Bragging Right

This tweaked-out system from BOXX Technologies delivers incredible performance.

BY DAVID COHN

BOXX Technologies, based in Austin, TX, has been building high-performance computer systems since 1996. While most of its workstations are targeted toward digital content creation and visual effects—customers include TV networks and major film and VFX studios—its 3DBOXX line has also found a home among CAD and engineering users. Since it's been quite a while since we last looked at one of these powerful workstations, we were quite pleased when BOXX offered to send us one of its latest systems.

There are currently three different series within the 3DBOXX lineup, including single- and dual-CPU models based on both Intel and AMD processors. For this review, the company sent us one of its 3DBOXX 4800 Series systems, a 4860 Extreme, based on a "performance enhanced" six-core Intel i7 processor.

All of the company's 3DBOXX workstations come housed in a custom-designed aluminum chassis that's a far cry from your everyday, run-of-the-mill boxes. The front is a beautiful brushed aluminum panel with a BOXX logo in the middle. Above this panel are two drive bays and a panel containing four USB 2.0 ports and one IEEE 1394a (FireWire) port, as well as headphone and microphone jacks. This panel also houses a round power button, a bright-white LED power indicator, a blue hard drive light, and a small reset button (which proved far too easy to accidently press, immediately rebooting the system). The topmost bay housed a 20X dual layer DVD +/- RW drive. The sides of the 7.0x19.5x17.5-in. (WxDxH) tower case have removable black aluminum panels, while the top is brushed gray.

The rear panel provides four more USB 2.0 ports, as well as a pair of USB 3.0 ports. There's also another IEEE 1394a port, six audio connectors (separate microphone and line-in jacks, as well as jacks for front, side, rear and base output channels), both S/PDIF and optical S/PDIF ports, and PS/2 connectors for a keyboard and mouse.

The 3DBOXX 4860 Extreme workstation from BOXX Technologies uses an over-clocked Intel i7 six-core CPU and top-of-the-line components to deliver one of the fastest workstations available. ***Images courtesy of David Cohn***

Where's the Hard Drive?

The side panels are held in place with captive thumbscrews. Once we loosened these and removed the side panel, we were immediately struck by the extremely clean interior. The ASUS P6X58D-E motherboard, based on an Intel X58 chipset, takes up just a bit more than half the case. Above this we noted a compact, 850-watt Seasonic power supply. Also quite prominent was the Asetek liquid cooling module mounted over the CPU. But where were the hard drives?

The specifications for the 3DBOXX 4860 listed a drive cage supporting up to six separate drives. Because our evaluation unit obviously booted up, and a quick check showed two separate hard drives, we were quite puzzled—that is, until we removed the panel on the other side of the system, the side behind the motherboard.

Sure enough, there we found a pair of 7,200rpm Western Digital SATA hard drives—a 250GB primary drive and a 500GB secondary drive—as well as space for up to four more. The drives mount flat against a metal plate separating the space from the back of the motherboard. To install drives, you must first remove a pair of phillips head screws to release an individual cage, then mount the drive using four additional screws, route some cables, and then reattach the cage. It's a clever system, but we'd be a bit concerned about heat buildup. While it's a novel spot to hide the drives, they're likely to get just a fraction of the air flowing through the case, particularly if the space is filled with hard drives. The company says it has tested the system with a full complement of six drives, and that airflow is not an issue. BOXX offers hard drives of up to 2TB capacity, as well as a redundant array of independent disks (RAID).

The 3DBOXX has plenty of ports, room for up to 24GB of DDR3 SDRAM, liquid cooling and six separate drives. It still manages to keep a tidy interior, in part by separating the drive bays from the rest of the components.

FEATURES

- BOXX 3DBOXX 4860 Extreme
- Price: $6,325 as tested ($3,899 base price)
- Size: 7.00x19.50 x17.50 in. (WxDxH, w/handle) tower
- Weight: 31 lbs.
- CPU: one Intel Core i7 X980 (six-core) 3.33GHz (over-clocked to 4.15GHz)
- Memory: 12GB DDR3 SDRAM at 1333MHz (up to 24GB supported)
- Graphics: NVIDIA Quadro 5000
- Hard disk: Western Digital 250GB SATA 7,200 rpm drive, Western Digital 500GB SATA 7,200rpm drive
- Optical: 20X DVD+/-RW Dual-Layer
- Audio: onboard integrated high-definition audio (microphone, line-in, front, side, rear and bass)
- Network: integrated 10/100/1000 LAN
- Other: Eight USB 2.0, two USB 3.0, two 1394a (FireWire), S/PDIF, optical S/PDIF,
- PS/2 mouse, PS/2 keyboard
- Keyboard: 104-key Logitech K120 USB keyboard
- Pointing device: Logitech LX3 Optical Mouse

Tweaking Six Cores

The 3DBOXX 4860 Extreme is the first system we've received based on the new Intel i7 X980 processor, one of the company's new six-core CPUs, codenamed "Gulftown." The X980, based on a 32-nanometer process, comes with 12MB of shared L3 cache and has a clock speed of 3.33GHz. But as soon as we began our testing, it was pretty obvious that the 3DBOXX was running faster than that.

