# *OpenStack and Why Fabric Computing Matters*

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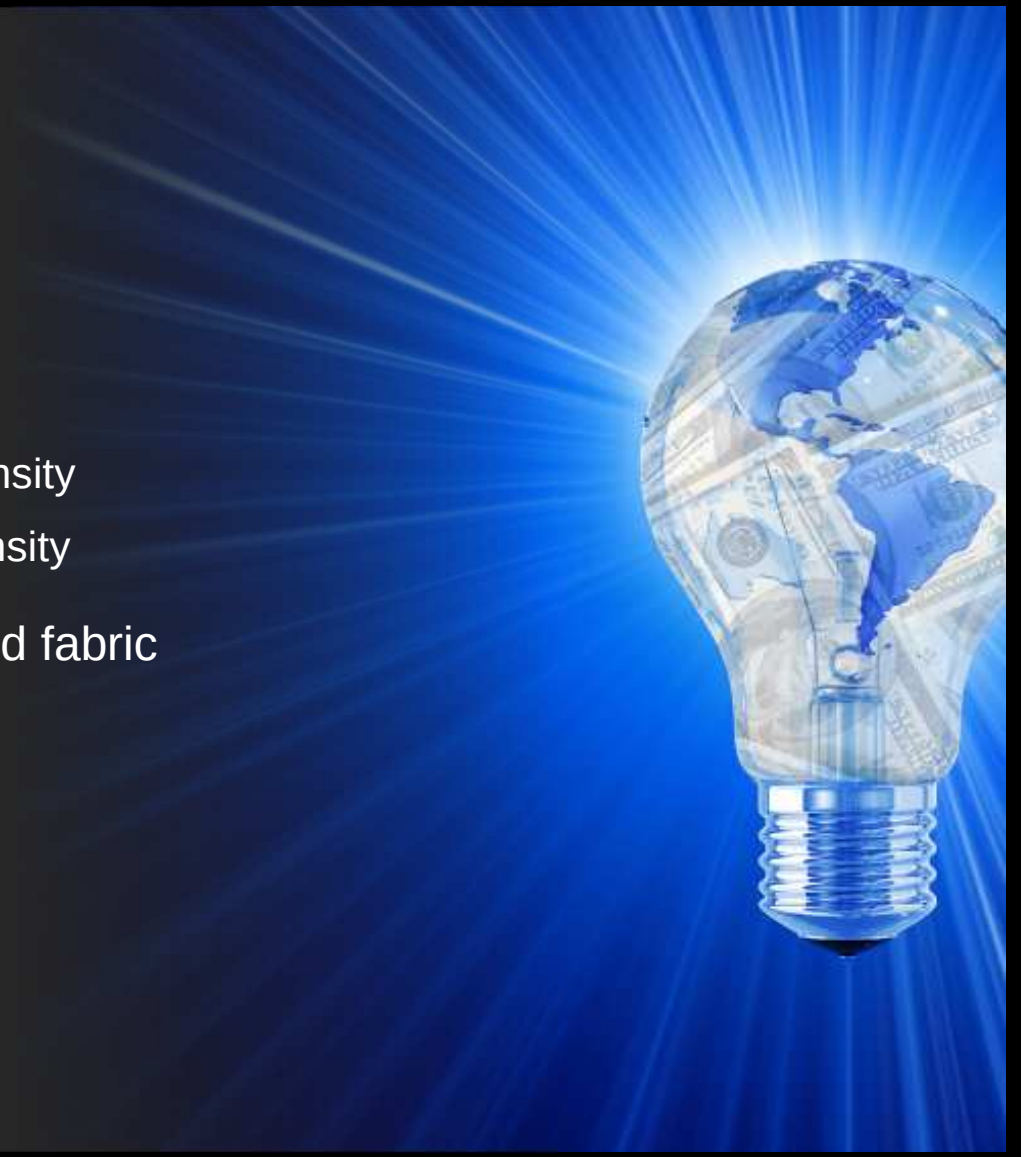
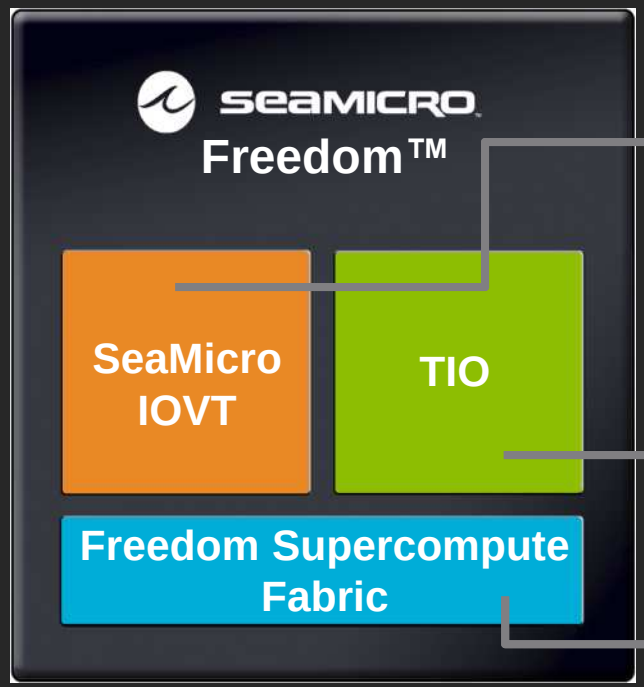
# AMD SEAMICRO TRANSFORMS WEB-SCALE COMPUTE AND STORAGE

