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Network Computing

NOVEMBER 25, 2003 | WWW.NWC.COM

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Sneak PREVIEWS

IBM Champs at The 64 Bit

New eServer 325 affordably packs high horsepower for your clustered environments

BY STEVEN HILL

good

- Excellent computing performance
- Superb price-performance ratio
- Open-source-friendly
- Sophisticated management tools

bad

- Few memory slots
- No PS/2 ports, no legacy KVM support

Do you believe good things come in small packages? Usually only small things come in small packages, and that's what I expected with IBM's new eServer 325. There are dozens of 1U servers that do an acceptable job, and it's getting hard to tell the players apart without a scorecard. But the eServer 325 is based on the new AMD Opteron chip, which means 64-bit speed and performance in a dual-processor SMP configuration for less than \$6,000.

A longtime player in 64-bit computing, IBM has wisely chosen to play the "Intel-

compatible" 64-bit challenge both ways, offering multiprocessor servers with your choice of Opteron or Itanium processors. The 325, IBM's first venture into the world Obeast that stands out even among its more expensive competitors. And for real power, you can team it with dozens, or even hundreds, of servers just like it in a clustered architecture to create an affordable Linux supercomputer.

The pre-release unit NETWORK COMPUTING received for evaluation came fully loaded with dual 2-GHz Opteron 246 processors, 2 GB of DDR SDRAM, a low-profile IDE CD-ROM drive and a single hot-swappable 36.4-GB Ultra320 SCSI hard disk. For the operating system, IBM installed SuSE Linux 8.2 for 32-bit and SuSE Linux Enterprise Server 8 for 64-bit modes, but IBM doesn't sell the 325 with SuSE Linux pre-installed. The company says it plans to provide full support for Red Hat Linux as well as Windows Server 2003 for 64-Bit Extended Systems in mid-2004.

Outstanding Performance

With SuSE Linux installed in both 32- and 64-bit versions, I decided to compile and load Apache HTTP Server 2.0.47 under both environments. I hammered the 325 with Spirent Communications' Avalanche at our Real-World Labs® in Green Bay, Wis.

After some minor modifications to the default configuration files, the 325 did reasonably well when operating in single-processor, 32-bit mode, peaking at a little more than 3,300 transactions per second using our standard 24-KB Web page. The real surprise came when I ran the same test in 64-bit mode. I was blown away by a dual-processor peak performance of more than 11,800 transactions per second. This was more than good—this was the greatest performance ever recorded at our labs, and almost double the next highest Web server performance I had ever experienced, regardless of the number of processors installed. Further testing showed that the 325 was capable of sustaining 10,000 transactions per second under a load average of 10.50 to 15.50, with zero dropped packets.

My tests validated many of AMD's claims regarding the performance of the Opteron chip with its integrated DDR memory controller, 128-bit memory path and Hyper-Transport I/O management technology. As a bonus, the 325's memory and processor resources can be mapped through the creation of a Static Resource Table (SRAT) during *post*. If you activate the bios-level SRAT option on the 325 that lets the OS dynamically



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allocate and optimize the use of addressable resources, you can realize a performance increase of as much as 30 percent.

As with most 1U servers, there's not a whole lot of space available in the 325 for extras—loads of drive bays and redundant power supplies—but IBM makes good use of the limited real estate. The front panel has two removable drive bays in hot-swappable Ultra320 SCSI or nonswappable IDE, a 48x CD-ROM drive, two USB 1.1 ports, and recessed power and reset buttons. In the back of the 26-inch chassis, there are two more USB ports, dual 10/100/1000 Broadcom Ethernet, serial and video ports, and room for one half-length and one full-length PCI-X 64-bit/100-MHz expansion cards.

Surprisingly absent are the traditional PS/2 ports for mouse and keyboard. This means you'll have to upgrade to newer, USB-compatible KVM switches or adopt one of IBM's sophisticated cluster-management solutions. Storage options for the 325 range from a single 7,200-RPM, 80-GB EIDE hard drive to dual hot-swappable 10,000-RPM, 148.6-GB Ultra320 SCSI drives—sufficient when you consider that this system is geared to providing high-processor density in a clustered environment.

The 325's motherboard is based on an AMD 8111/8131 chipset that allows for single- or dual-processor operation, and most services are integrated to save space and PCI-X slots. Inside you'll find an on-board Broadcom NetXtreme Ethernet

controller, an ATA-100 IDE controller, an ATI Rage XL PCI display adapter and a single-channel LSI Logic SCSI controller with integrated RAID-1 support.

The 325's peak performance of more than 11,800 transactions per second was the greatest our labs ever recorded.

I found it odd that the 325 provides physical room for only 6 GB of memory per processor, considering the Opteron's potential to address as much as 256 TB of 64-bit memory space. But to its advantage, the memory bus of the Opteron runs at the processor's clock speed of 1.4 to 2.0 GHz, rather than at a fractional front-side bus speed like the Itanium and Xeon. And because memory is controlled by the processor, adding a second Opteron to your system means you're adding another memory controller and another 128-bit memory bus, providing a two-way memory bandwidth of 10.6 GBps.

For systems administration, the motherboard has a socketed, Integrated System Management Processor module that provides

access to advanced server-management features, including secure remote power control, unattended install, and text console redirect via serial or LAN. The module is designed to work with Director 4.1, IBM's server-management software, which lets IT admins view and track the hardware configuration of remote systems in detail and monitor the usage and performance of critical components.

New 64-Bit Player

There's nothing new about 64-bit computing; but making it affordable and accessible to the Intel-dominated market is. The undeniable benefits of huge memory addressing and bandwidth, massive computational speed, and seamless I/O that 64-bit platforms provide are countered by the challenges posed in the transition path. As usual, AMD and Intel have opposing views on a solution—Intel has developed its Itanium 64-bit processor using EPIC technology and a new instruction set, while AMD has based its Opteron processor on a 64-bit superset of the massively popular x86 instruction set.

At less than \$6,000 per dual-processor server, the 325 offers an inexpensive migration path to high-performance, 64-bit data-center computing. With the street price of a 1-GHz Itanium 2 processor at around \$7,500 and the price of a 2-GHz Opteron 246 processor at \$800, it's hard not to see value in the 325's Opteron platform.

■ **IBM E325 SERVER**, starts at \$2,919. IBM, (888) 746-7426. www.ibm.com or www.pc.ibm.com/us/eserver/opteron/

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OPTERON VS. ITANIUM

From a 64-bit migration standpoint, Opteron-based systems can simplify the process by providing exceptional native support for existing 32-bit applications while offering seamless, concurrent support for optimized 64-bit applications as they become available. In comparison, the Itanium 2 processor, while providing exceptional 64-bit performance, handles legacy support through the use of an emulation mode, which has been shown to offer only mediocre, translated 32-bit performance.