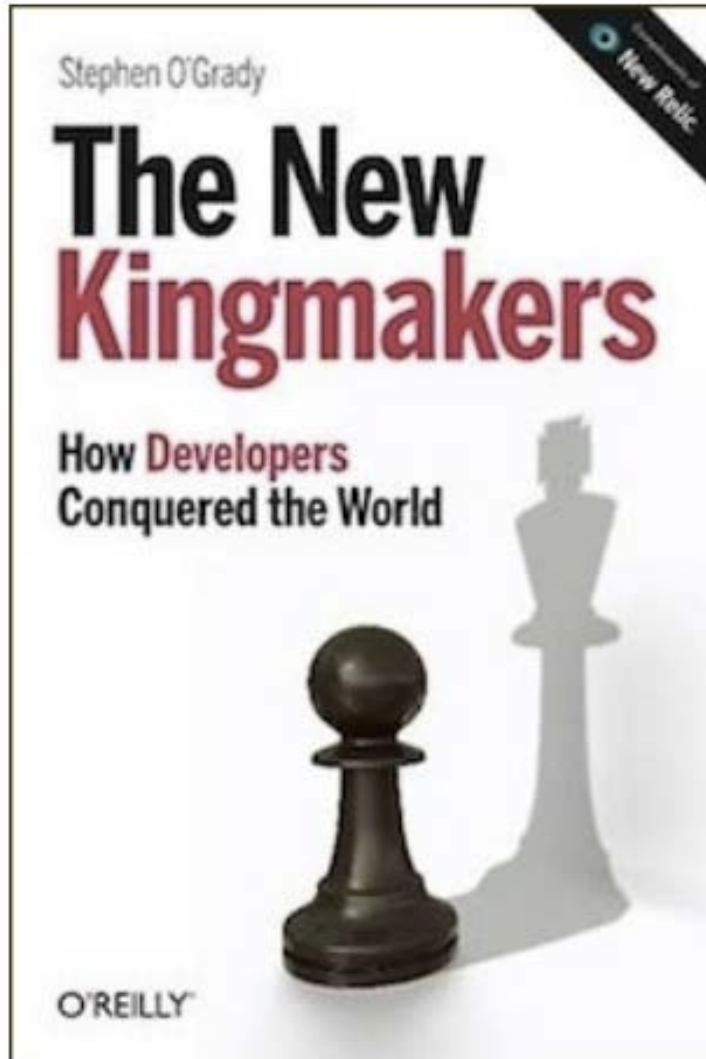
History – Storage Concentration



Trend – Storage diversity



The new Bible



Slides:

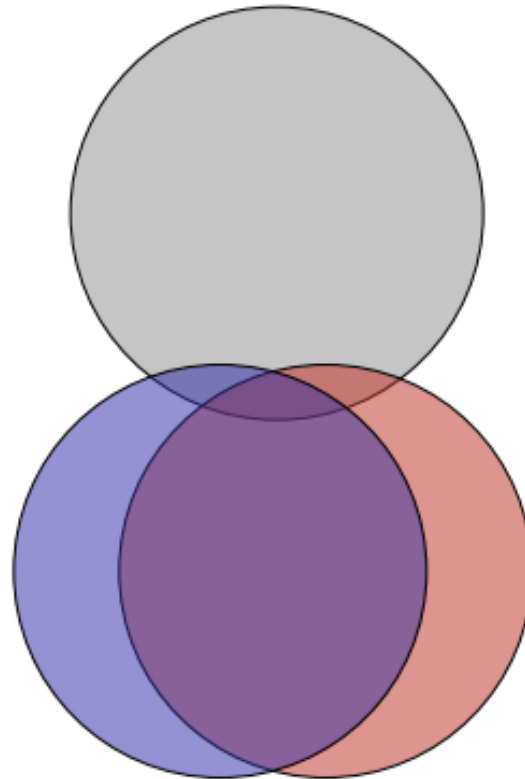
http://www.eclipsecon.org/2013/sites/eclipsecon.org.2013/files/OGrady_the-new-kingmakers-eclipsecon.pdf

E-Book:

http://try.newrelic.com/rs/newrelic/images/The_New_Kingmaker.pdf

The Net

What IT Decision Makers Think is Being Used

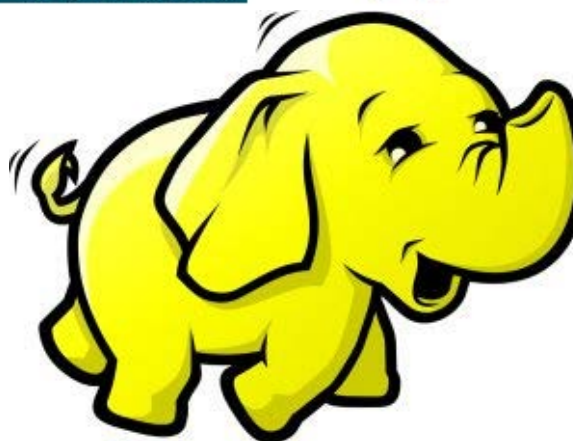


What Developers Want to Use

What is Actually Being Used

Wither SQL/ACID? (Big) Data Trends

Data Plane

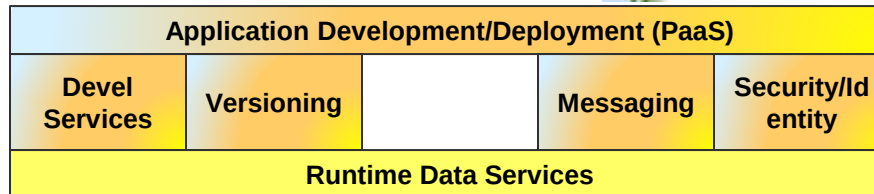


Emerging Architecture for App Development

App Services



PaaS platforms bundle wide range of data services with pure app middleware features



Amazon

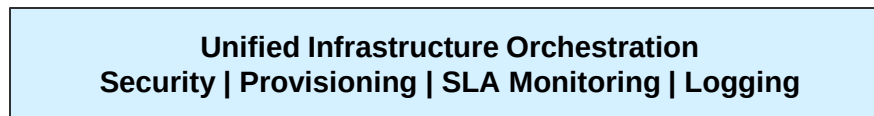
New app platforms are offering flexible data models for:

- Operational Efficiency
- Performance at scale

Data Services



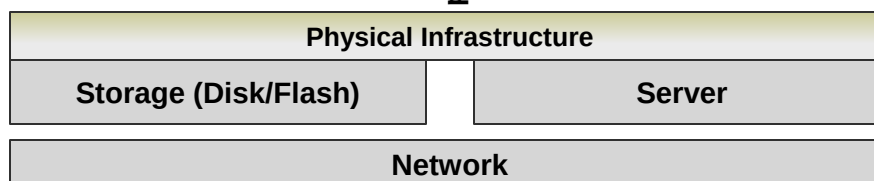
Infra Services



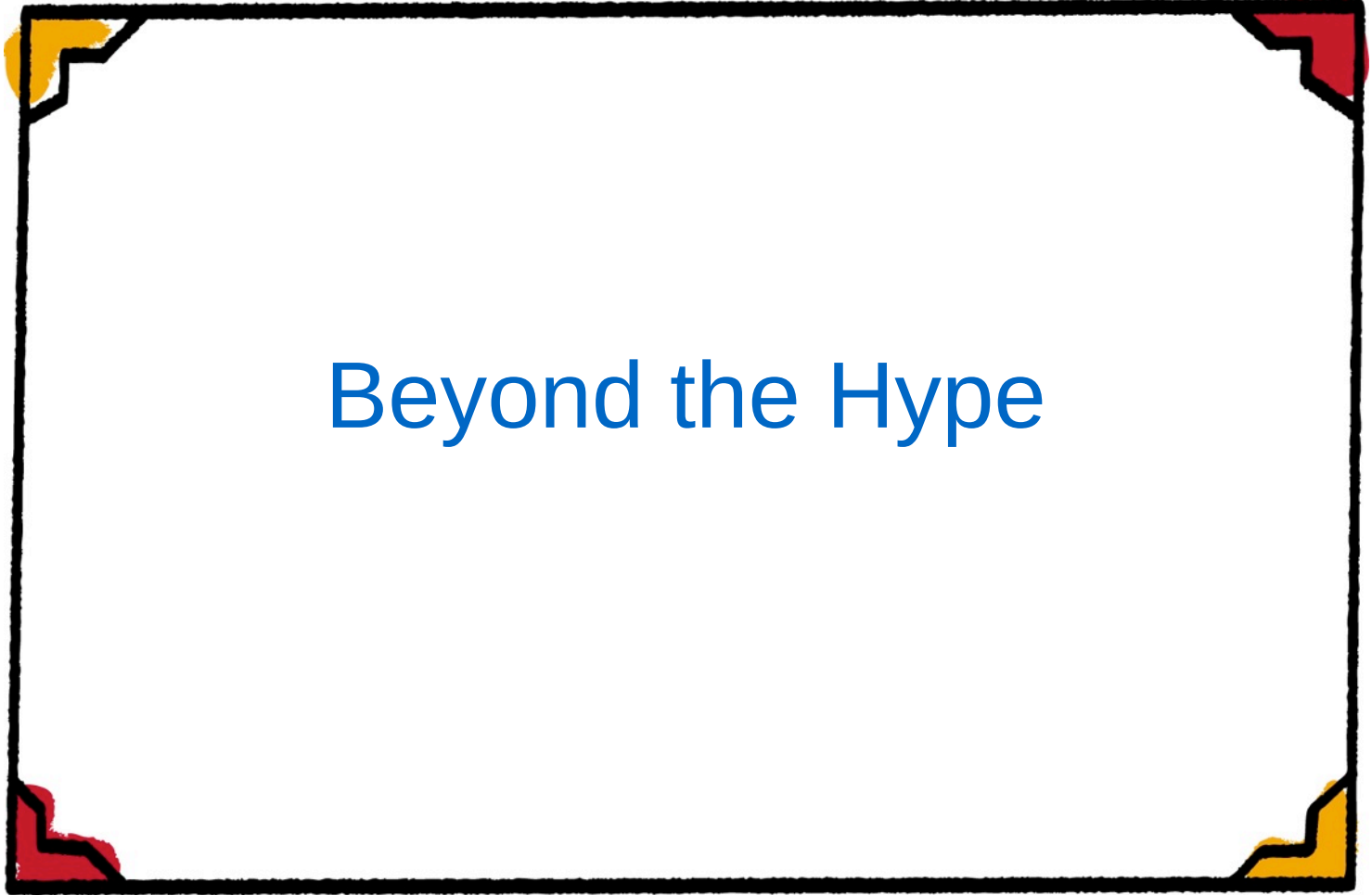
Infra as a Service platforms offer storage management for free/fee



Infra



Physical infrastructure formally abstracted as all data/infra management is S/W defined



Beyond the Hype

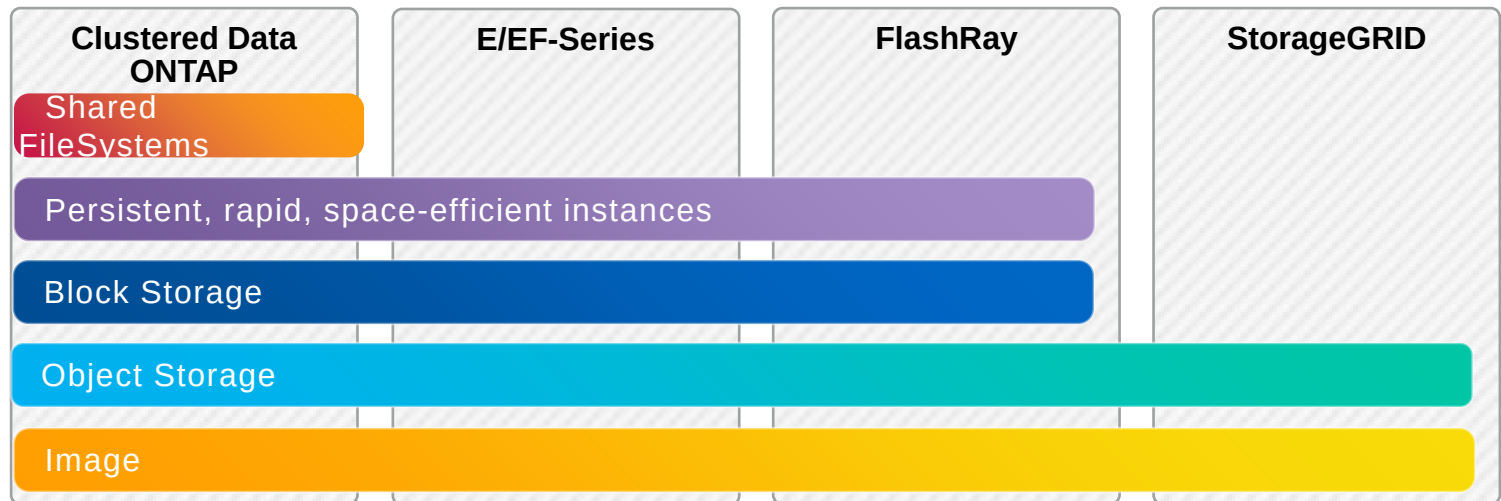
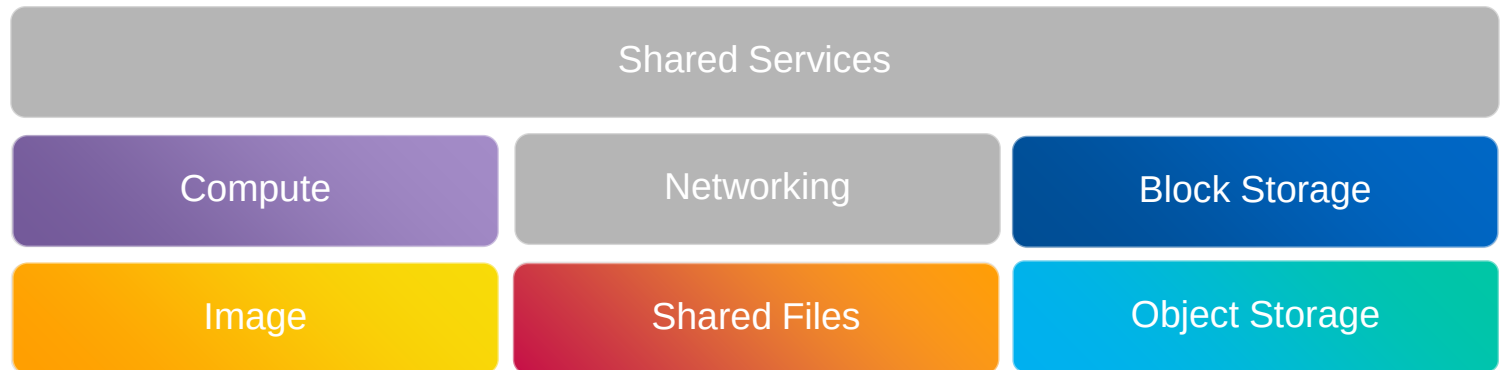