- Solve the data center's most pressing problems:
  - Power, space, bandwidth, storage
- The industry's most efficient servers
  - ½ the power draw, 3 X the compute density
  - 10X the bandwidth, 3 X the storage density
- Recognized leaders micro servers and fabric based computing
- AMD acquired SeaMicro in Mar 2012
  - Accelerate investment and expansion
  - Sell servers with both AMD and Intel processors



# SeaMicro's Freedom™ Fabric ASIC



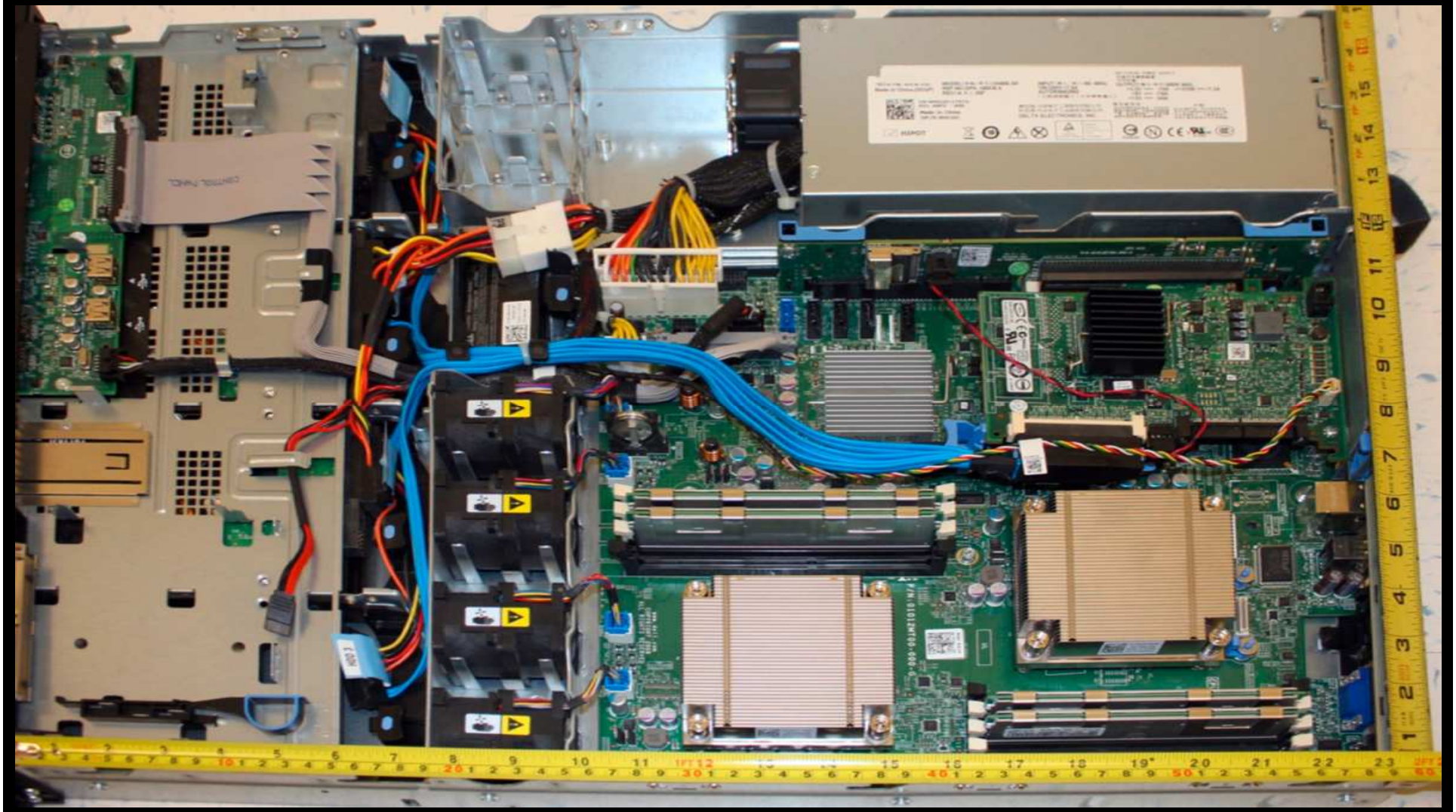

## Benefits

***Eliminates 90% of the components on a motherboard shrinking power used, cost and space***

***Reduces the power used by any CPU by consolidating and shutting off unused functionality***

***Provides massive bandwidth while eliminating power hungry top of rack switches***

# Traditional Server



# AMD SeaMicro Server

# SM15000 SYSTEM
## 10 Rack Units, draws 3-3.5 KW

- Compute
  - Up to 512 Opteron , Xeon  or Atom cores in 10 RU
  - 2,048 cores in a rack
  - Up to 64GB DRAM/socket = 4 terabytes/system,
- Networking
  - 10 Gbps full duplex bandwidth to each CPU socket
  - 16 x 10GbE uplinks to the network
- Storage
  - Up to 1,408 disks: HDD or SSD
  - Up to 5 petabytes of storage
- Fabric
  - 1.28 Tbps Freedom Supercompute Fabric
- Software
  - Off the shelf OS, Hypervisors

# Fabrics Key to Disaggregation
# Disaggregation Key to Efficient Resource Utilization

- Utilization up
  - Avoid stranded resources
  - Share to avoid waste
- Drive bandwidth up and latency down
- Upgrade resources independently
- Simplify management

