

HUAWEI ENTERPRISE ICT SOLUTIONS **A BETTER WAY**

Huawei

Converged Infrastructure Vision

Madrid, Oct 24th, 2013

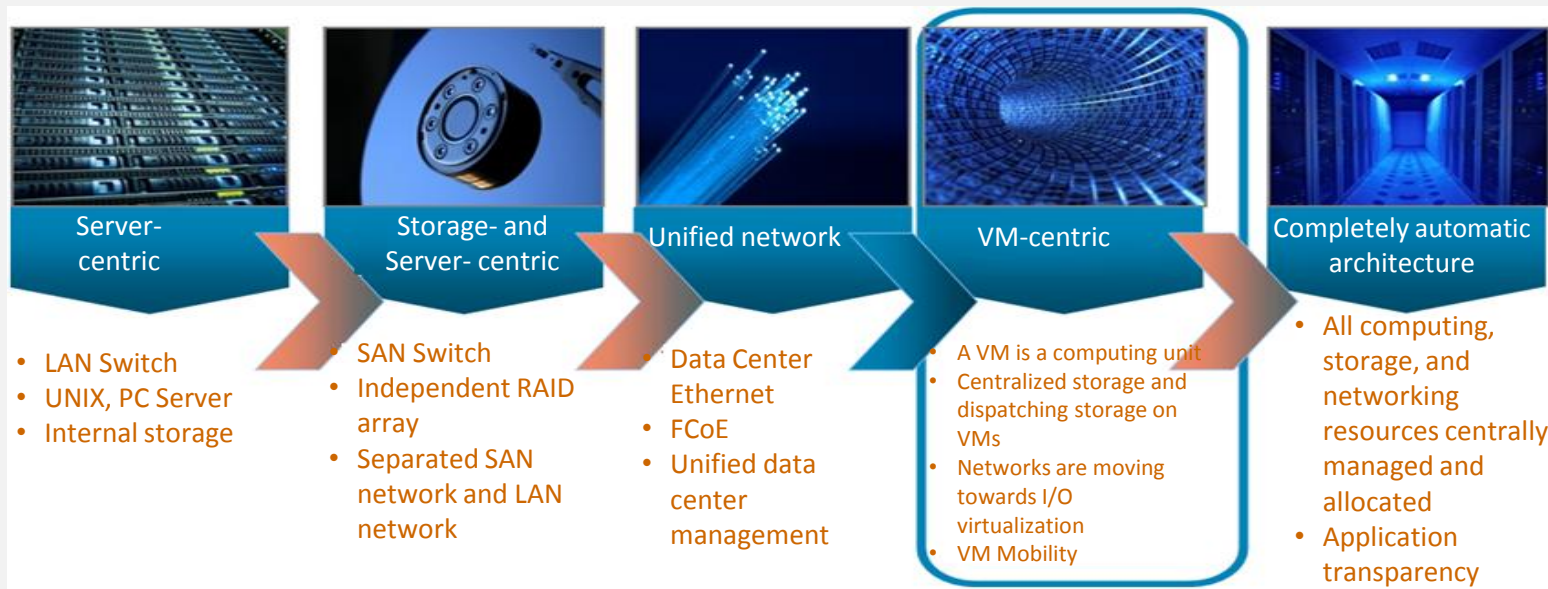
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Data Center Development Trends

