

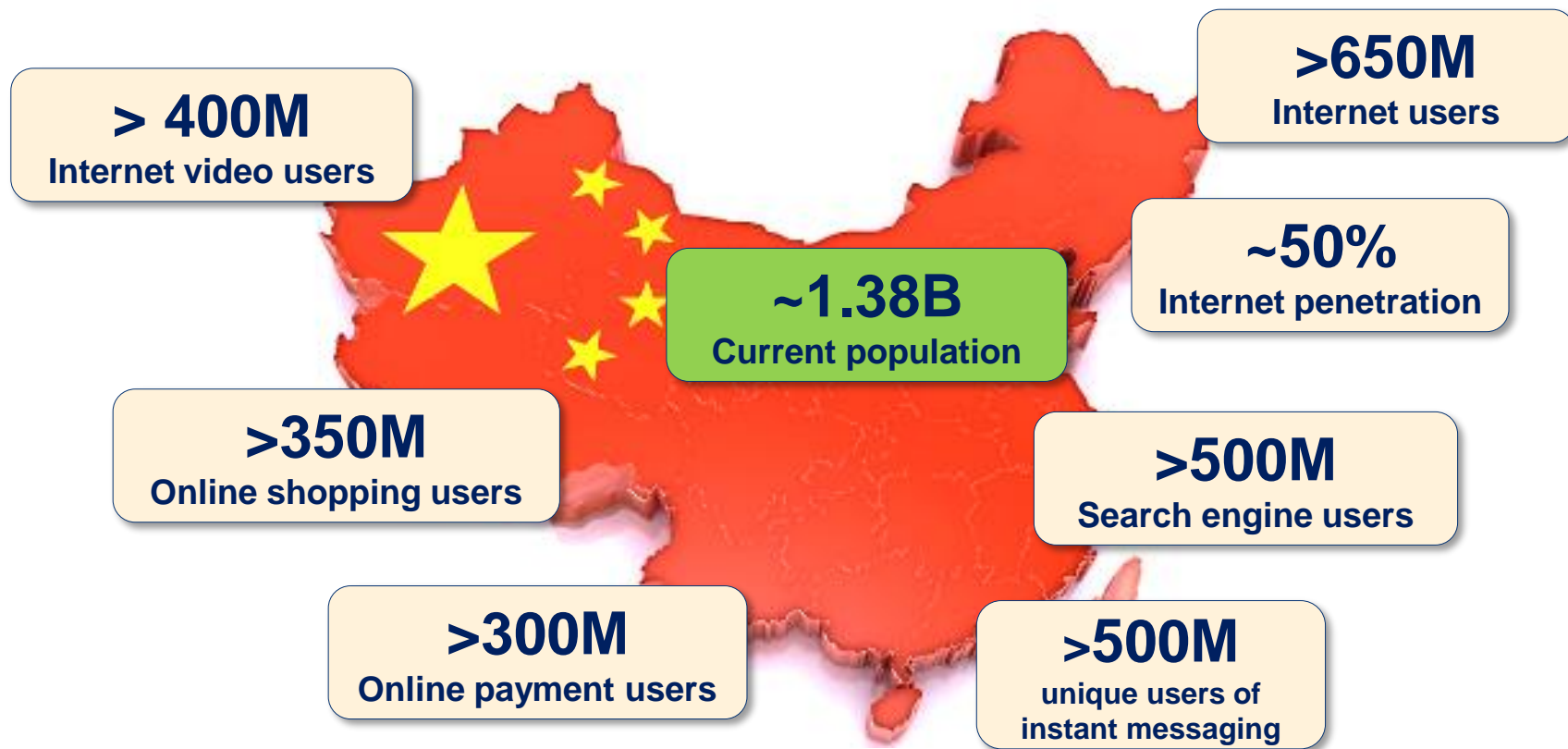


# **Microsemi - *Leading Innovation for China's Hyperscale Data Centers***

Andrew Dieckmann  
Sr. Director, Scalable Storage Product Marketing

- China – A Storage Growth Engine
- Data Center Storage Trends
- Microsemi – Positioned to Power the Cloud