Software Defined *Everything*





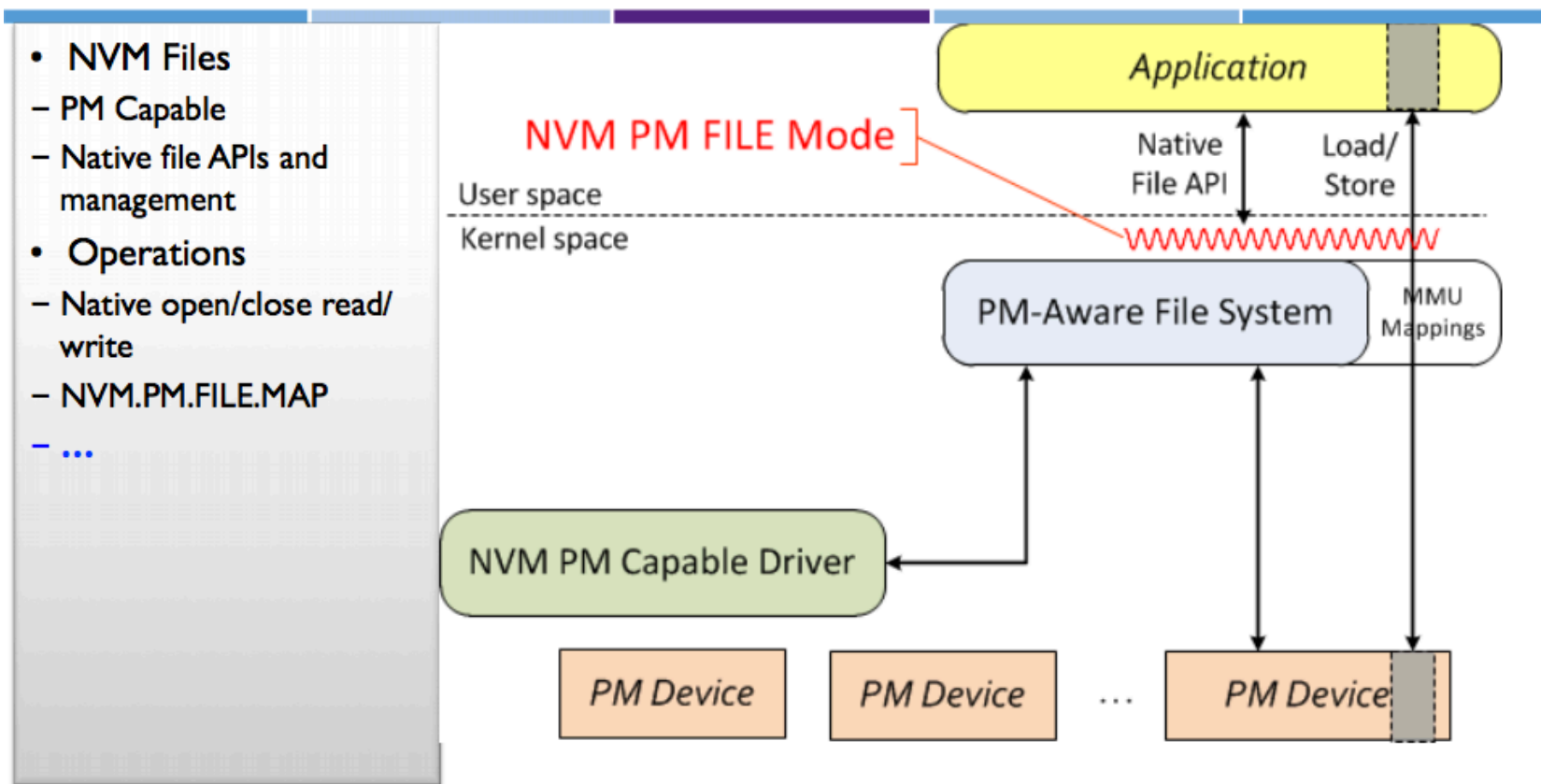
OpenStack



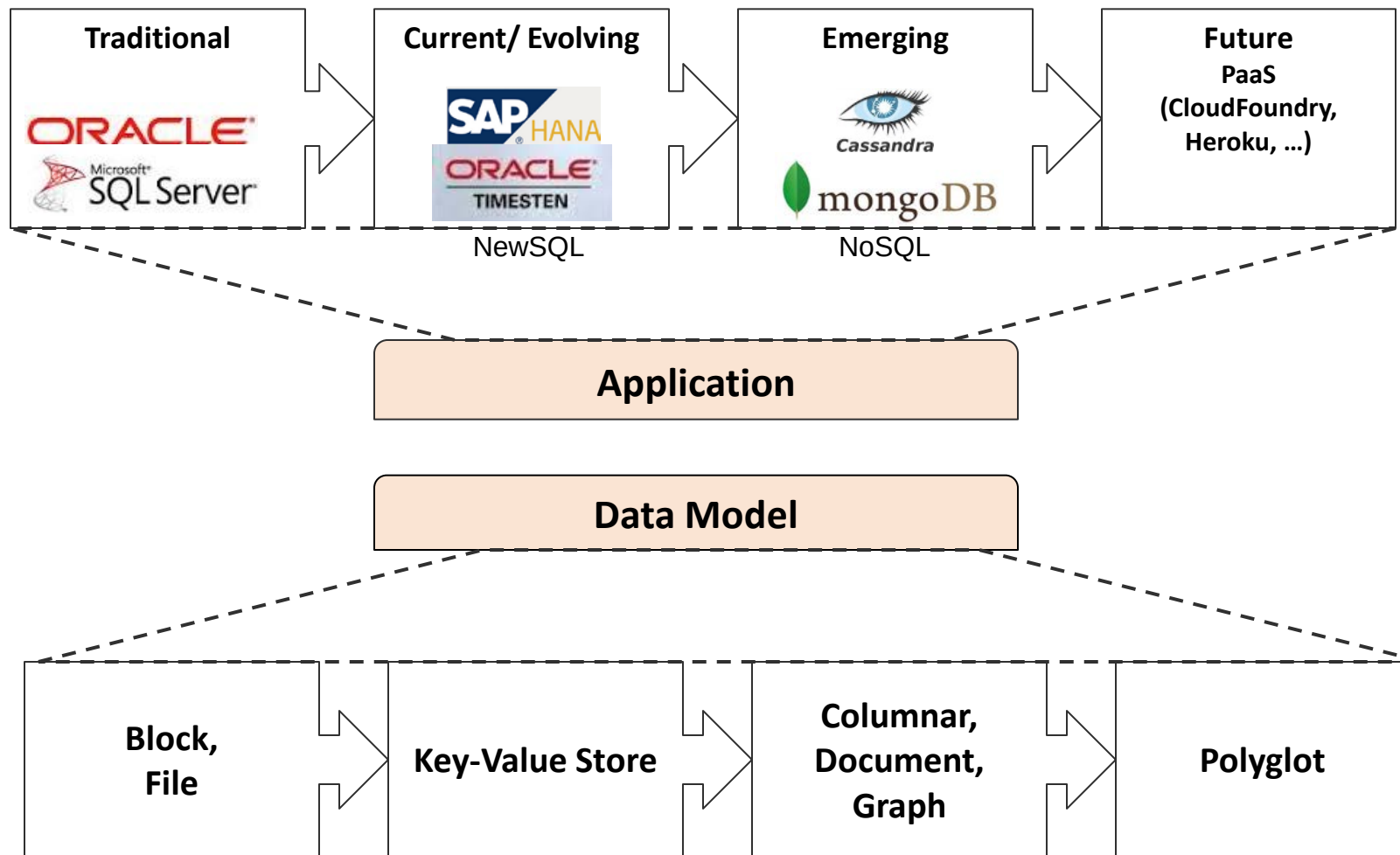
SNIA NVMe / Programming TWG

■ <https://snia.org/forums/sssi/nvmp>

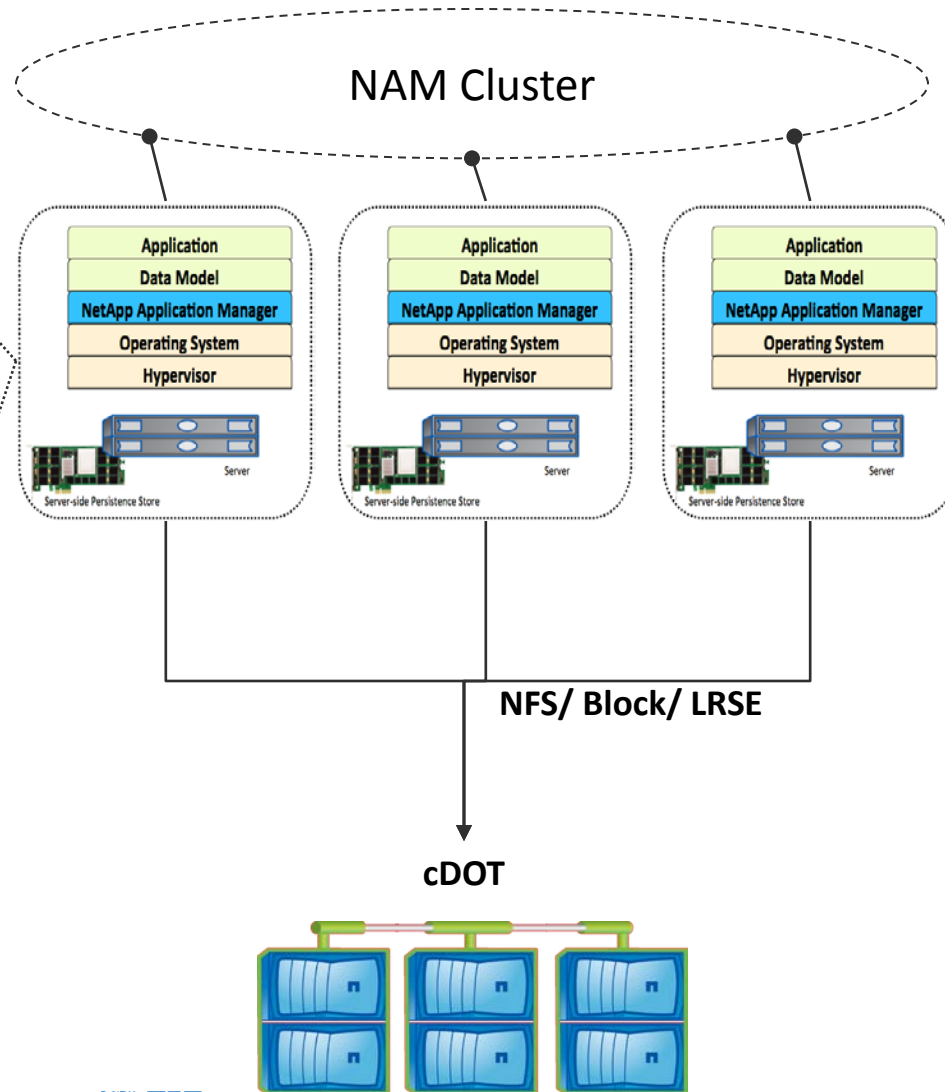