Sure enough, there's good reason for the BOXX team to put liquid cooling on the CPU: They over-clocked the processor 125% to a claimed 4.15GHz. At that speed, the CPU is going to consume more power and generate more heat.

The Gulftown CPU has an incredible 1.17 billion transistors, and supports both hyper-threading and turbo boost. With hyper-threading enabled, the processor appears to the operating system as having 12 cores; turbo boost means that the CPU can actually run even

Design Engineering Workstations Compared

		BOXX 3DBOXX 4860 Extreme workstation (one 3.33GHz Intel i7-X980 six-core CPU (over-clocked to 4.15GHz), NVIDIA Quadro 5000, 12GB RAM)		**Lenov E20** workstation (one 3.19GHz Intel i5-650 dual core CPUs, NVIDIA Quadro FX 580, 4GB RAM)		**HP Z200** workstation (one 3.47GHz Intel i5-670 dual core CPUs, NVIDIA Quadro FX 1800, 4GB RAM)		**Lenovo D20** workstation (two 2.66GHz Intel Xeon X5550 quad core CPUs, NVIDIA Quadro FX 4800, 8GB RAM)		**Dell Precision T3500** workstation (one 2.27GHz Intel Xeon E5520 quad core CPU, NVIDIA Quadro FX 3800, 4GB RAM)		**Lenovo S20** workstation (one 2.27GHz Intel Xeon E5520 quad core CPU, NVIDIA Quadro FX 3800, 4GB RAM)		**HP Z800** workstation (two 3.2GHz Intel Xeon X5580 quad core CPUs, NVIDIA Quadro FX 4800, 12GB RAM)	
Price as tested		$6,325		$1,224		$2,089		$5,943		$2,544		$3,885		$10,604	
Date tested		11/14/10		9/15/10		8/7/10		1/11/10		7/30/09		7/29/09		4/24/09	
Operating System		Windows XP	Windows 7 64-bit	Windows XP	Windows 7	Windows XP	Windows 7	Windows XP	Windows Vista	Windows XP	Windows Vista	Windows XP	Windows Vista	Windows XP	Windows 7
SPECviewperf	higher														
3dsmax-04		n/a	**90.25**	66.73	64.98	60.87	60.65	50.38	51.21	**39.91**	42.75	48.43	52.59	50.55	51.51
catia-02		n/a	**115.36**	68.28	63.79	68.13	66.87	61.79	62.01	**51.85**	53.33	60.40	60.61	62.10	61.66
ensight-03		n/a	**120.41**	45.79	**43.40**	53.85	53.06	55.26	53.51	47.26	47.84	51.74	**55.33**	53.99	53.62
maya-02		n/a	**458.21**	185.81	**157.57**	238.59	208.40	**250.41**	223.73	220.79	199.04	232.92	207.87	231.80	209.74
proe-04		n/a	**114.34**	64.08	59.17	**68.03**	65.74	64.83	63.66	55.67	**55.54**	61.56	64.49	63.59	61.48
SW-01		n/a	**223.03**	97.07	**89.67**	138.22	137.48	144.17	**145.19**	123.28	120.57	136.81	139.54	135.24	128.08
tcvis-01		n/a	**95.26**	23.66	**23.00**	35.60	34.81	**40.55**	39.51	28.71	28.07	29.17	38.76	28.93	28.29
ugnx-01		n/a	**88.75**	23.15	**16.93**	30.91	31.23	**34.93**	34.52	33.40	32.27	33.41	33.19	33.34	32.38
SPECapc SolidWorks	lower														
Score	seconds	n/a	n/a	**153.29**	n/a	148.72	n/a	141.59	n/a	178.39	n/a	**140.42**[1]	n/a	145.17[1]	n/a
Graphics	seconds	n/a	n/a	**58.71**	n/a	56.83	n/a	41.48	n/a	62.99	n/a	47.33[1]	n/a	**41.31**[1]	n/a
CPU	seconds	n/a	31.63	**33.67**	n/a	32.81	n/a	33.00	n/a	36.38	n/a	**31.01**[1]	n/a	32.68[1]	n/a
I/O	seconds	n/a	**54.68**	65.44	n/a	63.10	n/a	67.73	n/a	**83.35**	n/a	65.86	n/a	71.94[1]	n/a
SPECapc SolidWorks	higher														
Score	ratio	n/a	n/a	5.21	n/a	5.27	n/a	6.28	n/a	**4.66**	n/a	5.91[1]	n/a	**6.38**[1]	n/a
Graphics	ratio	n/a	n/a	3.25	n/a	3.23	n/a	4.68	n/a	**2.92**	n/a	3.92[1]	n/a	**4.85**[1]	n/a
CPU	ratio	n/a	10.20	9.58	n/a	9.83	n/a	9.78	n/a	**8.80**	n/a	**10.41**[1]	n/a	9.87[1]	n/a
I/O	ratio	n/a	**5.79**	4.84	n/a	5.02	n/a	4.67	n/a	**3.80**	n/a	4.81[1]	n/a	4.40[1]	n/a