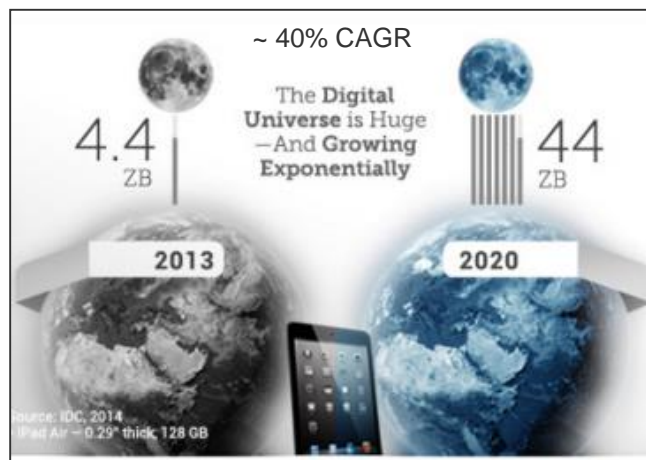
# 中国的网民



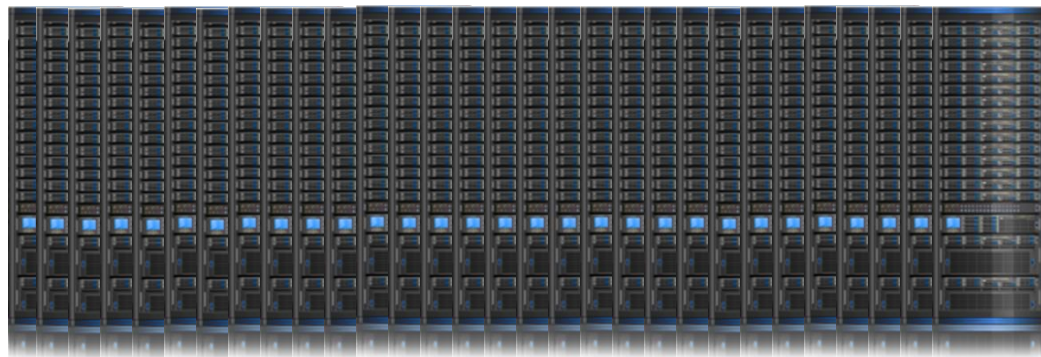
中国现在有世界网民的人口超过百分之二十。  
中国人每天超过二点六小时上网。

\*Source: CNNIC

# “不可用”的泽字节时代



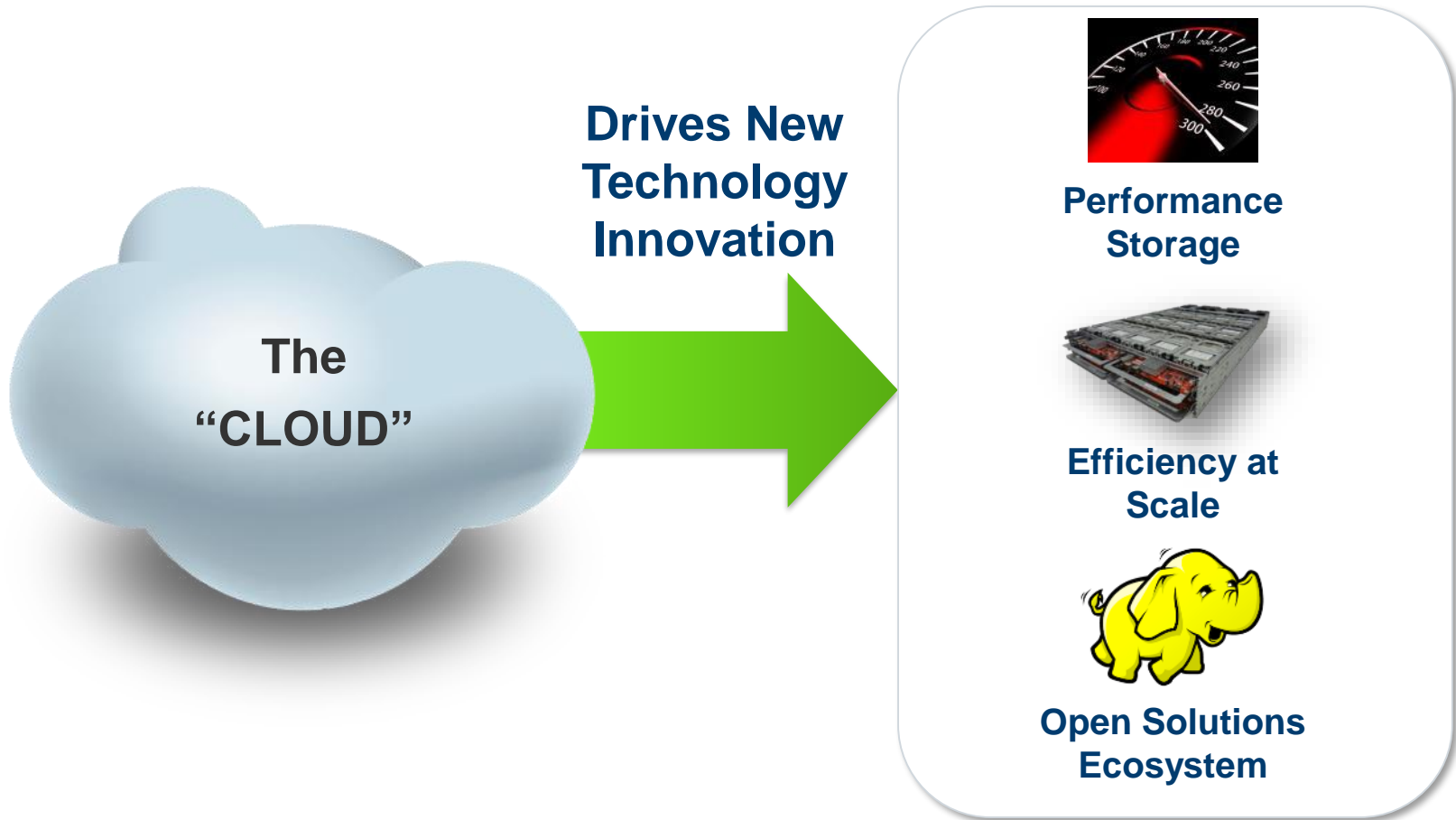
To address 20% of the estimated total storage of 44ZB in 2020 would require 8.8ZB of capacity  
...Assuming 10TB HDDs, that would be ~2PB of storage per average rack @ 20KW/rack ...



That will require  
4.4M racks and  
88GW!!!!

数据中心催驶设施效能

# 大量的数据催驶数据中心的进化



- China – A Storage Growth Engine
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# 市场趋势：性能存储 – NVM对高速计算的好处

HDD  
Capacity Only



Flash NVM



← TLC

New Persistent Tier



Property	HDD	PCIe SSD	NVRAM
Transactions	400 IOPS	800,000 IOPS	Up to 10,000,000 IOPS
Latency	15,000 us	50-100 us	<10 us (DDR4)
Bandwidth	200 MB/s	3,200 MB/s	17GB/s
\$/GB	\$.05/GB	\$1.00	\$5.00/GB

Microsemi的NVM技术是正在生产新一代的存储的行业。

# Microsemi Flashtec™ 存储控制器

## 进化高性能存储



**World's Highest  
Performance and Capacity  
PCIe NVMe Controller**

- 800k IOPS
- 20TB



**Programmable Architecture  
"Software Defined Flash"**

- Optimize solutions for: cost, performance, and endurance
- Flexible Host IF Support



**"Enterprise Class"  
for the Data Center**

- Reliability – Data Integrity, Security
- Availability – Industry's only Dual Port
- Serviceability – NVMe Management





# 介绍新存储模式

## Microsemi Flashtec™ NVRAM



**Establishes a New Storage Tier with Superior Performance**

- Non-volatile DRAM – DRAM performance, NAND persistence
- Over 10 million IOPS
- Sub-microsecond latency