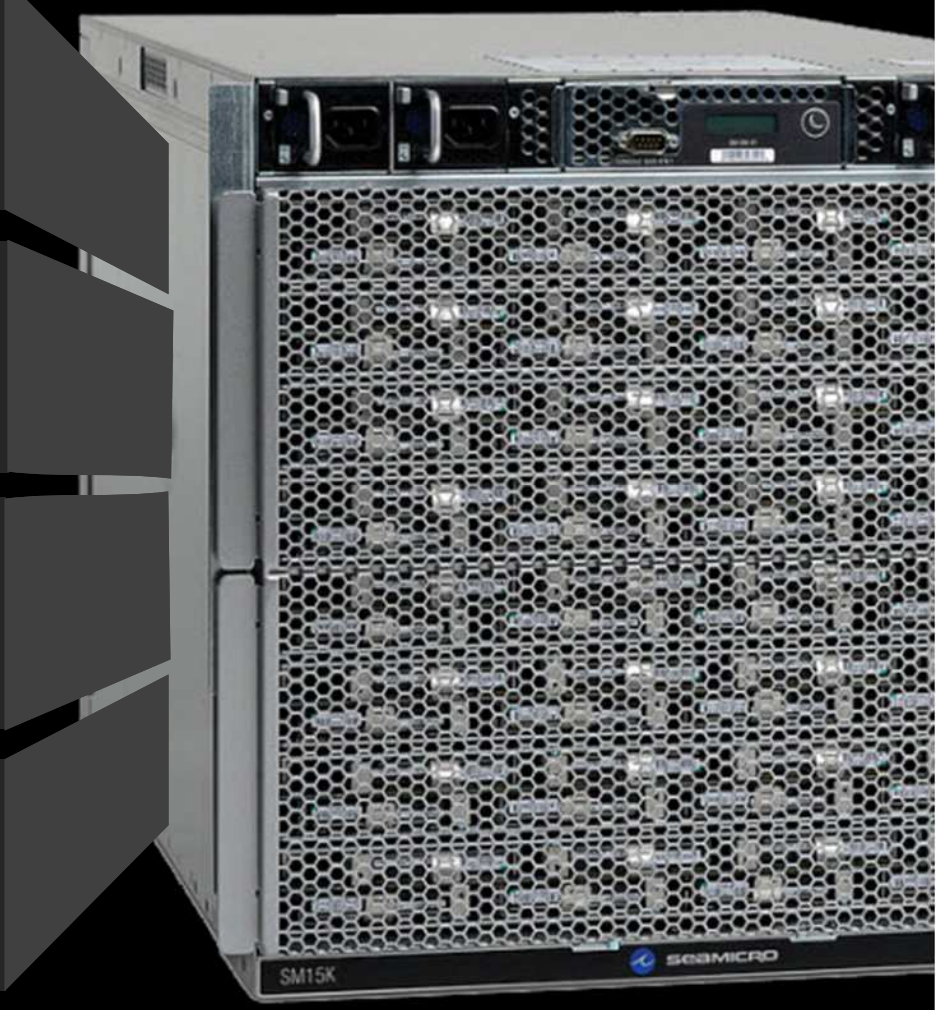
# Disaggregation Elements in Single System

FREEDOM FABRIC

COMPUTE

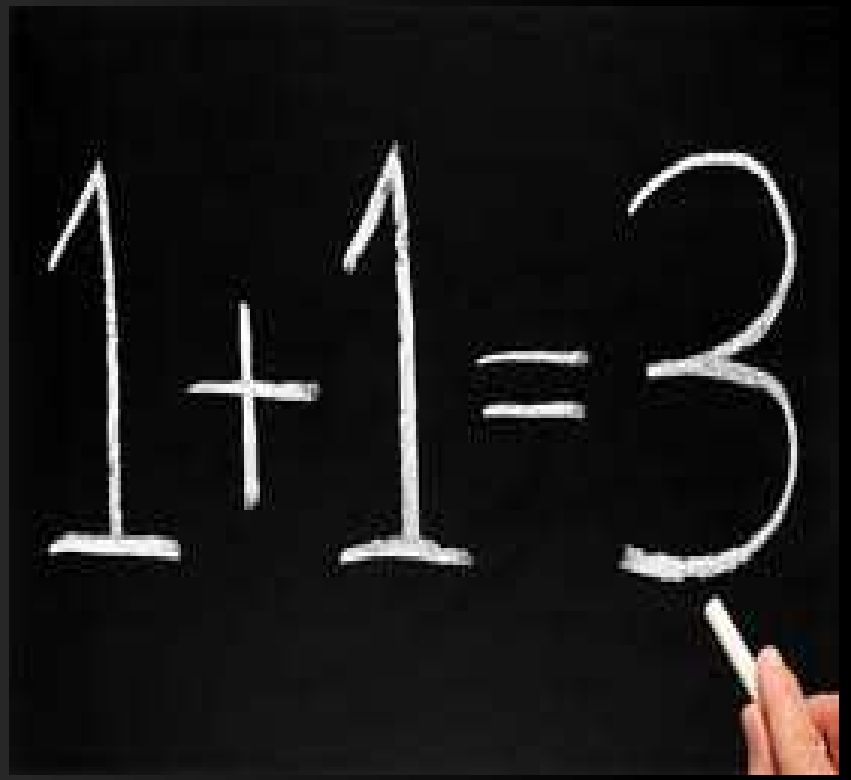
16 X 10 GIG
UPLINKS

STORAGE



# SCALE OUT SOFTWARE +
# BEST IN CLASS SCALE OUT HARDWARE

- Object Storage (Swift)
- OpenStack



# OBJECT STORAGE INFRASTRUCTURE OPTIONS

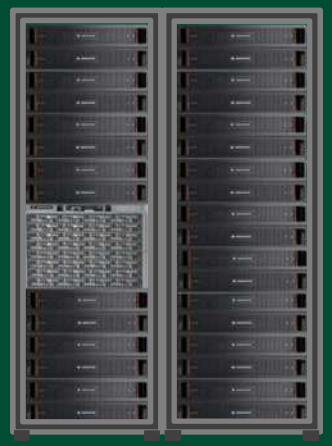
**PLATFORM EVOLUTION**

**COTS Servers and Switches**

- Many servers, switches, and appliances
- 100’s of cables to plug
- Inefficient in space, power, and cooling
- Complex heterogeneous sprawl to manage