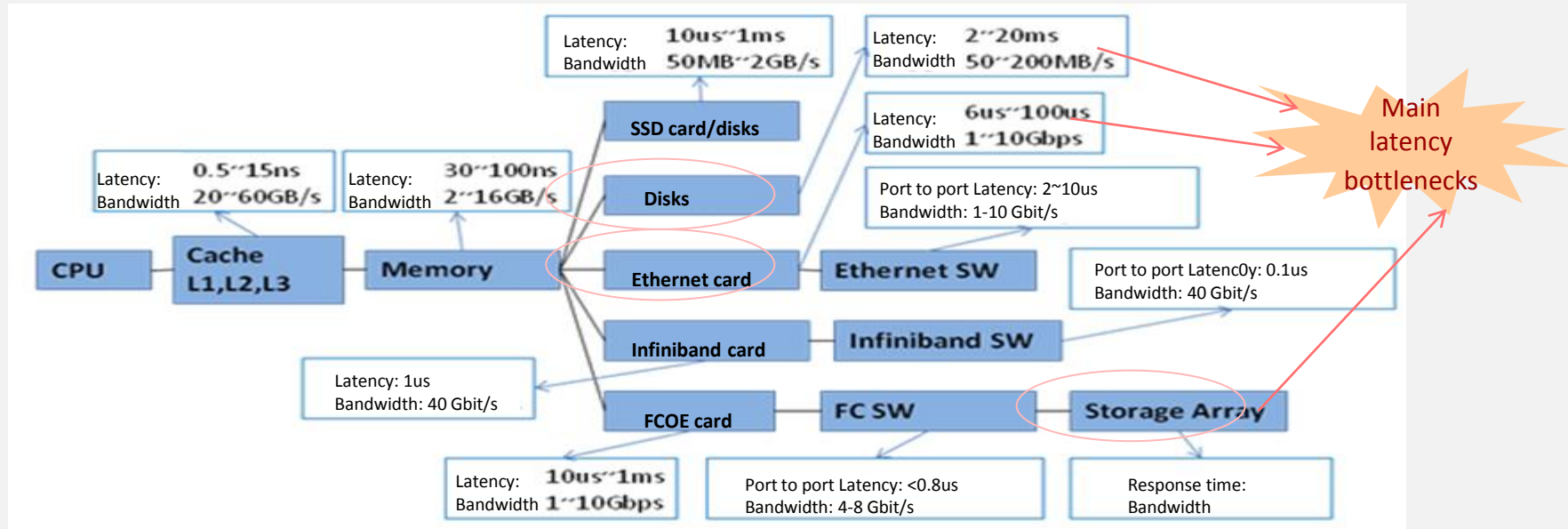


Converged infrastructure benefits:

1. Adapts to service changes: elastic system expansion reduces service risks
2. Enhances application performance: Computing, storage, and networking resources are optimized.
3. Shortens service online time: The resources pool supply shortens the time required for infrastructure construction from several months to several hours.
4. Reduces OPEX and IT costs: Unified management for infrastructure and automatic O&M reduces OPEX and IT costs.