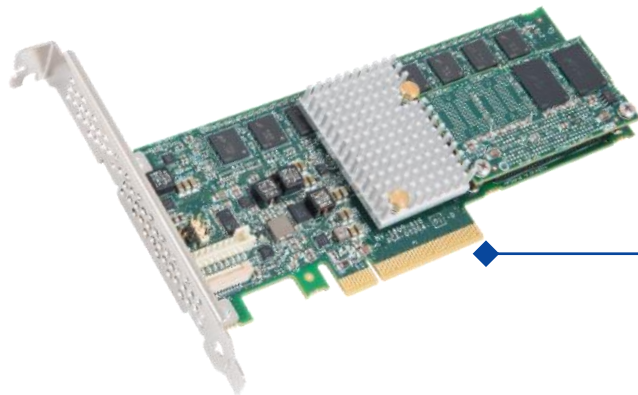
**Enables Faster Time to Market and Lower Cost of Ownership**

- Industry-standard interfaces
- Application friendly for ease of integration
- Zero maintenance green backup

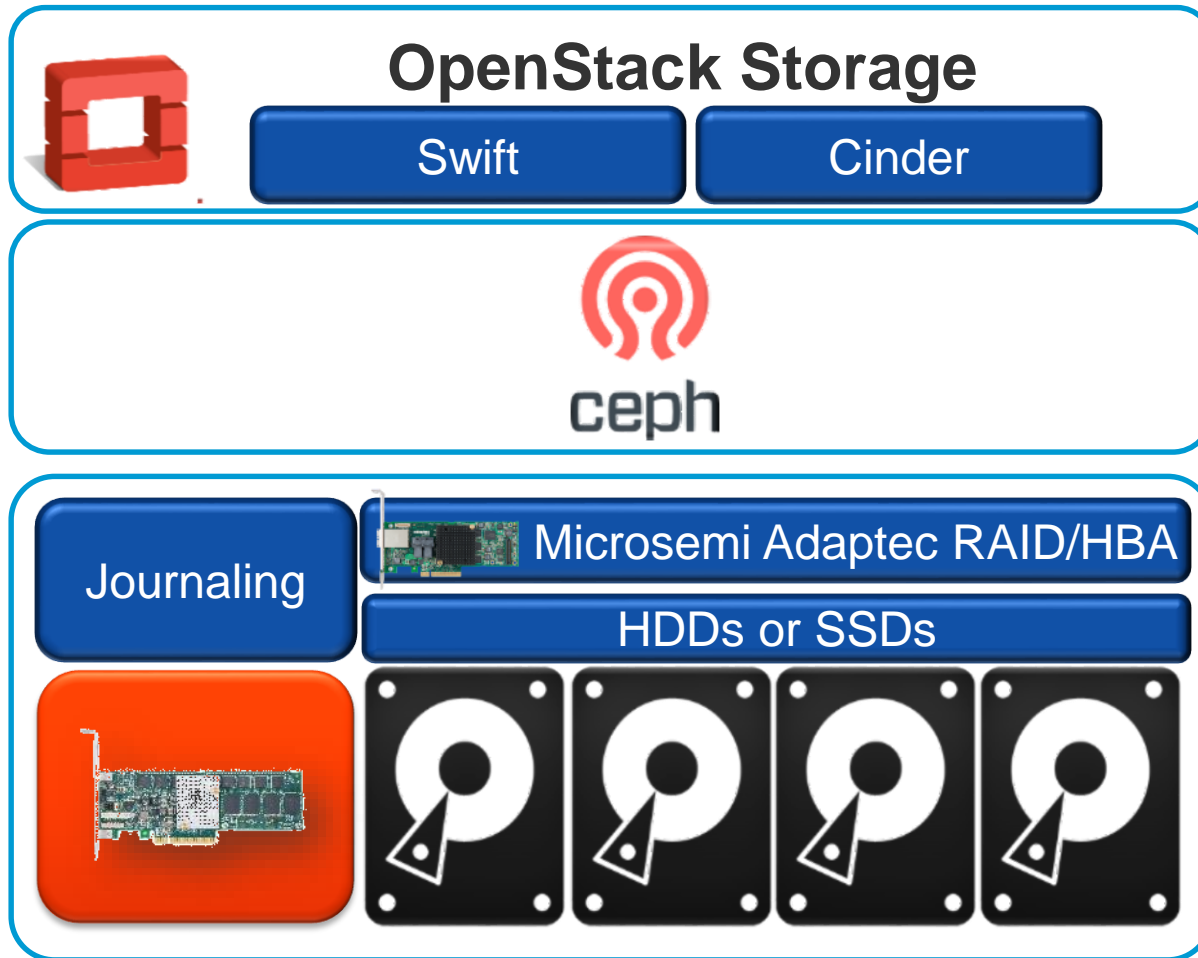


**“Enterprise Class” for Mission Critical Data Center Applications**

- Uncompromising quality and reliability
- DRAM endurance
- Small form factor, high-density rack solutions