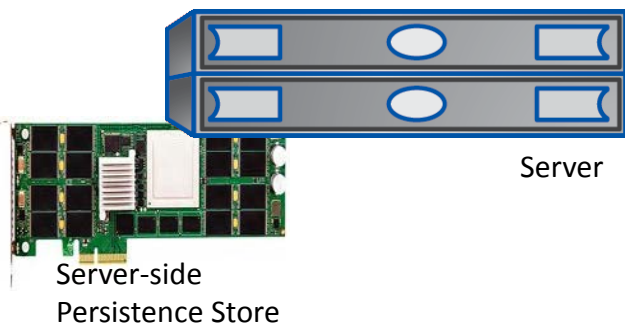
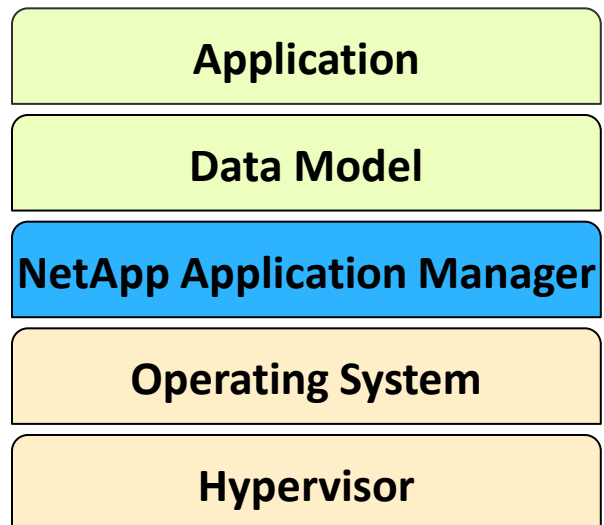
NVM.PM.FILE



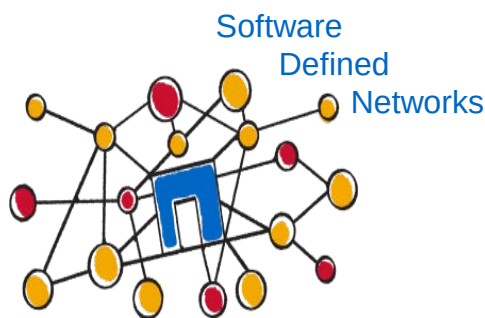
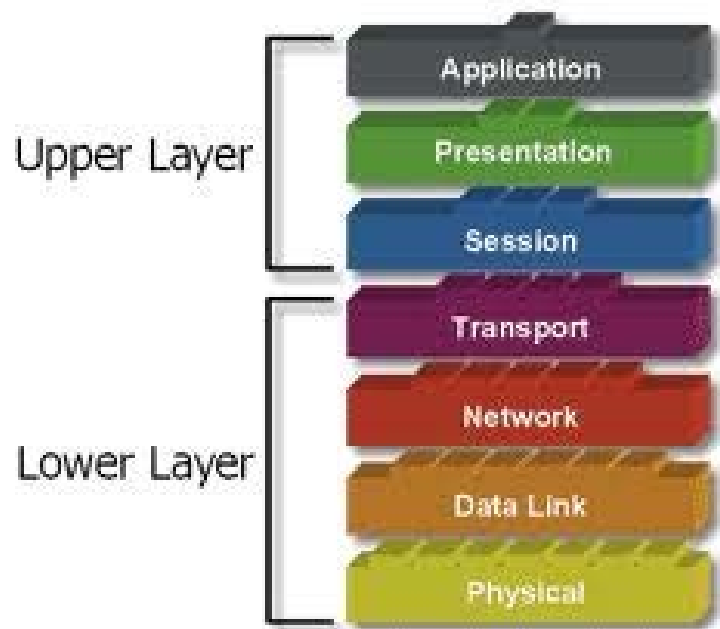
Enterprise Application Landscape