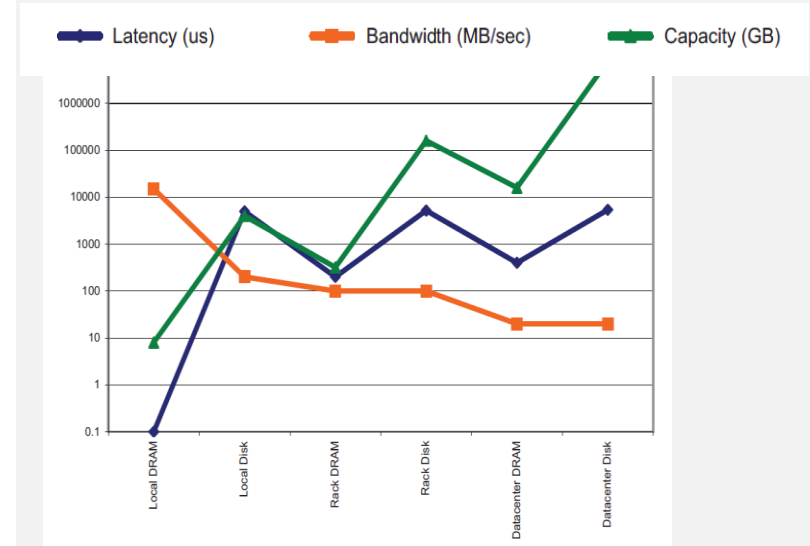
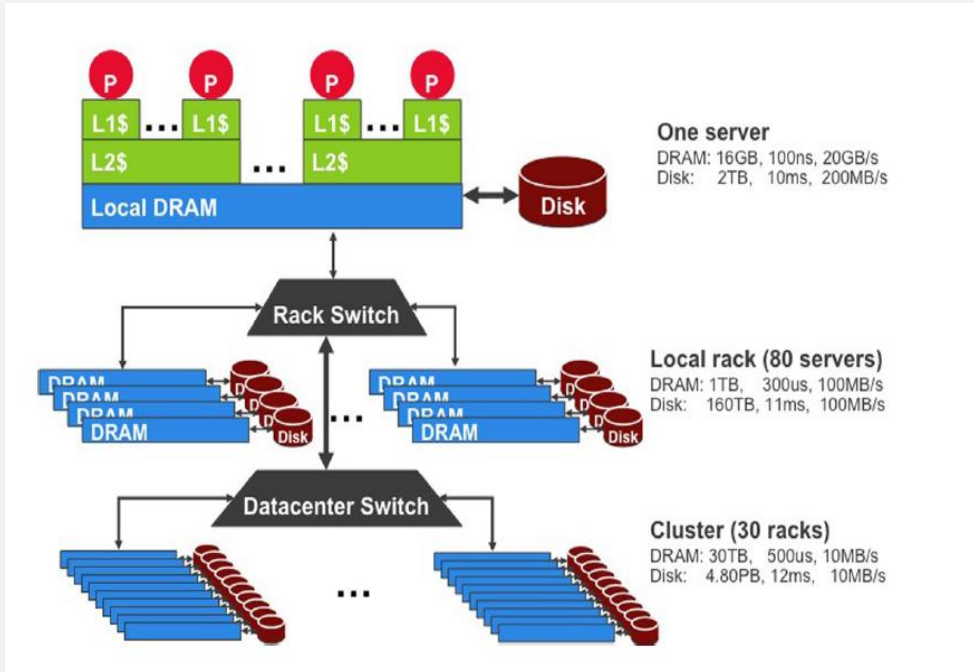
Research by Gartner indicates that 30% of data centers will use converged infrastructure by 2015.

