Advancements in Datacenter Service Design
By Mike Lata

Designing a datacenter is not an easy task. There is a lot of planning involved beforehand and needs that have to be met from the company, or multiple companies, that will be utilizing the datacenter operations. Once the datacenter is operational there are also many improvements that can be made over time to servers, HVAC, communication, other equipment (routers, power supplies, etc.), staffing and services (if it operates as a colocation center for instance) offered at the facility.

Server Innovations

Datacenter servers are known to be very bulky and power-hungry machines that take up a lot of rack space inside facilities. This has created an opportunity for companies to learn how to make them more efficient in terms of power and space. A startup emerged that has specialized in this form of computing and it was called SeaMicro.

The company would aim to take existing server architectures and minimize them so that they would be as compact as possible. Power efficiency was also what the start-up became known for. This in turn attracted the attention of AMD and the enterprise ended up acquiring the SeaMicro startup for over $300 million in early 2012.

AMD SeaMicro has made very interesting strides as of late related to server design. This past January, the company announced that its SeaMicro SM15000 server has been certified for Rackspace Private Cloud and combines private cloud with open source software. The Rackspace Private Cloud software was launched in August 2010 and utilizes OpenStack to simplify management of compute, storage and networking resources.

The press release states that the SM15000 server is the highest-density and most energy-efficient server on the market.

“In 10 rack units, it links 512 compute cores, 160 gigabits of I/O networking, up to five petabytes of storage with a 1.28 terabyte high-performance supercompute fabric, called Freedom Fabric,” it states. “The SM15000 server eliminates top-of-rack switches, terminal servers, hundreds of cables and thousands of unnecessary components for a more efficient and simple operational environment.”

Freedom Fabric

Freedom Fabric is a storage solution from AMD SeaMicro. The Freedom Fabric enables a single server to connect with up to five petabytes of storage capacity. AMD SeaMicro's customers gain the benefits of network attached storage (NAS) and storage area networking (SAN) with the low cost approach of direct attached storage.

According to AMD SeaMicro's website section on Freedom Fabric, this storage solution gives companies the ability to pool or group various storage solutions (listed above) together efficiently. It also gives companies more flexibility in their datacenter storage methods.

It essentially allows a company to cut down on extraneous hardware that a traditional motherboard relies on.

Benefits of the SM15000 Server Set-Up

Research facilities and universities are starting to rely on a lot more compute power today. According to an AMD SeaMicro press release from this past April, the University of Texas at San Antonio has deployed the SM15000 servers in 20 rack units covering 35-inches of space

Scientists and researchers need the freedom of being able to concentrate on research rather than IT overheads. They gather tremendous amounts of data and rely on inter-disciplinary collaboration. So research facilities need both high-powered compute power at their disposal and large amounts of storage space to be able to function at their potential. They also will often prefer the private cloud approach and ability to control their resources.

This is why AMD SeaMicro's SM15000 server makes sense. It is both powerful and flexible in its provisioning. The Freedom Fabric as well as its power of supporting various processors such as AMD Opteron, Ivy Bridge and Intel Atom N570. You can read about the different set-ups or options here.

Another AMD SeaMicro press release from last March mentions another recent advantage these servers have for companies looking to deploy compute power using the cloud. the SM15000 servers are now certified for CDH4. This is Cloudera's distribution of Apache Hadoop supports version 4. This means the SM15000 servers should be useful for any company looking to utilize big data analytics. A whole system overview is available here.

The Disaggregated Server Concept

It is costly for companies to have to repair entire server racks or replace them with new ones. Many components within standard datacenter servers are inter-connected.

This is why Facebook created its own Open Compute Project (OCP). Facebook is trying to address this need for independent components and create servers with rack-level component replacements that are energy efficient. These disaggregated servers (rack-level) are not on the market yet.

“Disaggregating rack level server architecture will enable Facebook to replace individual components at large scale, either when the break or when they become obsolete, lowering costs even more…at least in theory,” according to Forbes.

According to Forbes, the SM15000 already provides such features to an extent. The servers provide disaggregation to 10 rack unit (10U) increments that can scale to hyperscale datacenter levels. Freedom Fabric helps alleviate costs of not having to replace entire units.

This is because the technology separates CPUs, storage and data center network access within the 10U chassis allowing each component be replaced and updated independently from the others.

“What AMD SeaMicro is good at that many other hyperscale system designs don’t really address, like the OCP’s disaggregated rack-level architecture, is that AMD SeaMicro can scale from a single 10U chassis to racks, then to rows of racks, and into hyperscale,” Forbes reported.