**Integrated Solutions**

- Expensive proprietary appliances (i.e. EMC ATMOS)



**Object Storage as a fully integrated solution on the Fabric**

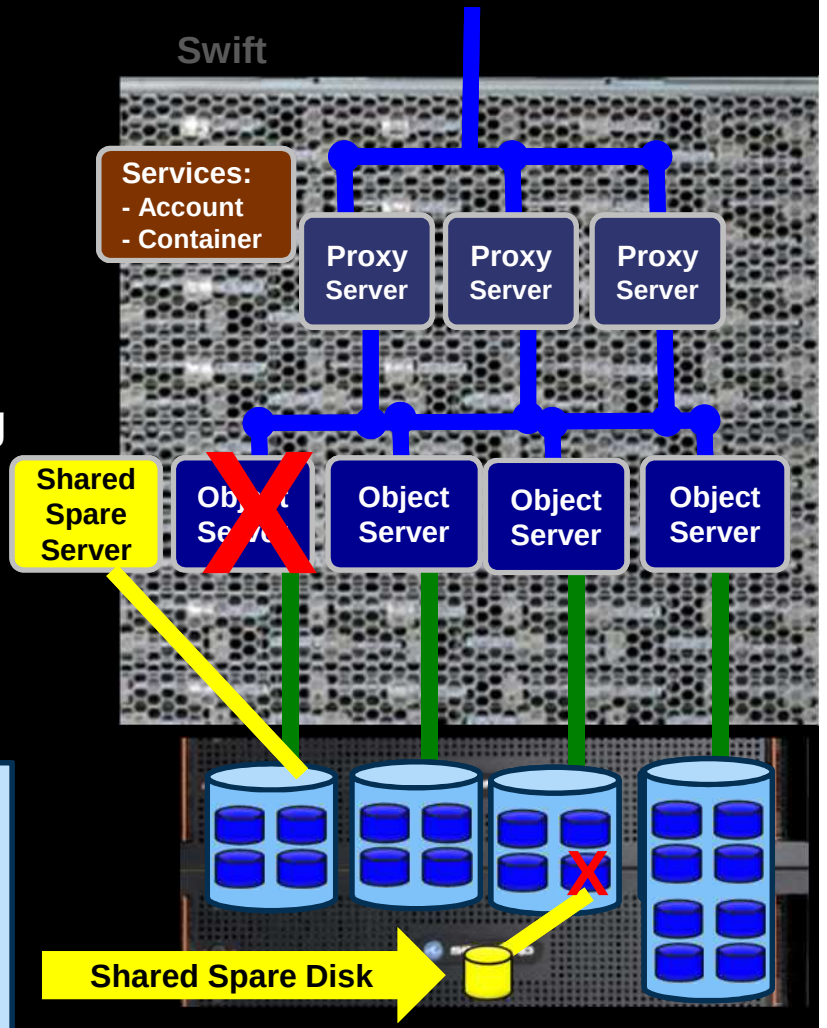
- Lowest cost per GB
- Massively scalable
- Easy to manage
- Built from off-the-shelf components

# By The Numbers

- 5 Petabytes per SM15000
- 2.5 Petabytes per Rack
- 64 Servers
  - AMD Opteron, Intel Xeon
- 1.28 Terabit Fabric
- 160 Gigabits uplink bandwidth
- 1 system to manage

# SeaMicro Object Storage – Deployed on the Fabric

- Deploy all elements of Object Store from a single management interface
- Deploy on a Single Chassis
- Disaggregation enables
  - flexibility on ratio of compute to disk— unlimited disk to compute combinations
  - Easily reconfigure resources meet changing requirements
  - Increased durability and availability through rapid repair




**OpenStack Swift Example**

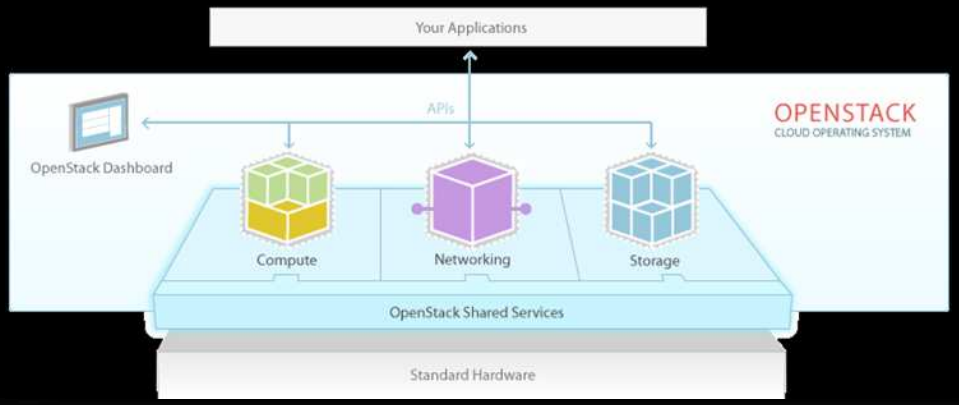
**5.4 PB raw storage, 1.8 PB useable per SM15K.**
(Swfit default 3 copy replication)

**Proxy Server** – All Read/Write operations streamed through the proxy servers determining object read write location. Typically 2-8 per SM15K.
**Object Server** – Simple blob storage server that stores, retrieves, and delete objects from the disks it manages. Typically 8-40 per SM15K
**Other Servers –** Other services needed for the complete solution include the Account Server, Container Server, and Authorization Server.