Data-Centric Computing Centers and Network Centers



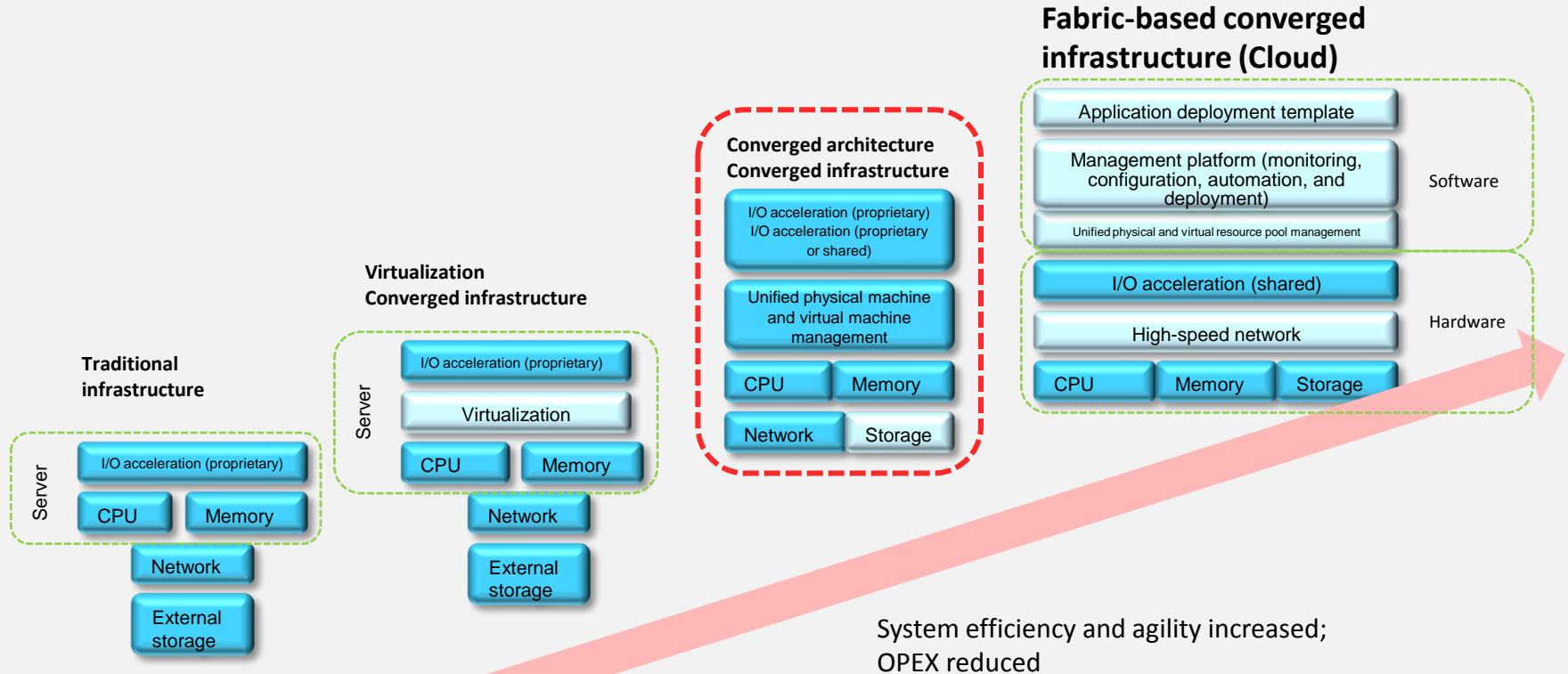
- Data centers need to shift the focus of data lifecycles to form a new balance between computing, storage, and networking resources when application performance bottlenecks occur.
 - SSD flash storage technology is widely used.
 - The data center layer 2 network (low latency, lossless Ethernet), virtual network, elastic cloud network, and software defined networking (SDN) have recently increased in popularity.

WSC Architecture for Tiered Data Access & Storage



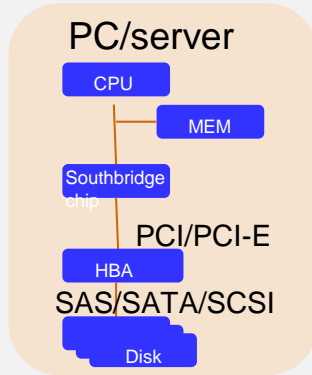
For Data Center with Cloud Computing Scale, the latency for remote RAM/SSD access is far less than local HDD storage with 2 orders of magnitude difference, while the capacity and bandwidth are at the same level.
 -- Abstracted from Google's "Data Center as a Computer".

Converged Infrastructure Development



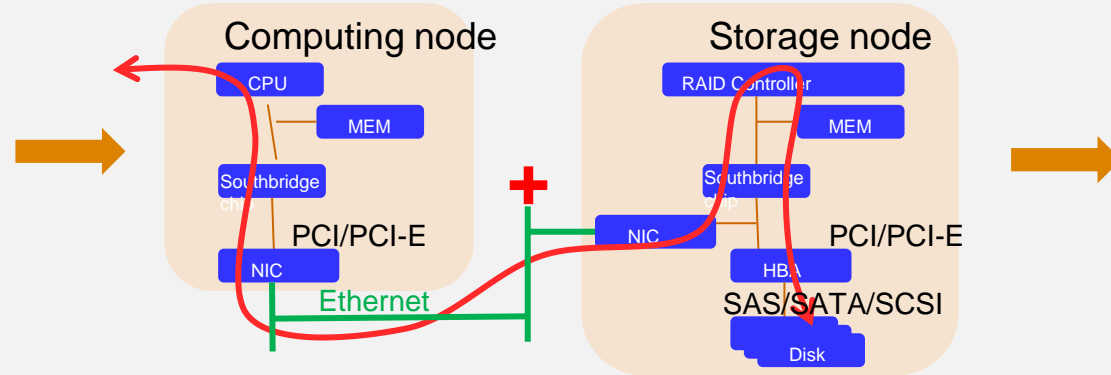
Computing and storage separation

Computing and storage convergence



1980 - 1990

Computing and storage separation (highly reliable virtualization integration scenario with large capacity)

