

The Server Industry Stands on the Brink of Evolution

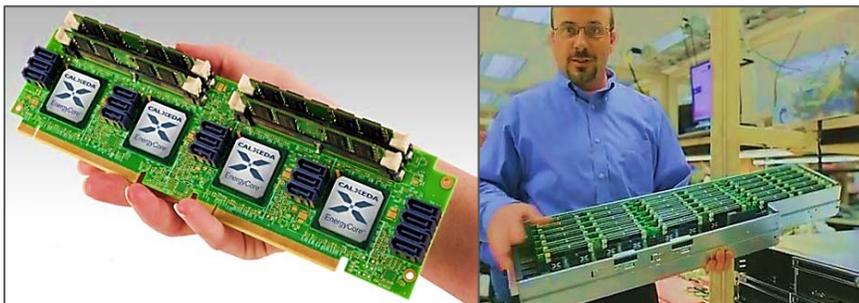
There are major changes on the horizon. The PC industry has already suffered a series of seismic shocks via smartphones and tablet computing; will “Big Data” be the next bombshell? There is no question that exponentially larger data loads will reshape the industry. It is possible changes will be gradual, slowed by IT departments’ reluctance to change critical hardware infrastructures. But companies that want to take advantage of major cost-savings and productivity gains — and to remain competitive — may push rapid changes that will leave some companies far behind.

Potential areas that will be impacted include:

- Virtualization of server resources, resulting in 10:1 streamlining of hardware resources
- Cloud computing, leading a shift of resources from the desk and equipment room to the Cloud
- Micro-Server technology, which can provide up to a 90% reduction in power consumption
- Open Compute, an initiative backed by Amazon, Google, Facebook, and others that plan to eschew OEM server hardware for build-your-own open source designs, such as those pioneered by Google

HP recently announced its first commercial foray into micro-server technology. Its new Moonshot program plans to cut server power consumption by roughly 90% — while using 80% less space than existing HP server clusters (Source: wsj.com 4.10.13). This bold initiative — even more bold because it potentially upsets HP’s own traditional server business model — stands to send a shockwave throughout the industry. Moonshot will initially use thousands of Intel Atom Centerton processors, and later AMD Kyoto CPUs, and ARM CPUs made by Calxeda, Texas Instruments, and others.

A collection of 45 Moonshot servers will cost about \$62,000, or 77% less than existing hardware. The Calxeda concept, which is probably similar, since HP has been working with them for some time, employs a server cartridge concept. Individual Calxeda servers, about the size of 2 PC cards, have up to 4 processors, 4 DIMM sockets, 4 MicroSD Card Slots, and 16 SATA connectors. The cards or cartridges (seen below; Source Calxeda.com), support 10GbE and are plugged into a rack with a midplane board via PCIe card edge connectors, with I-O modules connected on the backside. 36 or more cartridges fit into a rack, e.g. 36 PCIe connectors, 144 DIMM sockets, 144 CPUs (all surface-mounted), and 576 SATA connectors/rack.



It is said that such architecture can reduce power and the cable plant by up to 90%. That would reduce electric power consumption in the US by billions of kWh. (US total electricity use in 2011 was 4,138 B kWh, with data centers consuming 80B kWh; Source J Koomey Energy Report, Stanford University). The PCI interface, in effect, replaces back side server cables with a direct connection to other server cards and the total system.

Photos: Calxeda.com

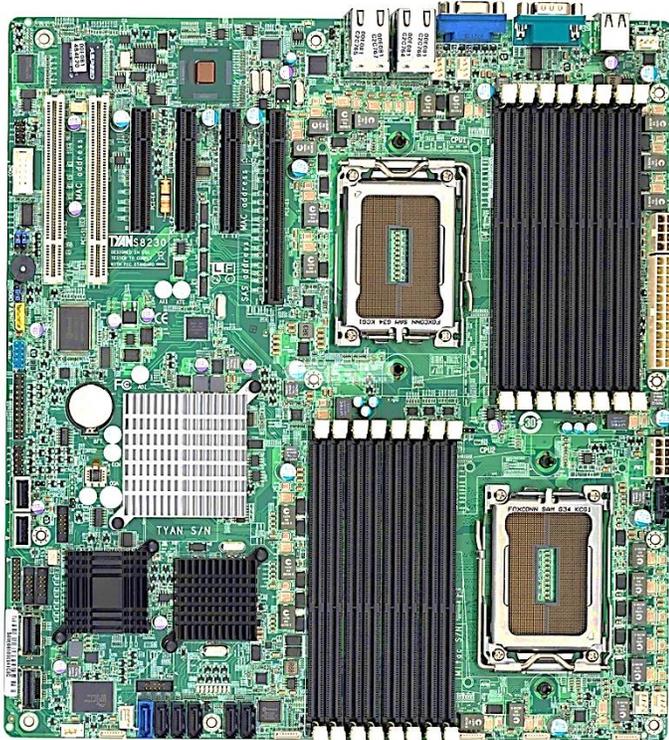
HP's Moonshot press release also mentions a shift from 1,600 cables in a traditional HP Proliant server setup to 41 in Moonshot. This probably does not include the SATA cables.

Other initiatives, such as virtualization, cloud computing, and open compute, are also positioned to impact OEM server business.

Currently, Amazon.com is the leader in cloud storage. Google is among the largest server manufacturers, with over 700,000 servers in operation at the company — most built from the ground up by or for Google. Facebook is becoming a leader in the fast movement toward open compute, which enables large end-users like Facebook to design and build their own data centers and then share the design with others. (See opencompute.org.) It appears that micro-server technology will also appear in this effort, but not to the exclusivity of Intel and AMD designs. Open compute will aim for low cost/low power specs and eventually ARM processors. Open computer architectures include the following features:

- AMD v2.0 6.6x20" motherboard with dual G34 sockets, 16 DIMM, PCIe slot and mezzanine card, 6 SATAII, 2 USB, and 1 RJ45 (see below)
- Intel v2.0 motherboard with dual Xeon (LGA2011) sockets, 16 DIMMs, 4 PCIe, 2 SATA, 2 mini-SAS, 2 USB, and 2 RJ45

AMD v2.0 motherboard Source: Google, serverthehome.com



Virtualization is the concept whereby multiple operating systems and software can run on one machine, simplifying the server infrastructure, and potentially reducing the number of servers.

The leader in virtualization software is VMware, with Microsoft and Red Hat following close behind. A 10:1 server consolidation would mean a significant reduction in hardware over time as virtualization becomes dominant.

With the explosion of big data requirements, however, it is believed that new applications and the explosive growth resulting from mobile computing, communications, and the Internet may offset declines in some hardware requirements. Cloud computing on the other hand, has its own set of issues directed at workspace, departmental, and even enterprise computing moving hardware resources into the cloud.

Bishop & Associates will have a detailed report on the server market available sometime this summer.