# Microsemi避免OpenStack的存储动态记录瓶颈



为了提高电脑的性能和非易失性，用Microsemi NVRAM 取代硬盘。

# Switchtec™ PCIe Gen3

## 多输出交换器和存储交换器

### PFX PCIe Fanout Switch



### Resilient and Flexible PCIe Solution

- Scalable up to 48 ports, 48 NTBs, 24 virtual switches
- Flexible bifurcation (x2, x4, x8, x16)
- Error containment (Hot- and Surprise-Plug)
- Reliability / Quality – 5<sup>th</sup> generation SerDes
- Advanced diagnostics and debug
- Low power
- End-to-end data integrity
- 96, 80, 64, 48, 32, 24-lane variants

### PSX PCIe Storage Switch



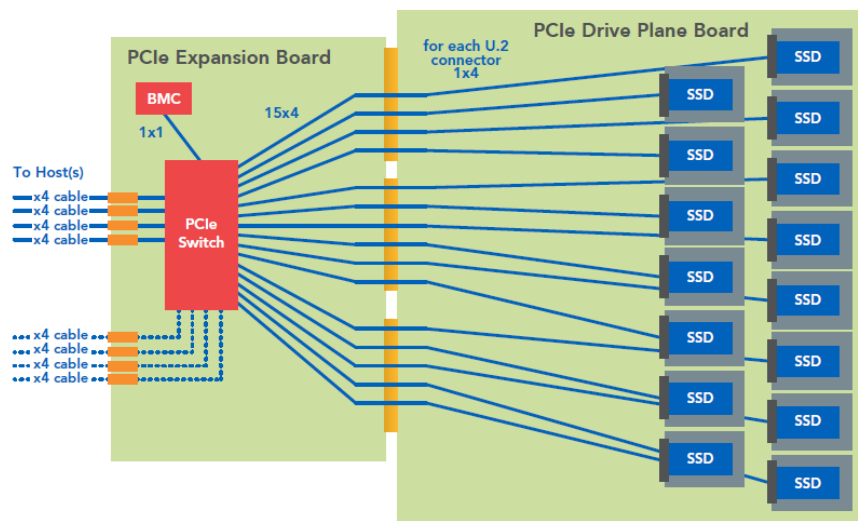
### Programmable PCIe Switch

- Superset of PFX, completely pin-compatible
- SoC architecture / SDK enables customization and differentiated solutions (e.g. internal root complex, error containment)
- Enterprise- class, field-proven, enclosure management processor
  - SDK and reference code provided
- 96-, 80-, 64-, 48-, 32-, 24-lane variants