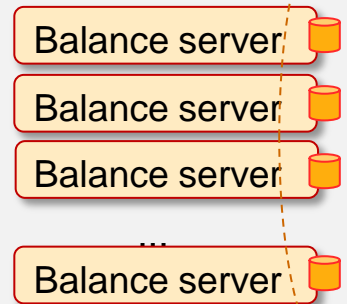
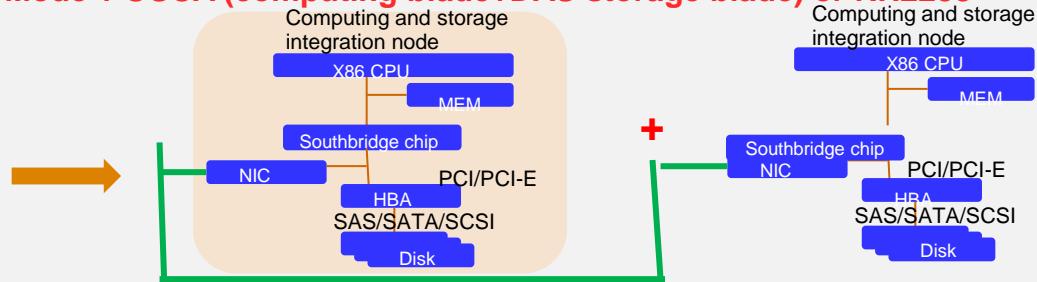


1990 - 2011

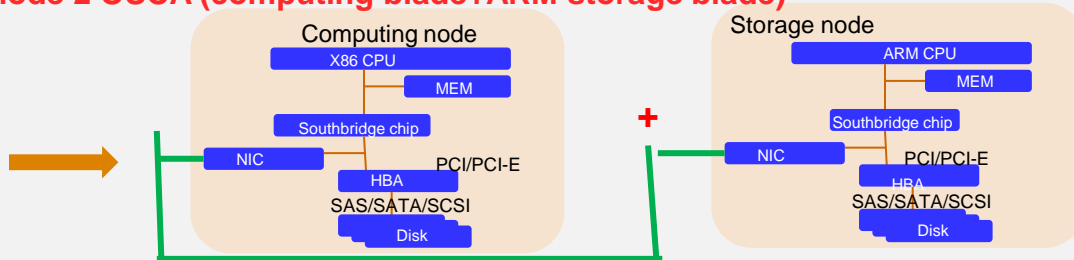
- ✓ **Unbalanced development of computing and storage performances leads to the architectural separation of computing and storage.** The difference between transistor-based computing and disk-based processing keeps increasing, with data storage attracting more concerns. As a result, computing and storage are separated to improve resource utilization.

Hardware architecture with integrated computing and storage

Mode 1 OSCA (computing blade+DAS storage blade) or RH2288



Mode 2 OSCA (computing blade+ARM storage blade)