# OpenStack

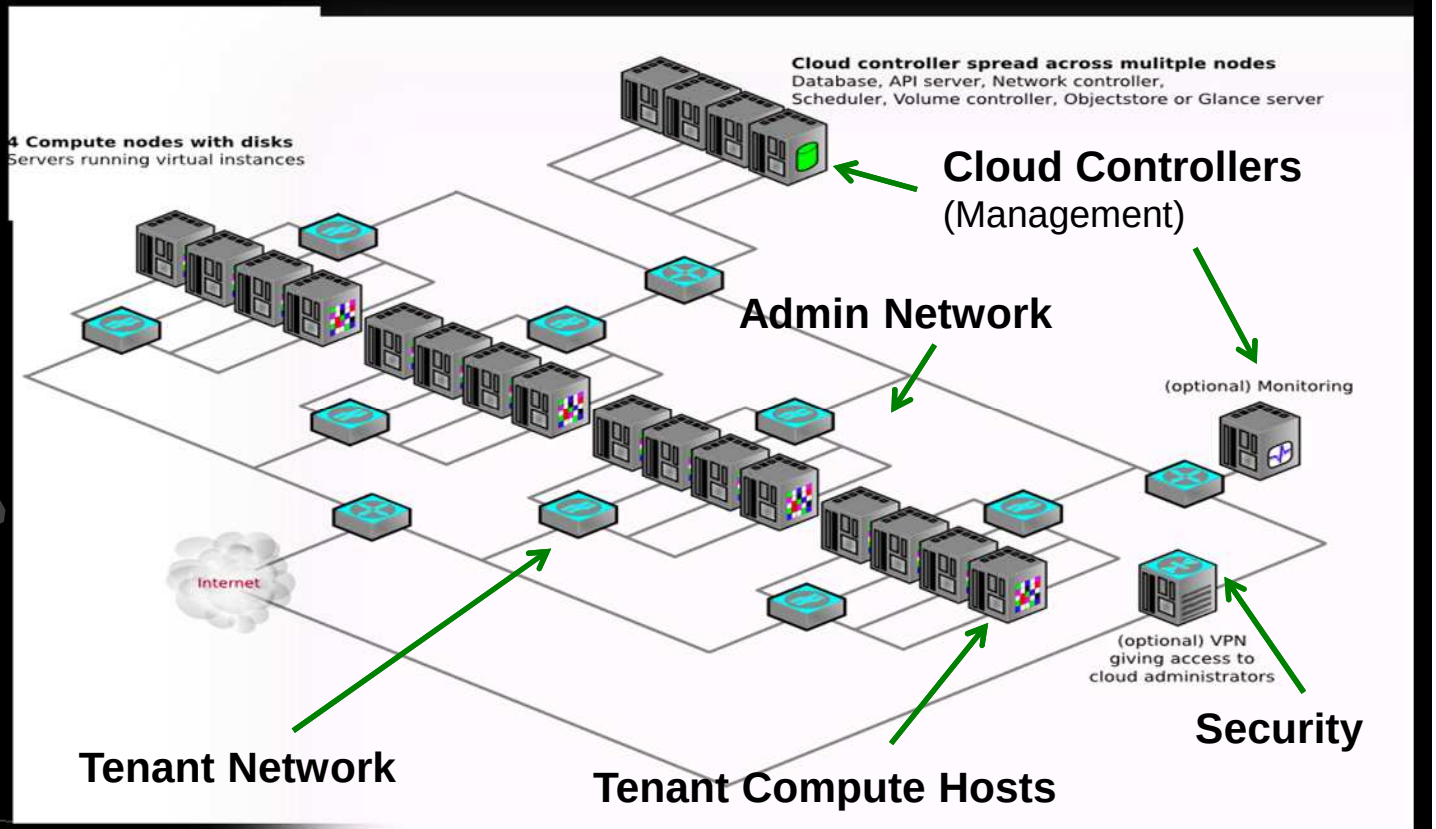
What's the right Infrastructure?

## Can Be Complex…

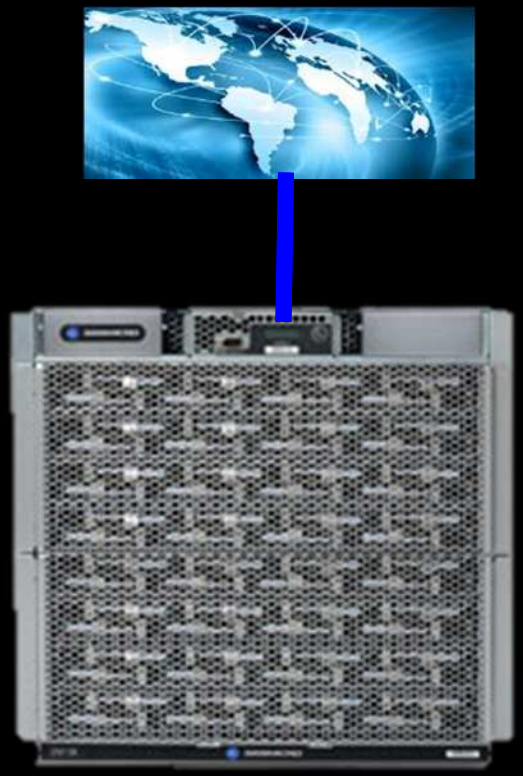



OpenStack Infrastructure Example

(From the OpenStack Documentation)



# Or not



SeaMicro SM15000
Fabric Compute System

# SeaMicro and OpenStack

**Nova Compute**

- **Compute Density -** 512 Compute Cores and 4TB of memory in 10RU
  - 64 AMD Opteron, 64 Intel Xeon (Sandy and Ivy Bridge), or 256 Intel Atom servers per SM1500K
- **Energy-Efficiency** – Industries best performance per Watt per RU.
- **Simplified Management –** Manage 64 servers, network, and storage from a single-pane of glass.