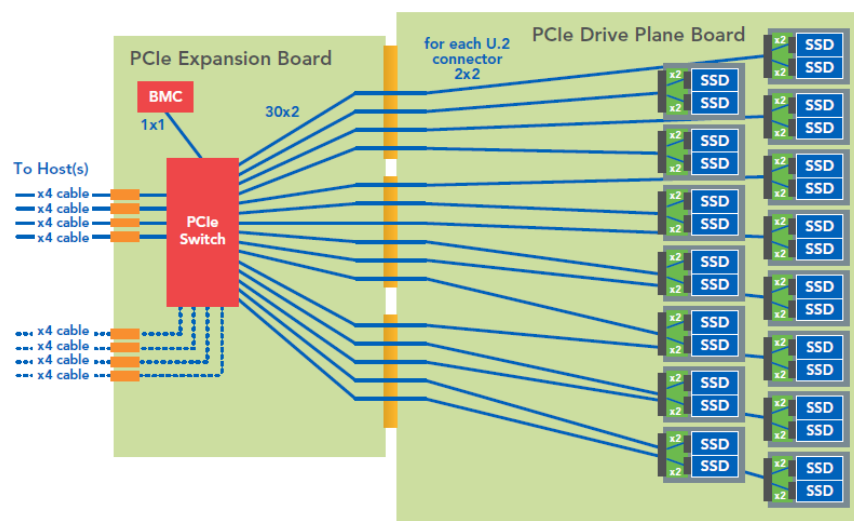
高性能电脑系统工业的最低功耗PCIe存储交换器。

# Facebook Open Compute 参考设计

## PCIe switch configurations



15 x4 SSDs



30 x2 SSDs

<http://www.opencompute.org/wiki/Storage> (Lightning program)

以上两个设计只要利用一台Switchtec PCIe 第三代96路交换器。

# 可扩展效能



Data Center efficiency requires

- **Scalability**

- Server densification
- HDD technology evolution

- **Flexibility**

- Disaggregated and pooled storage
- Server virtualization

- **Efficiency**

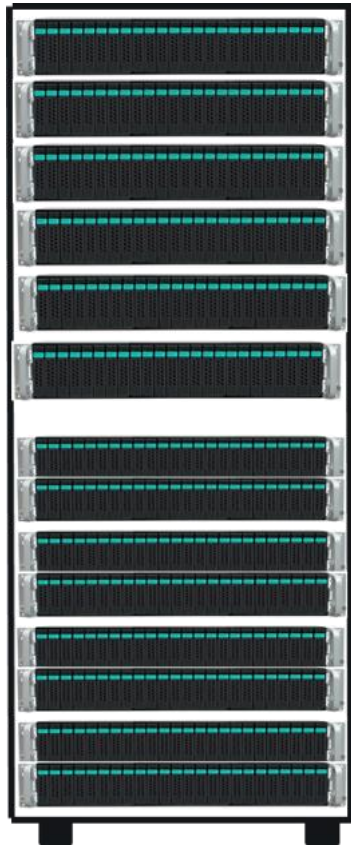
- Standardized storage servers designed for rack scale
- Customized servers for specialized Big Data workloads

提供多种技术来解决可扩展效能。

# 服务器密度化



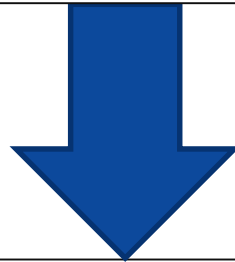
Microsemi enables dense architectures at the lowest overall power and cost with the high-density storage controllers and expanders



## Compute-Optimized Storage

**40 x 1U12 Servers**

~1PB / Rack



## Density-Optimized Storage

**10 x 4U90 Servers**

~4PB / Rack

## Smart Storage Family

- HBA1000 = 16-port 12Gb/s SAS (6Gb/s SATA) controller LP MD2 form factor cards



## 12Gb/s SAS Expander Family

- Broadest range of port count solutions: 24, 36, 48, 68-port options
- Industry's only 68-port device enables efficient high-density 4U designs