C1	S1
C2	S2
C3	S3
C4	S4
C4	C8
C6	C9
C7	C10

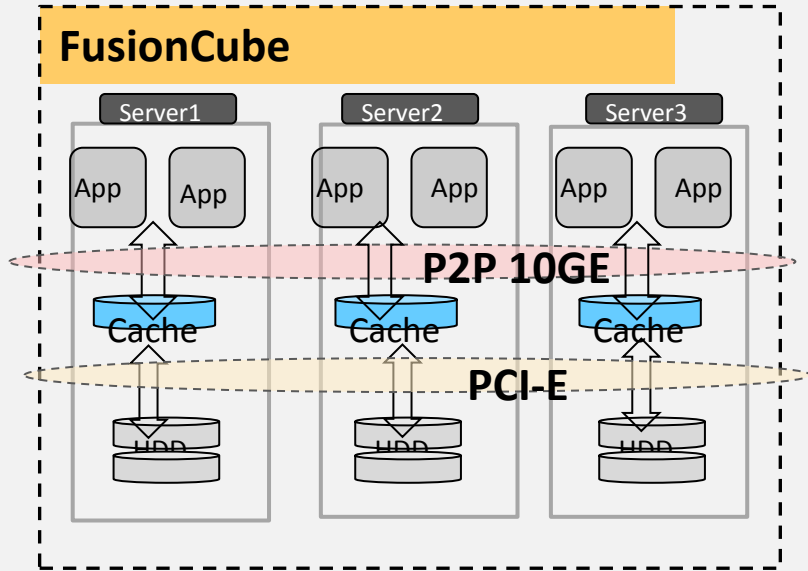
Cn: Computing blade
 Sn: Storage blade
 Computing blade slots are compatible with storage blade slots.
 Mixed insertion of computing blade and storage blade is supported.

2012 + --?

With the use of P2P block storage mechanism in cloud OSs, resource pools and the virtualization technology are applicable to the DAS in the server cluster. The physical separation of computing and storage evolves to the physical convergence and logical separation of architecture to support typical enterprise application consolidation with the minimum cost.

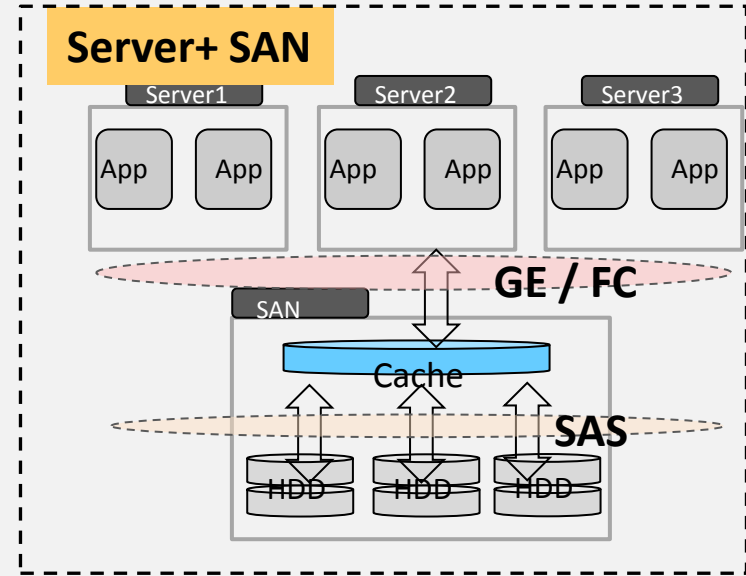
Most IT applications for business transactions of enterprises focus on the instant processing of information instead of the storage or archiving of data. The convergence of storage and computing can meet this basic requirement of applications.

IO Performance Enhancement enabled by Scale-Out Computing-Storage Convergence



For random IOPS:

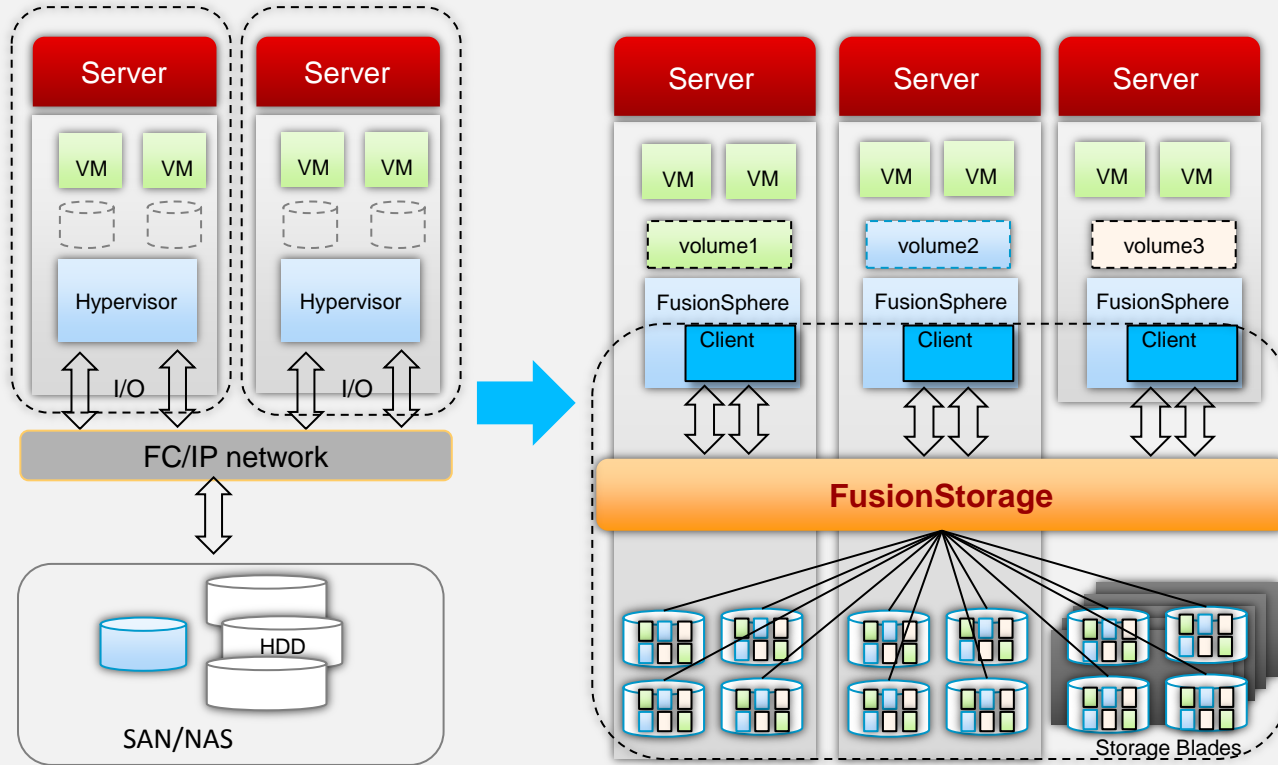
- ✓ Based on Dsware distributed storage engine, total capacity of server cache is more than 5 times larger than that of centralized SAN controller, thus result in 3-5 times better hot-data hit-rate and on-line IOPS performance;
- ✓ SATA can be adopted to substitute SAS to achieve comparable performances with half the cost



For sequential IOPS (esp. large Files):

- Much more number of HDD can serve the same App or VM instance under the flat P2P architecture, with peak burst MBPS escalated 3-5 times;