Numbers in **blue** indicate best recorded results. Numbers in **red** indicate worst recorded results.

faster at times (our tests showed it accelerating to nearly 4.26GHz).

In addition to speeding up the CPU, BOXX provided us with a full load of system memory—a total of 12GB of RAM installed as six 2GB DDR3 1333MHz dual in-line memory modules (DIMMs), filling all of the available memory sockets. The system can accommodate up to 24GB using 4GB memory modules. The ASUS motherboard also provides six expansion slots: one PCIe x1 slot, two PCI slots, and three PCIe x16 slots each capable of a PCI Express graphics card. Our evaluation unit came equipped with an NVIDIA Quadro 5000 graphics board with 2.5GB of GDDR5 video memory. Built on NVIDIA's Fermi architecture, the Quadro 5000 is one of NVIDIA's latest high-end graphics accelerators, with 352 compute unified device architecture (CUDA) cores.

The extra thickness of the NVIDIA board meant that the adjacent PCI slot was unusable. Installing a second similar graphics board could also cover the other PCI slot, depending on which PCIe x16 slot you used. BOXX does offer other NVIDIA boards, ranging from a Quadro FX 580 up to the ultra-high-end Quadro 6000.

Blowing the Doors Off

With all of the power packed into this 3DBOXX, we had high hopes for our benchmarks—and the 4860 Extreme certainly delivered. On the SPECviewperf test, which focuses solely on graphics performance, the results were nothing short of incredible. The 3DBOXX 4860 Extreme, equipped with the NVIDIA Quadro 5000, not only beat every system we've ever tested, it demolished them, with some results more than two times faster than those previously recorded.

Unfortunately, since the system came with only Windows 7 installed, we were not able to obtain a complete set of meaningful results from our SPECapc SolidWorks benchmark, since this benchmark only runs effectively under Windows XP. That said, the CPU and I/O performance scores were excellent, and we'd expect actual performance when running SolidWorks or any other CAD application to be quite fast.

On our own AutoCAD rendering test, however, which clearly shows the advantages of hyper-threading, the 3DBOXX 4860 Extreme became just the second system we've ever tested to complete the renderings in less than a minute. But again, it not only beat the previous record, it was 1.3 times faster—and it managed this feat with the equivalent of 12 CPU cores, compared to 16 cores in the next fastest machine. The results of all our tests appear in the accompanying table.

A system as fast as the 3DBOXX 4860 Extreme needs lots of cooling, and BOXX certainly didn't skimp. We counted a total of seven fans: two behind the front panel (including one dedicated to the Asetek liquid cooling unit), another mounted near the front, two more on the rear panel, one on the NVIDIA graphics board, and one more inside the power supply. With all these spinning and lots of air moving through the case, the 3DBOXX was certainly not silent, although the fan noise was not obtrusive and would likely vanish into the background in a busy office. But on our test bench, we knew when this system was running.

BOXX rounded out the system with a Logitech K120 104-key keyboard and a Logitech LX3 optical mouse. Windows 7 Professional 64-bit came pre-installed, although we had to complete the final installation steps and locate the 25-character product key on a small label located behind the removable front grill. BOXX Technologies backs its systems with a three-year limited warranty, including return shipment costs in the first year, with phone and email tech support Monday through Friday from 7 a.m. to 6 p.m. Central Standard Time.

While we were quite astounded by the performance of the 3DBOXX 4860 Extreme, it certainly won't appeal to everyone. First, the system is currently only certified for SolidWorks and DCC products from Autodesk and a few others. Second, the incredible performance comes with a price to match. The 3DBOXX 4860 Extreme has a base price of $3,899, and the configuration of our evaluation unit would set you back $6,325. But for the price, you get bragging rights to one of the fastest systems currently built—and for some applications, the cost of the 3DBOXX 4860 Extreme is money well spent. DE

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