NetApp Application Managers: Context



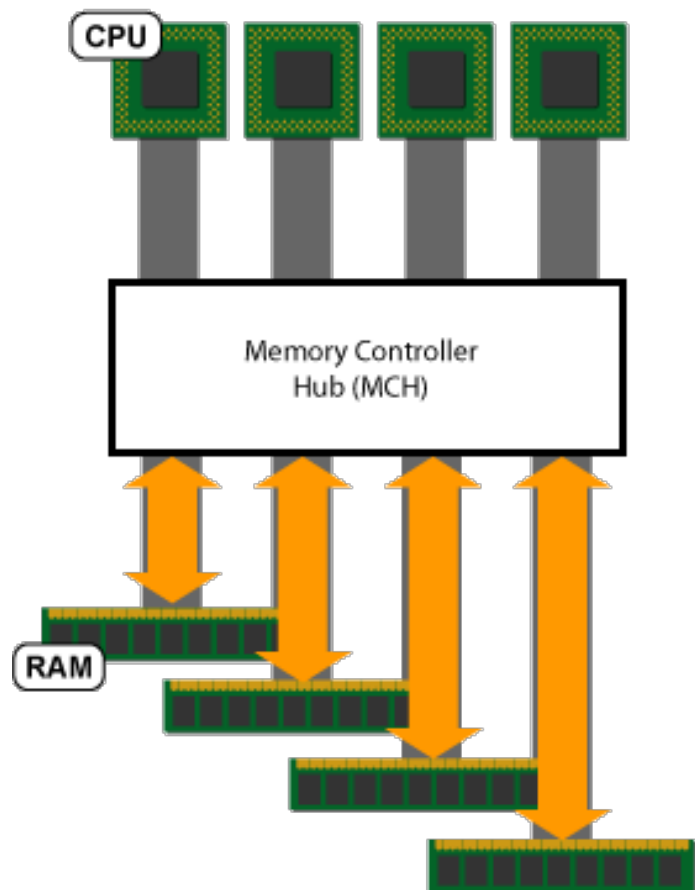
Wither OSI? Networking Trends



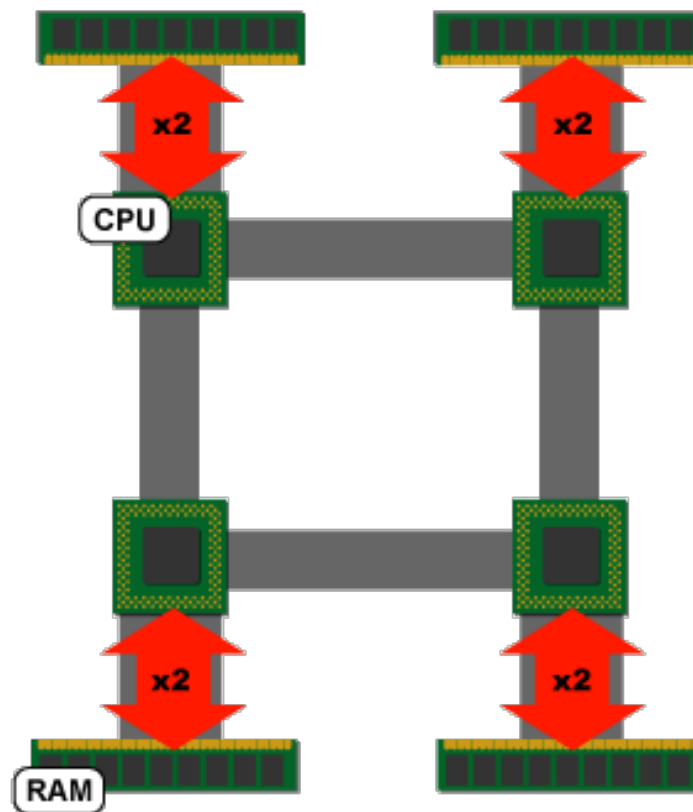
Network:

1. Virtualization
2. Correctness
3. ***Abstraction***

Future Networks? Ethernet→PCI→Memory

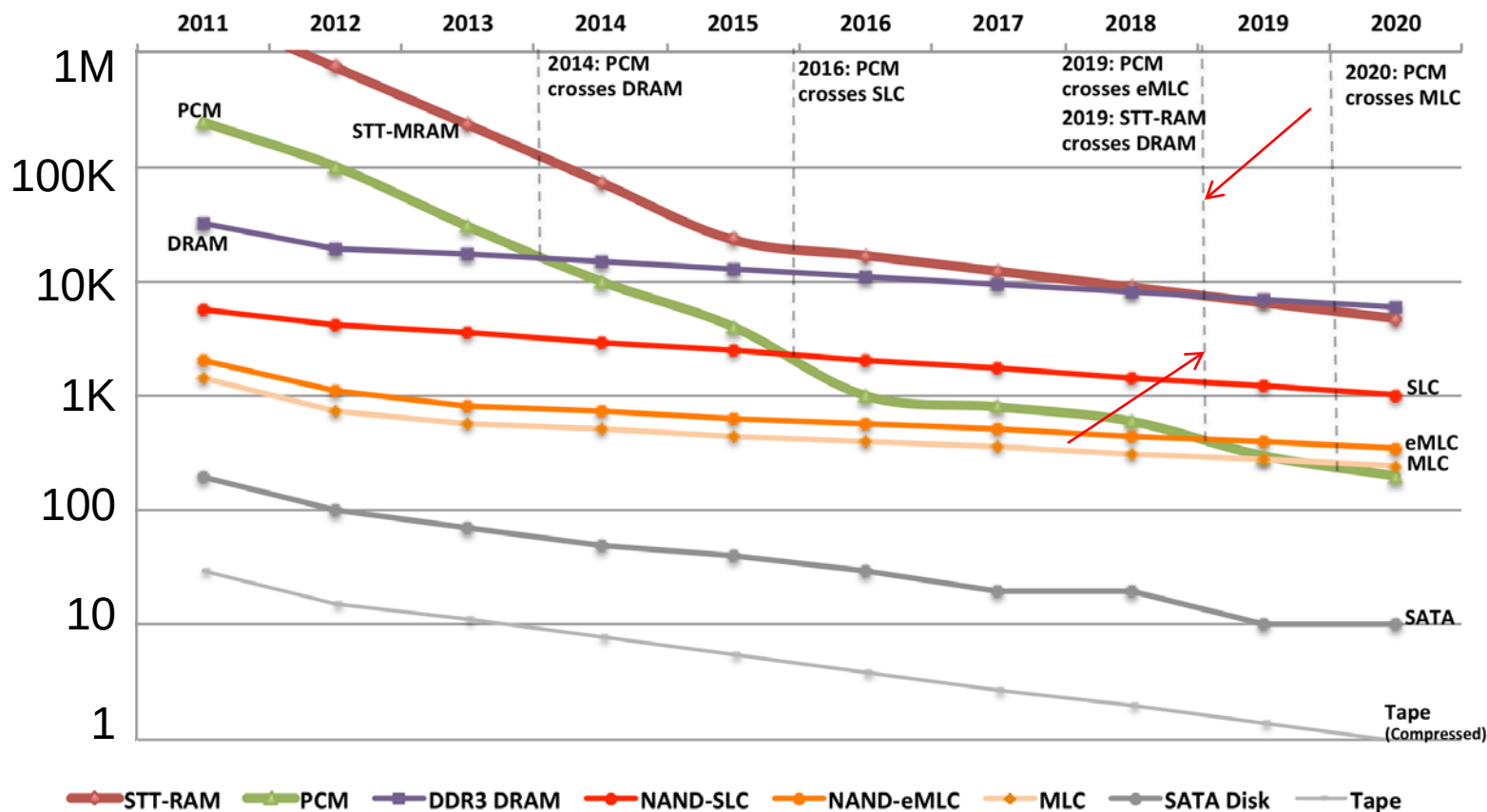


**INTEL'S FOUR-SOCKET
PLATFORM**



**AMD'S FOUR-SOCKET
PLATFORM**

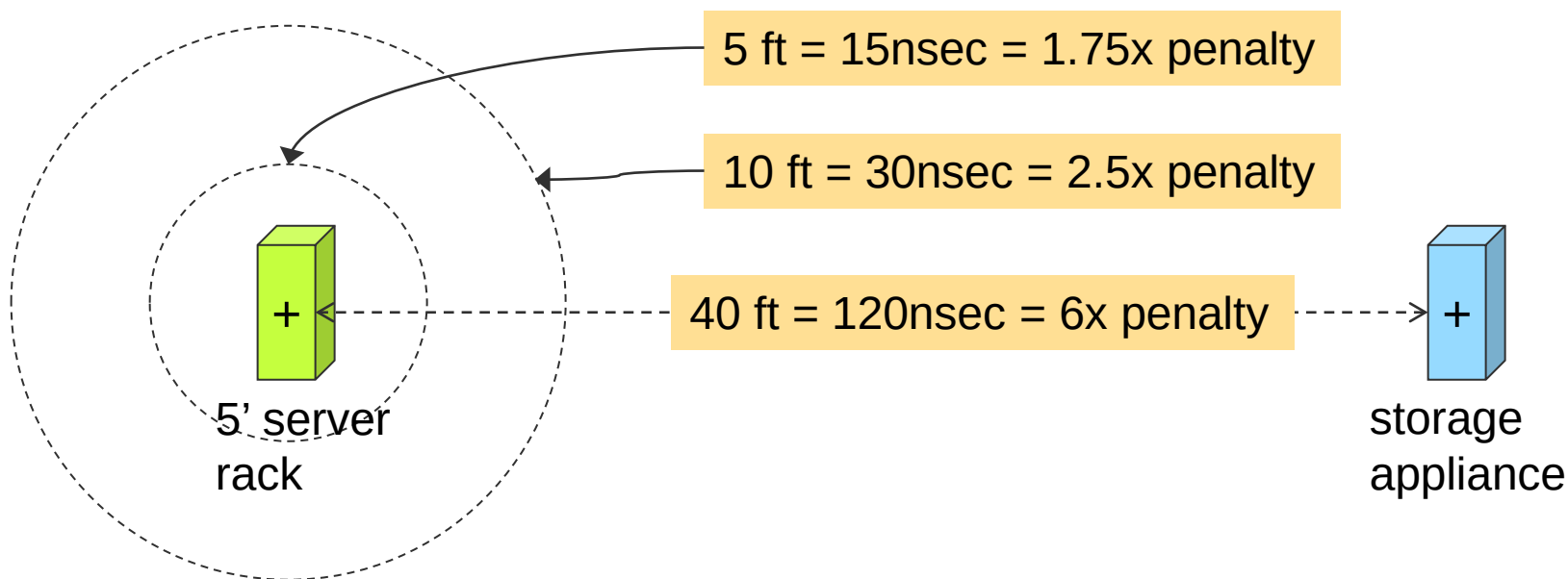
Wither Disk ? and later Wither Flash ??





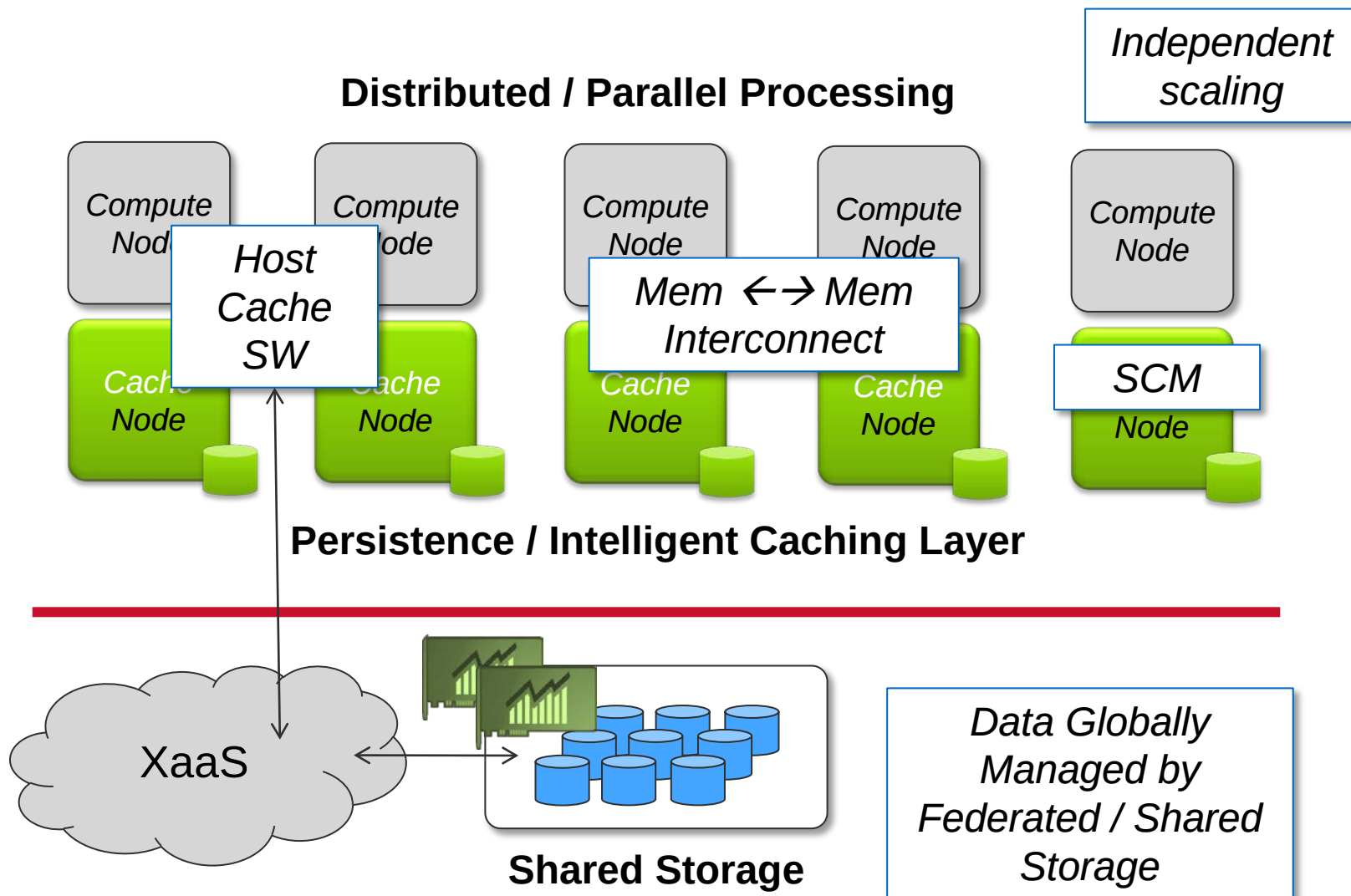
Why Storage Class Memory means the end of traditional Storage Networking.