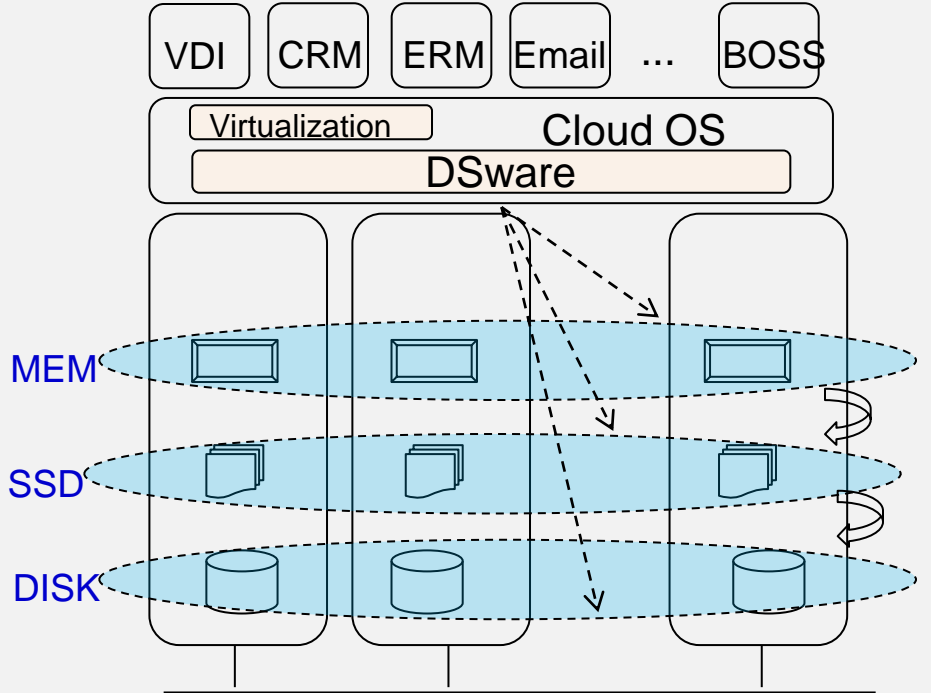
Scale-out Distributed Storage



- **High Performance**
 - Parallel I/O
 - **10X** total IO throughput
 - **3-5X IOPS** improvement
- **High Reliability**
 - Replications cross nodes
 - Quick data rebuild (**30min** vs. **12hrs** for 1 TB)
- **High Scalability**
 - Up to 2000 nodes
 - **Linearly scalable** in both capacity and performance

Typical applications of converging computing/storage resources in enterprise appliances

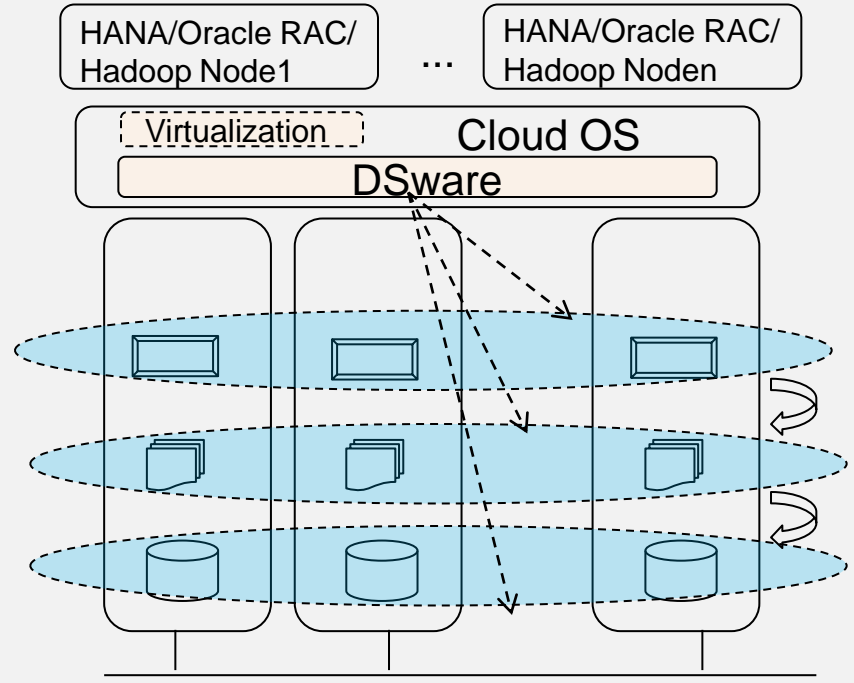
Converged infrastructure



Converged Fabric (10GE/IB/PCI-E)

Aggregated multiple small-granularity independent applications

Appliance



Converged Fabric (10GE/IB/PCI-E)

Exclusive single large-granularity distributed application

FusionCube – A True Converged Infrastructure



Scale On Demand Smoothly

- **Start from small**
- One chassis - Half configuration with 4 full-width blades



- Up to 8 chassis concatenation **w/o external switches**
- Up to 4096 vCores, 96TB RAM, and 1.9PB Storage



- Scale out with external switches
- **Auto-discover, auto-configure**
- Up to $20 \times 3 \times 512 = 30,720$ vCores, 240TB RAM and 6PB Storage



Single Chassis



One Rack with 3 Chassis



Multiple Racks



Up to 20 Racks



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