**Swift/Cinder Storage**

- **Shared Storage Architecture**
  - Provision the right ratio of storage to compute, and reallocate on demand.
  - Provides Enterprise shared storage capabilities at DAS prices and no SAN needed.
- **Storage Density** - Over 5 Petabytes per SM15000. Up to 2.5 Petabyte per rack

**Quantum Networking**

- **Bandwidth –** Superior network to compute bandwidth available.
  - 1.28 Tbps Fabric, 10Gbps bandwidth per 4core socket, 16x 10Gbps uplink
- **Integrated TOR Switch –** Integrated Layer2 switching
  - 4K VLAN support and rich Layer2 switching capabilities.

# SeaMicro and OpenStack - Progress

AMD

Today

**Certified and Supported**

openstack certified

RACKSPACE® CLOUD PRIVATE EDITION POWERED BY OPENSTACK®

- SM15K is a Certification Launch Partner.
- Rackspace provides software support for any OpenStack based Rackspace Private Cloud built on the SM15K

**Ease of Deployment**

**Cloud-in-a-Box**
Turnkey OpenStack Solution on SM15K

- Simplify the Deployment of OpenStack
  - Deploy in < 2hours
- A complete IaaS solution that includes all compute, storage, and network resourced needed to host tenants and manage the environment.

Development

**Future Cool Stuff**

**Nova Compute**

**Swift/Cinder Storage**

**Quantum Networking**

Value added Integration of OpenStack Compute, Object Storage, Block Storage, and Quantum Networking into SeaMicro management and Fabric Architecture

# SeaMicro and OpenStack - Roadmap

**Nova Compute**

## Bare Metal Provisioning

- Manage provisioning of VMs and Physical machines from the same OpenStack Management Interface.
- Especially compelling form micro-servers. Atom today and ARM in the future.
- Nova API integrated into SeaMicro management interface.

**Swift/Cinder Storage**

## Cinder Block Storage API and Target support.

- SeaMicro shared storage provides block storage provisioning today (via SATA).
- Cinder API will be integrated into SeaMicro management and allow provisioning of block store targets directly to Nova Compute instances.

## Swift Object Offload

- Integrate Swift Object Nodes into SeaMicro shared storage controller, and reduce number of servers needed.

**Quantum Networking**

## Quantum and SDN integration into SeaMicro Fabric and NPU

- Integrate SDN features and Quantum API into SeaMicro network architecture.
- Deliver SLAs, QOS, and simplified network management
- Utilize integrated 100Gbps NPU.

# Mozilla slashes power and opex while increasing compute density and Reliabiltiy

"The savings were so straightforward the business case discussion with the CFO took four minutes."

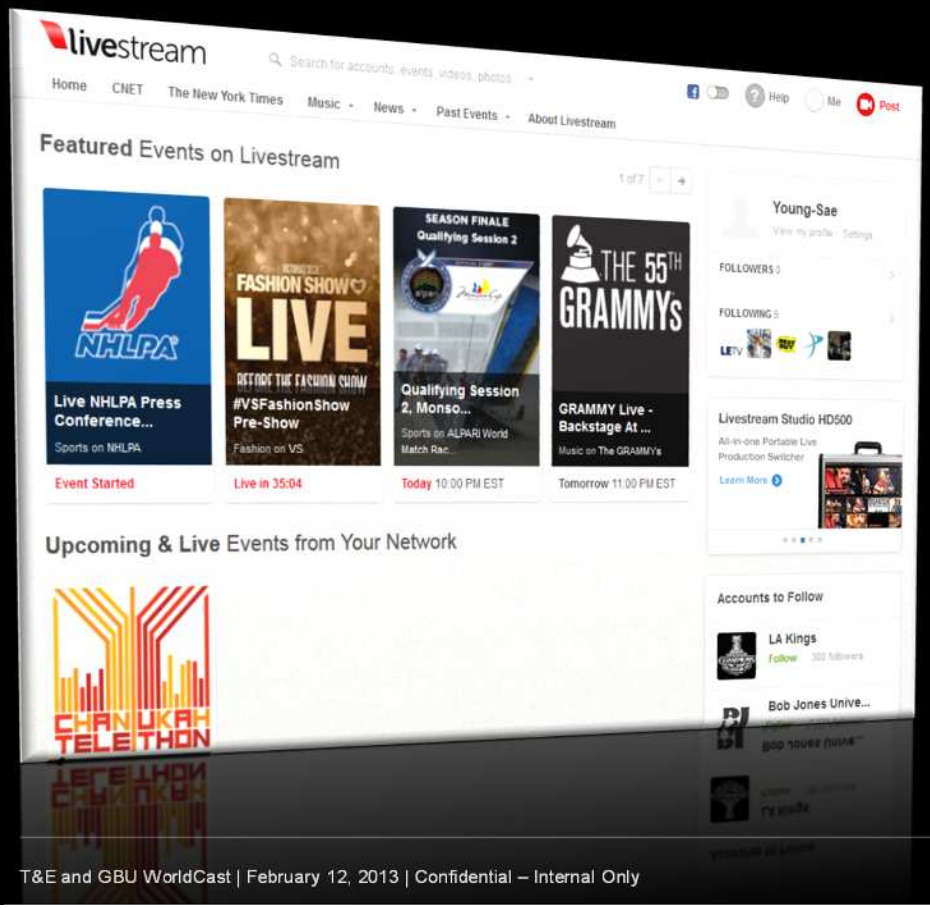
*Matthew Zeier, Director IT Operations*


- Challenge
  - Explosive growth resulting in power and space becoming increasing portion of operating expense
- Solution
  - SeaMicro SM high density servers
  - XE: 256 Intel® Xeon ® cores in 10 RU system
  - 64: 512 Intel® Atom™ cores in 10 RU system
- Results
  - 192 server instances in a single rack
  - Reduce power consumption for by 80% and space requirements by 75%
  - Reduced computing footprint
  - Focus on growth vs. operational band aids

