Verizon Cloud Compute and Verizon Cloud Storage

Website
www.verizon.com

Background
Verizon provides business solutions to customers in more than 150 countries, including ninety-nine percent of the Fortune 500. They operate America's largest 4G wireless network and provide services over America's most advanced fiber-optic network.

Services/Workloads
Verizon Cloud Compute
Verizon Cloud Storage

Challenges
- Create the world's highest performance enterprise-class public cloud
- Provide granular, customized configurations defined by the user
- Uncompromising security with strict partitioning for every virtual machine

Solution
- SeaMicro SM15000 server (AMD Opteron™, Intel Xeon® CPUs)
- SeaMicro Freedom Fabric Storage FS 5084-L
- Co-develop technology for advanced cloud computing capabilities

Results
Enterprise class public cloud with the most advanced cloud capabilities
- Most robust set of SLAs for VM provisioning and availability
- Customizable configurations with processor speed and memory options
- Guaranteed networking and storage performance with secure, granular traffic control

Verizon Cloud

With enterprise adoption of public cloud services at 10 percent[1], Verizon identified a need for a cloud service that was secure, reliable and highly flexible with enterprise-grade performance guarantees. Large, global enterprises want to take advantage of the agility, flexibility and compelling economics of the public cloud, but the performance and reliability are not up to par for their needs. To fulfill this need, Verizon spent over two years identifying and developing software using AMD's SeaMicro SM15000, the industry's first and only programmable server hardware. The new services redefine the benchmarks for public cloud computing and storage performance and security.

Designed specifically for enterprise customers, the new services allow companies to use the same policies and procedures across the enterprise network and the public cloud. The close collaboration has resulted in cloud computing services with unheralded performance level guarantees that are offered with competitive pricing.

The Verizon Terremark data center

> "We reinvented the public cloud from the ground up to specifically address the needs of our enterprise clients. We wanted to give them back control of their infrastructure — providing the speed and flexibility of a generic public cloud with the performance and security they expect from an enterprise-grade cloud. Our collaboration with AMD enabled us to develop revolutionary technology, and it represents the backbone of our future plans."
>
> **John Considine**
> CTO, Verizon Terremark

The new cloud services are backed by the power of Verizon, including global data centers, global IP network and enterprise-grade managed security services. The performance and security innovations are expected to accelerate public cloud adoption by the enterprise for their mission critical applications.

AMD and Verizon Co-Develop Revolutionary Public Cloud Platform

While researching the technology required to develop an enterprise-class cloud service, Verizon came to the conclusion that it was not possible using off the shelf servers and created a partnership with AMD to collaborate on new cloud technologies. The collaboration focused on leveraging AMD's SeaMicro SM15000 server and the SeaMicro Freedom™ fabric's ability to interconnect compute, storage and network I/O of 1.28 Tbps of bandwidth. With integrated networking, it eliminates top-of-rack switches, terminal servers, and thousands of cables to reduce deployment time and errors.

AMD and Verizon co-developed hardware and software to dynamically reserve, allocate and guarantee application service level agreements (SLA). AMD's SeaMicro SM15000 server delivers the industry's first and only programmable server hardware that includes a high bandwidth, low latency programmable interconnect fabric, programmable data and control plane for both network and storage traffic. Leveraging the programmable server hardware, Verizon innovated and developed unique software to guarantee and deliver much needed reliability and SLAs for an enterprise-class cloud offering.

SeaMicro SM15000 Server Provides Unprecedented Performance Guarantees

The collaboration resulted in a public cloud service with unmatched capabilities. The innovations in compute performance, storage flexibility and networking are one of the most significant advancements in cloud computing.

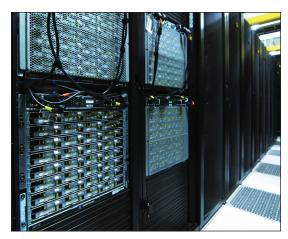#### *Compute Performance Industry Firsts*

Server disaggregation creates massive pools of computing resources from which virtual machines can be provisioned with granular configuration options.

- Server provisioning in seconds
- Fine-grained server configuration options that match real life requirements, not just small, medium, large sizing
  - Virtual machine processor speed options: 500 MHz to 2,000 MHz
  - Virtual machine DRAM options: 0.5 GB increments

Storage Flexibility Industry Firsts

Verizon Cloud Storage allows the sharing of the disks among multiple virtual machines with multi-path redundancy.

- Shared disks across multiple server instances versus requiring each virtual machine to have its own dedicated drive, which is not available from other cloud services
- Defined storage quality of service by specifying performance up to 5,000 IOPS to meet the demands of the application being deployed, compared to best-effort performance

SM15000 servers and Freedom Fabric Storage FS 5084-L units deployed in the Verizon Terremark data center

Security, Network Performance, and Operations Industry Firsts

The system integrates Layer 2 networking, allowing enterprises to extend their network and operational procedures to the public cloud.

- Consistent network security policies and procedures across the enterprise network and the public cloud
- Strict traffic isolation, data encryption, and data inspection with full featured firewalls that achieve Department of Defense and PCI compliance levels
- Guarantee network performance for every virtual machine with reserved network performance up to 500 Mbps compared to no guarantees in many other public clouds

For more information about AMD and the SeaMicro family of high density, low power servers, please visit **www.seamicro.com**.

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[1] *Lauren E. Nelson. The Forrester Wave™: Hosted Private Cloud, Q1 2013.*

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