# HBA 1000使用案例

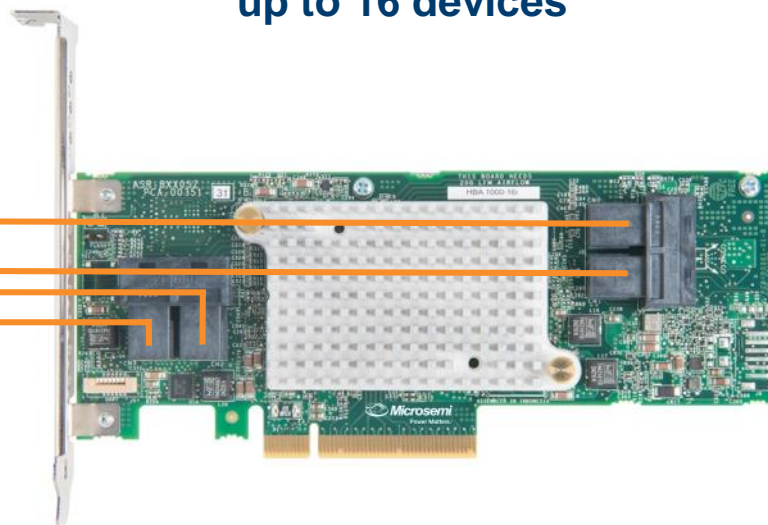


- High-speed IO throughput for datacenters
- Low power consumption

Backplane



Direct connectivity for up to 16 devices



**HBA 1000 MD2 form factor and high port count enables “scale out” and maximum density for confined spaces**

# Microsemi HBA 1000

## Microsemi OpenStack方案与Canonical可互通



### Ubuntu OpenStack Interoperability Lab partners

The Ubuntu OpenStack Interoperability Lab (OIL) is an integration lab in which we test our cloud partners' products in countless Ubuntu OpenStack configurations, over and over again. Currently we are working with over 3,000 combinations per month.



#### OIL Report

March 2015

Ubuntu OpenStack Interoperability Lab



HBA1000 Family



■ swift (100% success)

■ ceph (100% success)

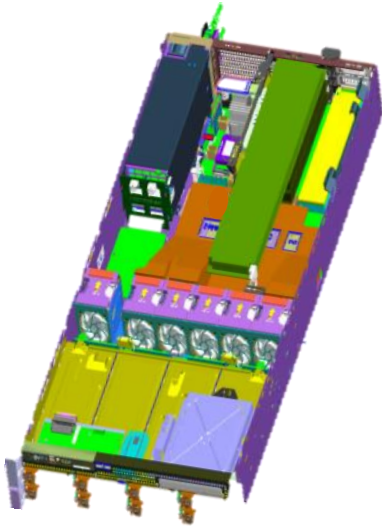
Microsemi通过可互通测试来保证兼容性。



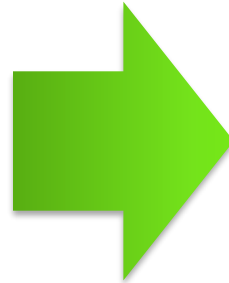
# Disaggregation Delivers Infrastructure Flexibility



What if the rack was the server?



Storage Server



Compute



Storage

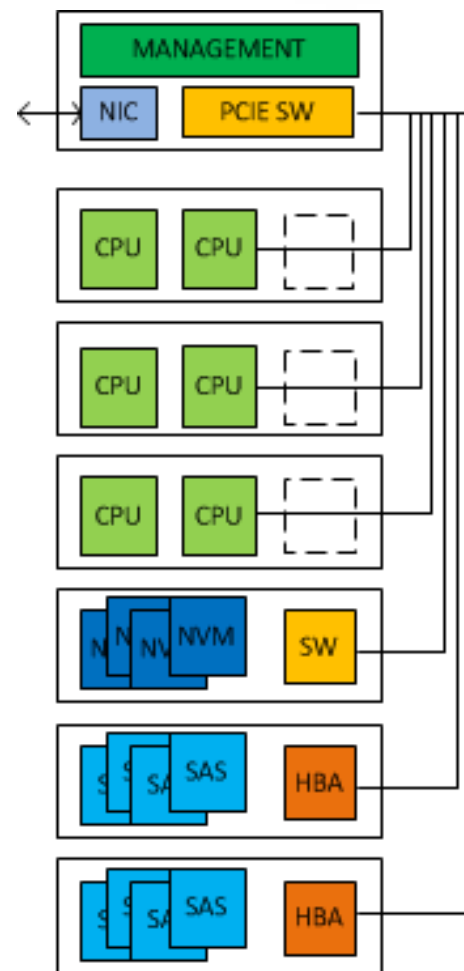
Rack-scale architecture enables a Data Center to achieve:

- Higher storage efficiency
- Improved flexibility/agility
- Lower power and higher reliability
- Reduced server SKUs

# Agility and Efficiency: Rack-Level Virtualization and Storage Pooling



- Flexible capacity expansion
- Optimized resource utilization (CPU/VM) and reduced “resource stranding”
- Maximizes the benefit of SSDs through device sharing
- Reduced power by improving air flow and running cooler
- Maximized use of space close to the CPU – the most valuable real estate in the Data Center
- Fewer server SKUs required
- Intra-rack reliability; less network-wide rebuilds, migrate jobs vs. storage