# Livestream: redefining live video experience

*"The SM15000 is the highest density, most energy efficient computing platform we've tested, and it has provided us with huge savings in power, space and operational expenses."*

*Thomas Bonnin,*
*Chief Architect, Livestream.*




- Applications: Ruby on Rails, Node.js, Nginx, Varnish, Redis
- Challenge
  - Server expansion constrained by power and space requirements in the data center
- Solution
  - SeaMicro SM15000 high density server
  - 256 Intel® Xeon® ("Ivy Bridge") cores in 10 RU system
- Results
  - 100% increase in computing density for new build outs
  - 50% increase in computing resources without expanding power requirements
  - Qualified for grant from New York State Energy Research and Development Authority (NYSERDA) based on audited power savings

# Red 5 Studios: Mobile gaming Unit

"The MGU would not have been possible without AMD SeaMicro servers. It allowed us to install a mobile data center equal to the size of one of *World of Warcraft's* data centers into a back closet. AMD SeaMicro technology is ahead of the competition and brings us closer to achieving our vision."

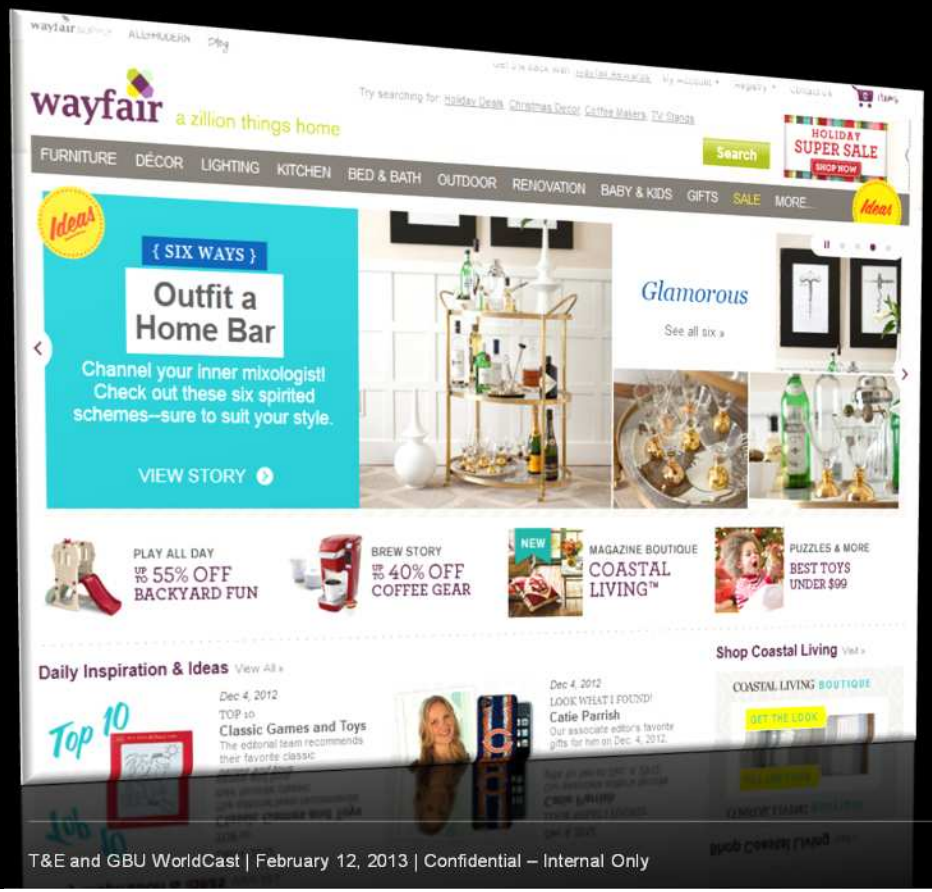
*Mark Kern, CEO, Red 5 Studios*


- Applications: OpenStack, Massively Multiplayer Online (MMO) Gaming
- Challenge
  - Create high impact, mobile gaming unit with the capacity and performance to support thousands of gamers
  - Implement mobile data center on a bus
- Solution
  - SeaMicro SM high density server
  - 256 Intel® Xeon® cores in 10 RU system
  - 64 servers, 1.28 Tbps SeaMicro Freedom™ Supercompute Fabric
- Results
  - Mobile LAN gaming center that can support up to 3000 simultaneous players
  - Eliminated dozens of unnecessary parts and components to fit in compact environment

# Wayfair.com: personalized shopping experience for “a zillion things”

“*The SeaMicro SM server is helping us operate at a large scale and fast pace. The key benefits are reduced operating costs and increased efficiency for our big data development infrastructure. It provides the highest density and flexibility while slashing energy consumption: 256 Intel Xeon cores, 64 hosts. It consumes 50 percent less power and doubled our computing capacity...*”

