HP Bests Sun in a Dual-Core Server Duel

Enhanced machines take advantage of plug-in Opteron processor replacement

By Alan Zeichick

See correction at end of review

October 24, 2005 (INFOWORLD)—Dual-core technology is here. It's mainstream, and it's now part of the enterprise server ecosystem. IBM and Sun Microsystems led the charge with dual-core versions of their Power5 and UltraSparc processors; now AMD and Intel are offering dual-core versions of their 32- and 64-bit Opteron and Xeon processors.

The market leaders, of course, will be the x86-based chips. Here AMD has an advantage because its processor architecture allows the dual-core Opteron to be a plug-in replacement for its single-core predecessor. This allowed companies such as Hewlett-Packard and Sun to release dual-core upgrades of existing Opteron-based systems, such as the four-processor versions of the HP ProLiant DL585 and the Sun Fire V40z.

InfoWorld has already reviewed the single-core implementation of the ProLiant DL585 and Sun Fire V40z. Both were solid performers, although the DL585 had the edge in manageability and high-availability features. In short, you'll find that the dual-core versions of the processors remain solid systems. Both companies have also made moderate updates to the server hardware since the previous reviews, but overall, the same conclusions hold: The ProLiant DL585 is a better, more reliable server, with better management, I/O and high-availability features, and a better RAID controller, at a slightly better price.

If you don't need those extra features, however, the Sun Fire V40z offers more internal storage and a smaller form factor, for about 10 percent more in cost. (Prices were calculated by assuming an identical configuration—four 2.2GHz dual-core processors, 16GB RAM, two 73GB hard drives, and no extra-price software or services.)

It's all about the processor

The key to both machines' success, and HP's and Sun's abilities to bring them to market quickly, is the architecture that AMD uses for its Opteron server-class microprocessors. A single-core Opteron processor die—the actual silicon—contains the processor core, which has the queues, execution units, and on-chip cache. However, it also contains an on-chip crossbar switch. Three things plug in to that switch: the core, an on-chip integrated memory controller, and the on-chip high-speed system bus, which AMD calls HyperTransport.

The dual-core design for the Opteron processor is almost identical to that of the single core, except that there are two cores, each of which plugs in to the crossbar switch. The two cores share the same memory controller and HyperTransport bus. This means that, first of all, the Opteron design is inherently scalable; you can easily imagine AMD being able to plug four, eight, or more cores in to that same architecture. But second, this design doesn't require additional physical circuitry on the server's main logic board or additional pins for the chip. Thus, AMD's dual-core processors are simple plug-in replacements for the single-core chips.

The only changes that were required, as far as I can tell, may have been to the system BIOS, in order for the firmware to understand that there would be more cores than physical processors. Also, because each core generates heat, a plug-in dual-core processor would need to run at a slower clock speed than the original single-core chip, if the goal is to keep current draw and generated heat the same. There are also minimal bottlenecks because the cores must share the same memory and HyperTransport buses.

The net result, according to benchmarks I've seen, is that switching from, say, a 2.6GHz single-core to a 2.2GHz dual-core Opteron processor speeds up things about 30 percent to 40 percent. Of course, that's a rough estimate because a lot depends on the application's CPU utilization, but the upshot is this: There's a significant performance boost to using dual-core chips.

Hewlett-Packard ProLiant DL585

The HP ProLiant DL585, which I reviewed in a 2.2GHz dual-core configuration, is stronger in high-availability and expandability features and has a more sophisticated onboard management processor that offers an intuitive graphical user interface. Windows users, in particular, will find that the DL585's management interface is more comfortable and user-friendly than the Sun V40z's command-line-based service processor and that it allows for continuous monitoring and alerting for system faults.

Hewlett-Packard's four-processor server is physically larger than the Sun server: It's 7 inches high (4U), which means you can pack 10 of them in a standard 42U rack. Internal storage is limited to four Ultra320 SCSI drive bays, plus one optical/floppy bay that can be converted to a hard-drive bay. The server sports an integrated dual-channel RAID 5 controller that's for use only with the internal drives.

Beyond the limited storage, the server has eight PCI-X slots—two 64-bit 133MHz, the others 64-bit 100MHz, all full-length. Unfortunately, none is hot-swappable, and despite the fact that this server's CPUs have the bandwidth to drive PCI-Express cards, the backplane doesn't support that faster I/O standard.

Internally, the DL585 is designed around an active main logic board, which supports four plug-in modules, each of which contains one Opteron processor and four memory slots. (The design of the processor's integrated memory controller requires that each processor has its hardwired memory, but one processor can access another processor's RAM across the HyperTransport bus.) The server design requires that either two or four identical processor modules be installed. The upgrade from single-core to dual-core functionality is achieved simply by swapping these modules—a simple operation. Performing a processor replacement or upgrade on the Sun Fire V40z is more complicated.

Although both servers offer dual hot-swap power supplies, HP's are accessible from the front, making servicing easier in those rare cases when the power must be changed. What truly makes a difference in serviceability is a little panel inside the server (under the top cover) filled with dozens of LEDs. These illuminate to help identify a faulty part. Many other parts, such as the myriad hot-swap fans, also have LEDs that light up when something goes wrong.