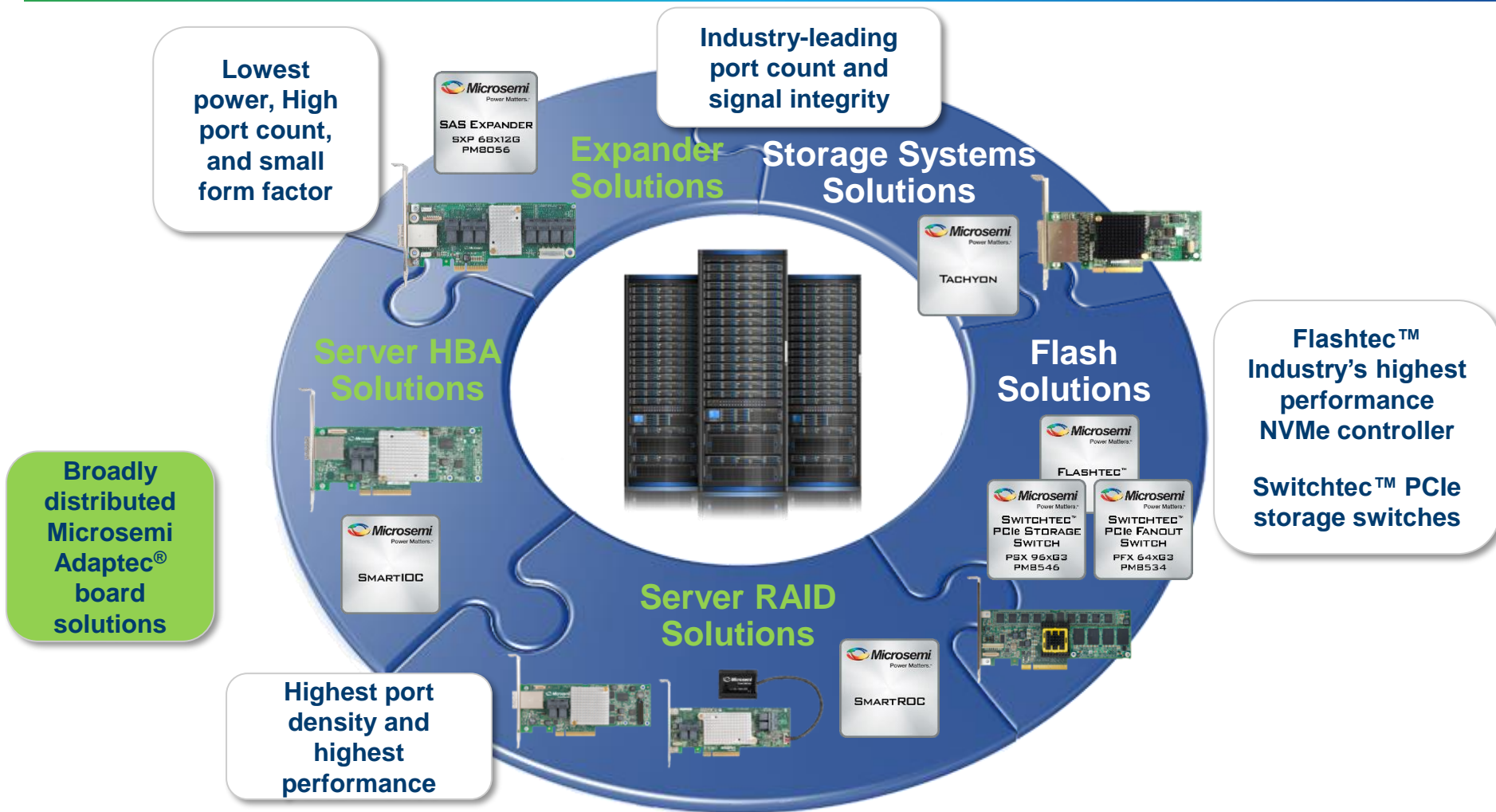
**Flexibility with DAS price and performance points**

# 议程

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- China – A Storage Growth Engine
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# Microsemi – Industry Leading Solutions for Servers and Storage Systems



**Microsemi – Positioned to Power the Cloud**

# 谢谢 !



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