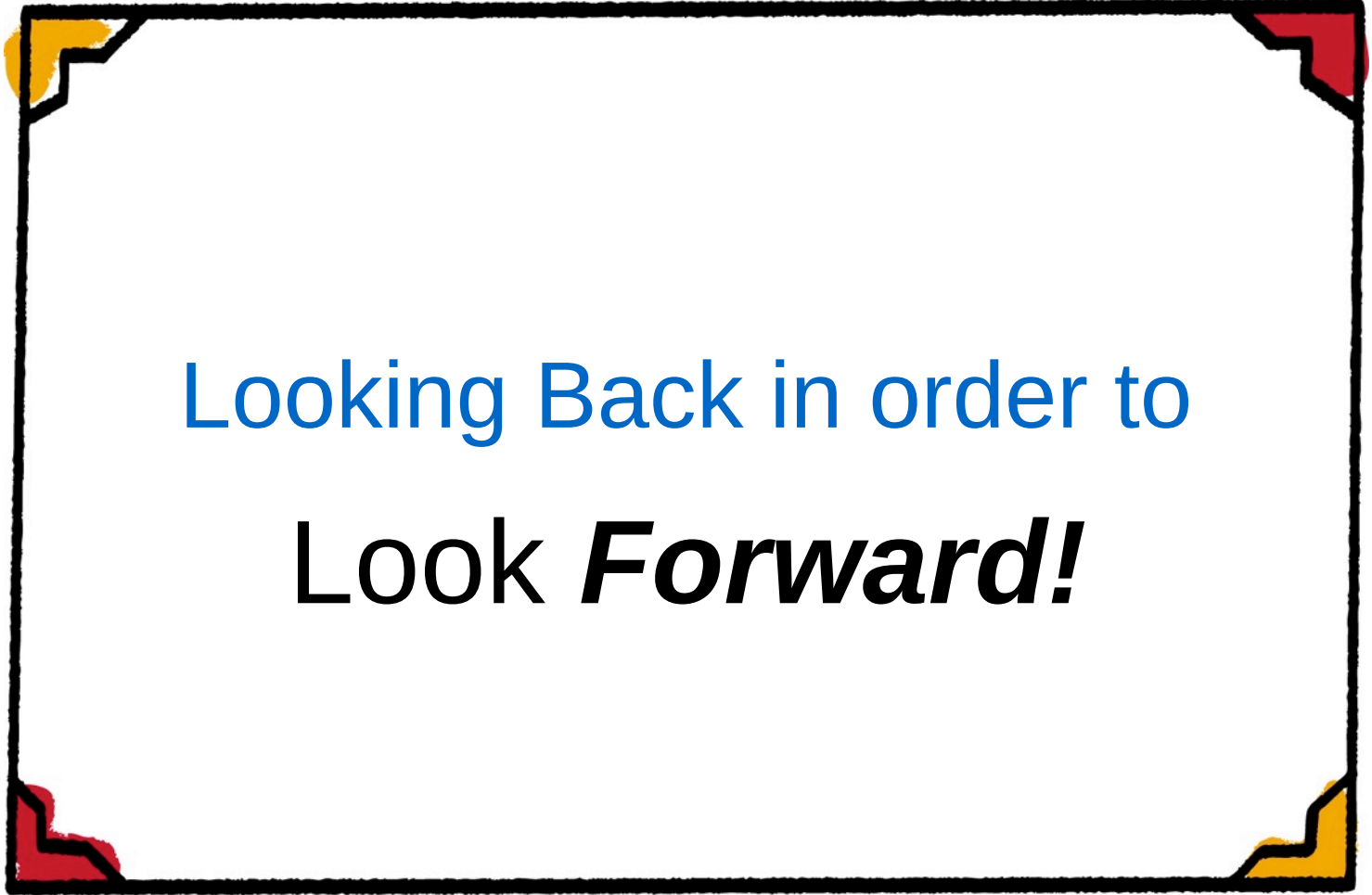
- DRAM $\approx 20\text{ns}$ latency
- Assume 50ns SCM access time (DRAM speed)
- PCIe, InfiniBand latency $\approx 1\text{ }\mu\text{sec} = 21\text{x}$ latency
- Speed of light in optical fiber $\approx .65\text{ ft / nsec}$