Organizations thinking about high-availability operations might tilt in favor of the ProLiant DL585 over the Sun Fire V40z due to the more accessible power supplies and easier-to-troubleshoot, better way of swapping out a single processor. The Web-based Integrated Lights Out management processor is also far easier to use than the SSH-based processor in the V40z. Beyond that, there's no reason to believe that the components in the HP box are more reliable—it's just that the box is easier to service. Of course, neither of these systems is a true high-availability server; both lack RAID memory, for example, and processor fail-over. They're just a couple of steps above entry-level, in that regard.

Sun Fire V40z

As is the ProLiant DL585, the Sun Fire V40z is a four-processor server that originally shipped with single-core chips but has since been upgraded to support the dual-core chips. I worked with a 2.2GHz version. At 5.25 inches high (3U), the Sun server is slightly smaller than the HP DL585, allowing you to fit 14 of them, as opposed to 10, into a standard rack. That gives a significant process-density benefit for clusters or datacenters: A fully laden rack of DL585 servers has 40 Opteron processors, while the V40z has 56.

There are very few trade-offs that can be associated with the smaller space. The V40z has seven PCI-X slots, rather than eight, although some are half-size. None is hot-swappable, and there's no option for PCI-Express.

Because the V40z puts its hot-swap power supplies at the back, it has more hot-swap Ultra320 SCSI drive bays in the front—five, plus one convertible bay that's initially populated by the DVD and floppy drives. However, Sun has provided only a single-channel SCSI controller, and it only supports RAID 1 (mirroring) in hardware. If you want to use hardware-based RAID 5 (striping with redundancy), you'll need to add an accessory RAID controller.

Architecturally, the V40z is configured with a main logic board with two Opteron processors --and their memory and support chips. There's an accessory board that adds the second pair of processors. This renders the system somewhat less serviceable than the DL585; if the daughter board fails, you can remove it, but if something goes wrong with the main logic board's processors, you're hosed until a replacement arrives.

On the management side, the service processor has already been managed; it's a command-line-based system with its own Fast Ethernet jack, and it's accessed via SSH or through the serial port. There's also a small LCD panel on the front of the server, which can be used to configure the service processor. It's a rudimentary system, especially compared with HP's management system. The V40z also has nothing like the DL585's array of LEDs to assist with fault management. If something goes wrong, you'll need to interrogate the service processor to find out what's amiss—or call Sun.

One final point about these two servers: operating systems. Hewlett-Packard will install and support Windows Server 2000, Windows Server 2003, Red Hat, and Suse Linux. I tested a Windows Server 2003 configuration. Sun will install and support Solaris 10 x64, Red Hat, and Suse Linux. Although Sun says that the V40z will run Windows Server 2003, the company does not install or support it.

With their four dual-core 2.2GHz Opteron processors, both the HP ProLiant DL585 and

Sun Fire V40z offer the same primary business benefit: a lot of processing power in a small space. Given that the HP server offers more expandability (except for four instead of five hard drives), a better onboard RAID controller, a better service processor, and more maintainability options for about 10 percent less in price, it's this dual-core shoot-out's overall champion. However, in situations where sheer processor density is important—such as in clusters—the smaller size of the Sun Fire would tip the scale in Sun's favor.

Correction:
In this review, we originally misreported the HP ProLiant 585's maximum memory. The error has been corrected.

Sun Fire V40z

Good 7.8

criteria	score	weight
Availability	7	25%
Performance	9	20%
Scalability	8	20%
Management	7	15%
Serviceability	8	10%
Value	8	10%

Cost:
$35,495 with four dual-core 2.2GHz processors, 16GB RAM, two 73GB hard drives, and no OS

Platforms:
Sun installs and supports Solaris 10 x64, Red Hat, and Suse Linux; also compatible with Windows

Bottom Line:
A good server, the Sun Fire V40z comes with four dual-core processors, a lot of internal storage, and reasonable, but not exceptional, high-availability features. The server, with its rudimentary service processor and smaller form factor, is well suited for clustered applications where its high processor count—and 14 servers per rack—enables companies to put a lot of CPUs into a small space.

HP ProLiant DL585

Very Good 8.2

criteria	score	weight
Availability	7	25%
Performance	9	20%
Scalability	8	20%
Management	8	15%
Serviceability	9	10%
Value	9	10%

Cost:
$31,335 with four dual-core 2.2GHz processors, 16GB RAM, two 73GB hard drives, and no OS

Platforms:
HP installs and supports Windows Server 2000/2003, Red Hat, and Suse Linux

Bottom Line:
This is a very good server that brings together four dual-core processors, solid onboard storage, and reasonable, but not exceptional, high-availability features. Outstanding features are the DL585's onboard management processor and ease of serviceability. The server is well suited for clustered and stand-alone applications that would benefit from a lot of processors and hardware threads.

Alan Zeichick is principal technology analyst at Camden Associates in San Bruno, Calif., which specializes in networking and software development. Reach him at zeichick@camdenassociates.com.