*Ben Clark, Director of Software Engineering*




- Applications: Hadoop, SQL server, PHP
- Challenge
  - Space and power constraints hindered availability of “shared nothing” servers for development
  - Too costly in space and power to use traditional servers for the number of servers required and accurately test application performance
- Solution
  - SeaMicro SM high density server
  - 256 Intel® Xeon® cores in 10 RU system
  - 64 servers, 1.28 Tbps SeaMicro Freedom™ Supercompute Fabric
- Results
  - Reduced development cycles and shortened time to market for new products
  - Increased productivity of development engineers by providing abundant access to “shared nothing” servers versus developing on virtualized server farms
  - Eliminated unnecessary equipment such as top of rack switches and terminal servers; simplified network and power cabling

# Photobucket: Slashes costs and consolidates multiple racks into two seamicro servers

"With AMD's SeaMicro SM10000-XE we have simplified our operations, increased our capacity, and improved the user experience. This will result in greater revenue and profitability for our company."

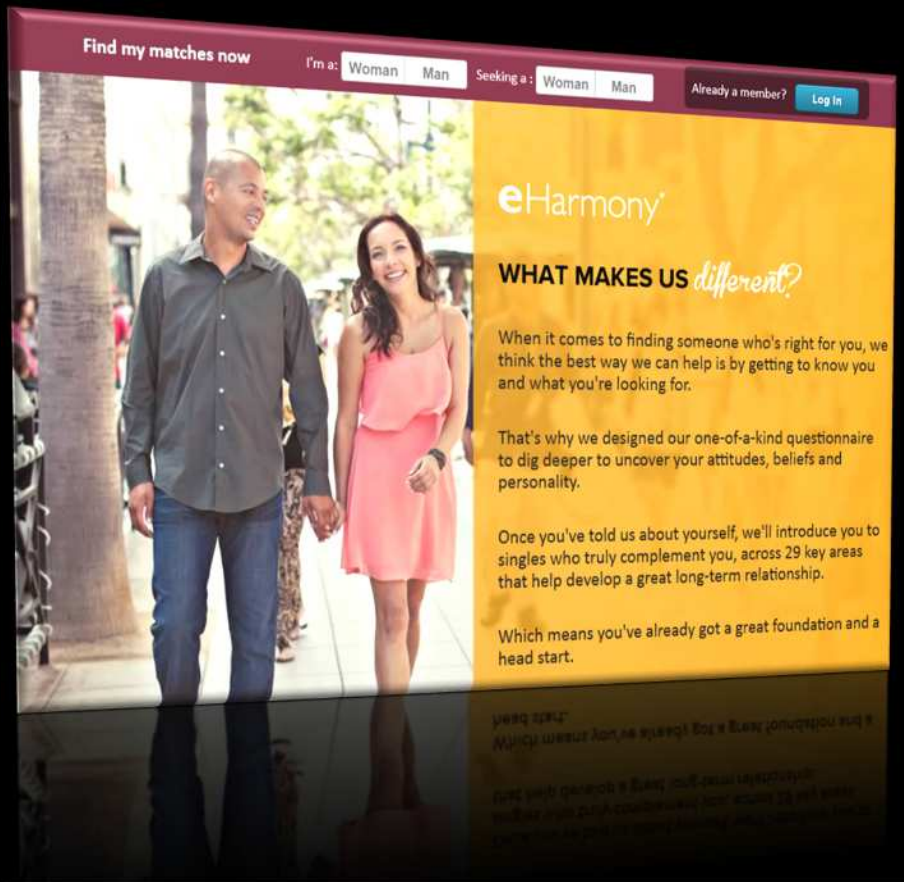
*Jim Goss, VP Operations*


- Applications: CentOS, Apache, PHP
- Challenge
  - Cost effectively server over 100+ million users
  - Increase revenue by improving by delivering pages faster
- Solution
  - SeaMicro SM high density server
  - 256 Intel® Xeon® cores in 10 RU system
  - 64 servers, 1.28 Tbps SeaMicro Freedom™ Supercompute Fabric
- Results
  - Replaced 60 1RU servers with two SeaMicro systems
  - Lowered space and power expenses
  - Increase advertising revenue

# Eharmony: increase computing while reducing total cost of ownership

"We purchased SeaMicro servers and immediately reduced our operating expenses…The system has been in place for over two years, and we have had zero down time."

*Cormac Twomey, Data Center Operations*




- Applications: Hadoop
- Challenge
  - Provide cost effective computing platform for Hadoop
  - Reduce costs incurred from external cloud computing
- Solution
  - SeaMicro SM high density server
  - 512 Intel® Atom™ cores in 10 RU system
- Results
  - Reduce TCO by more than 74 percent
  - Save thousands per month spent on cloud computing service
  - Utilize computing resources 7 x 24

# Massively scaled Infrastructure as a service for Global service provider

"Typically, you need specialized servers and storage devices that are specially tuned to achieve this type of performance. We used an SM15000 and standard off the shelf SSD's to achieve 1,000,000 IOPS at a tiny fraction of the cost of specialized flash storage appliances."

*Senior Director, Storage Architecture*

- Challenge
  - Scalable, secure infrastructure that provides cloud services
  - Deliver stringent SLAs to differentiate their offering
- Solution
  - SeaMicro SM15000 (Xeon and Opteron)
  - Freedom Fabric Storage 5084-L Enclosures
  - Amplidata AmpliStor Object Storage system
- Results
  - Enterprise class IaaS cloud deployed globally with unmatched performance, security, availability and SLAs
  - Industry leading performance with 1,000,000 IOPS per system
  - Simplified operations and deployments removing thousands of cables and physical elements

# Questions ?

Come See Us at
OpenStack Summit
Portland
April 15-18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