New Data Center Storage Stack

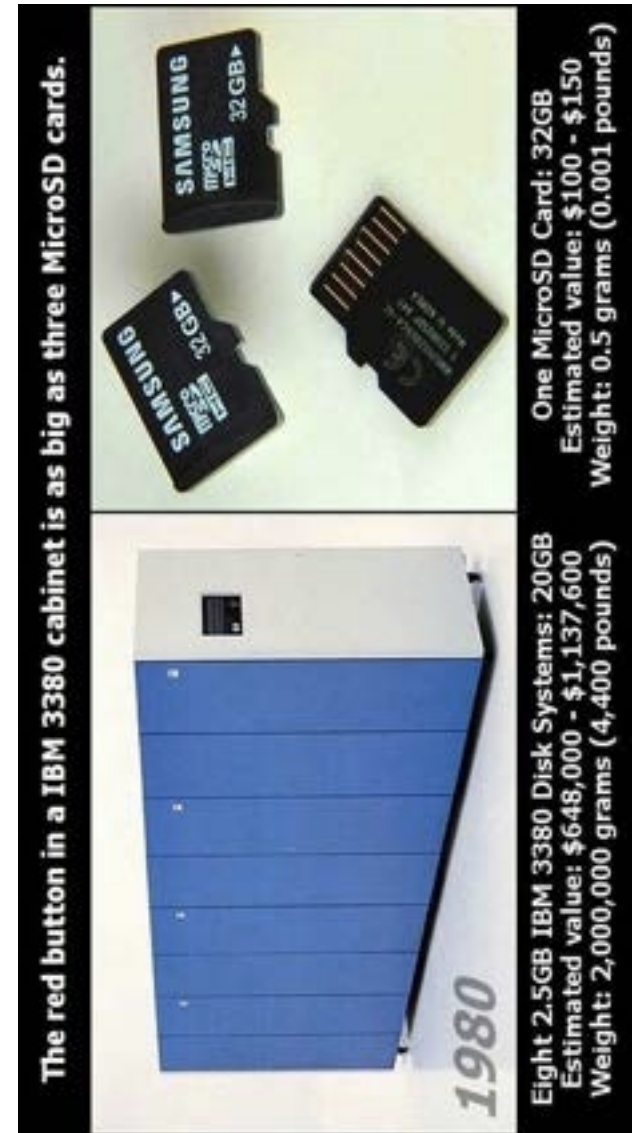
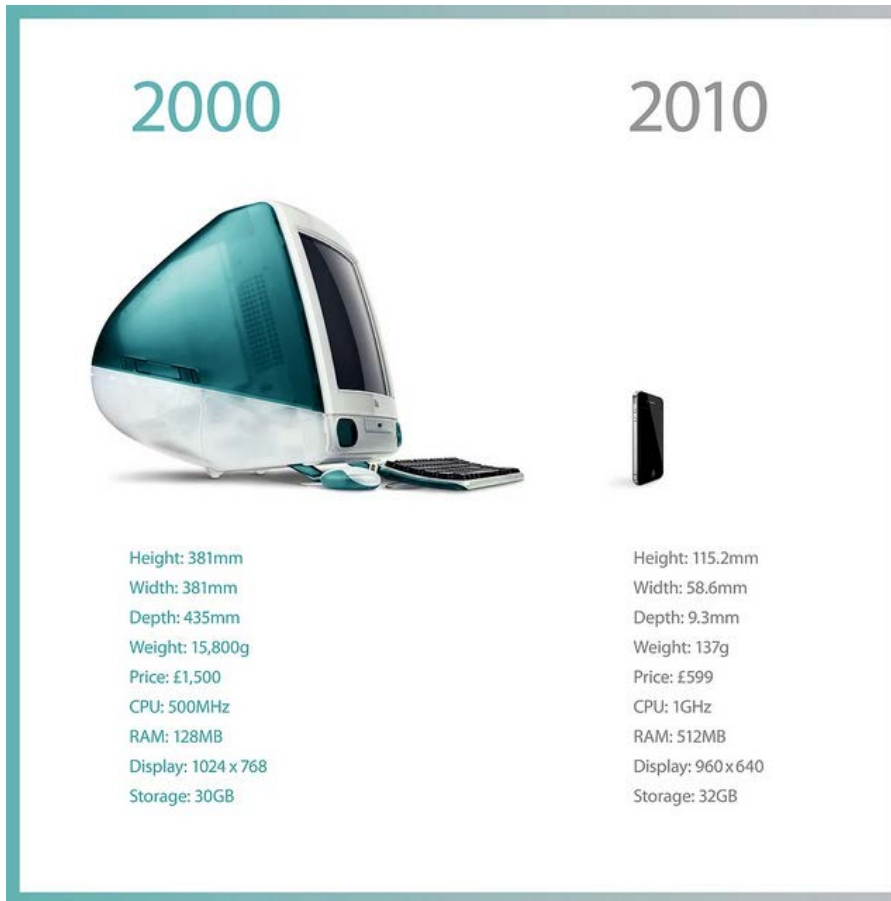
Circa 2017





Looking Back in order to
Look *Forward!*

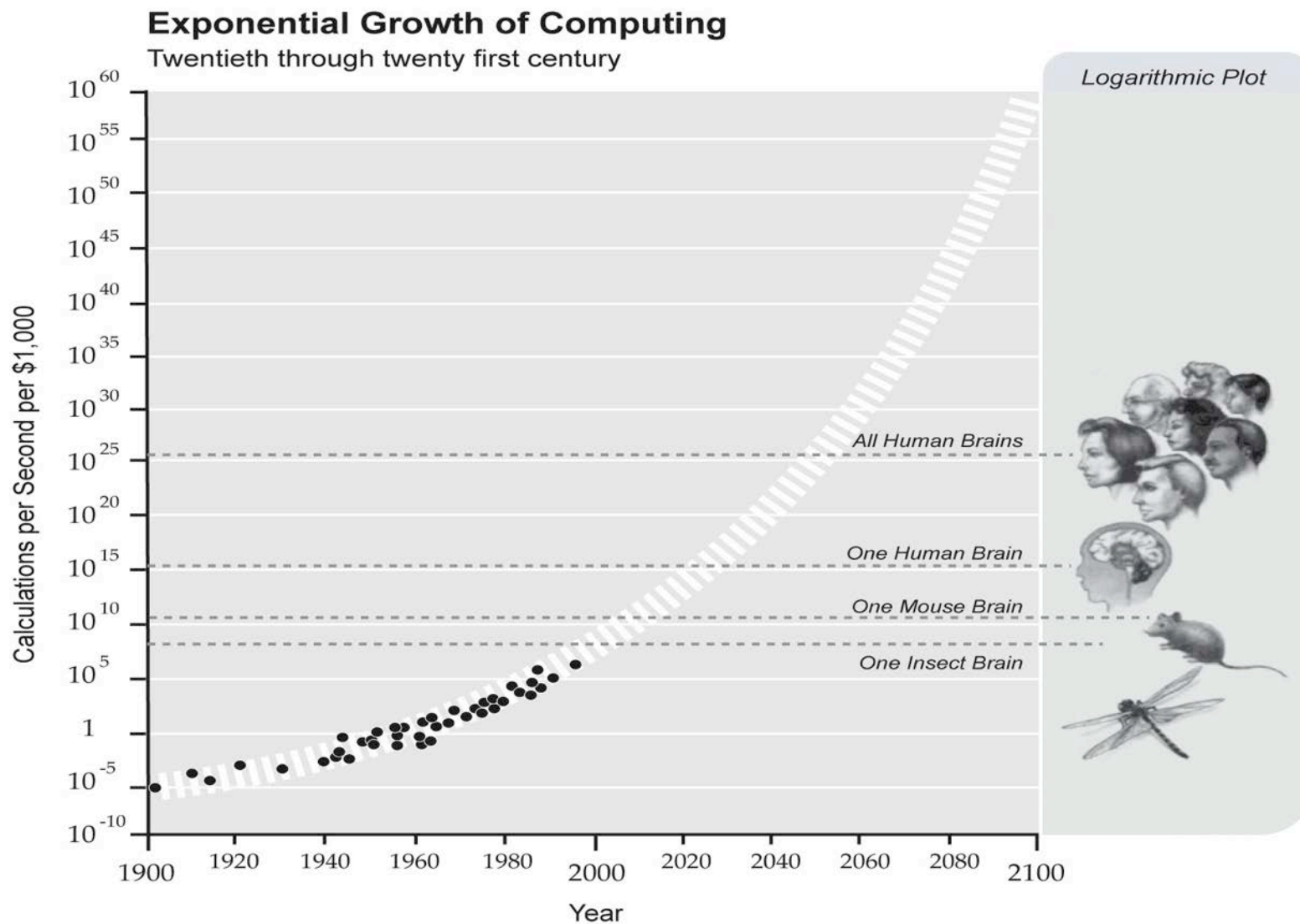
Historical Context



<http://antranik.org/using-moores-law-to-predict-future-memory-trends/>

Science (Fiction?)

<http://www.singularity.com/charts/page70.html>





IBM Watson – Circa 2010!

(SCM + *Fast Interconnect* + *Hadoop*)



[http://en.wikipedia.org/wiki/Watson_\(computer\)](http://en.wikipedia.org/wiki/Watson_(computer))

Thank you

