

Smart *and* Fast

The 3DBOXX 3970 XTREME harnesses several new technologies to deliver incredible performance.

BY DAVID COHN

We've come to expect a lot from BOXX Technologies. The Austin, TX-based company has been building computers since 1996, and its systems epitomize peak performance. The 3DBOXX 4860- and 8550-series workstations we recently reviewed (*DE* January 2011 and May 2011, respectively) proved to be the fastest single and dual-CPU systems to date. So we were quite excited when we received the latest BOXX workstation, the 3DBOXX 3970 XTREME—particularly because it incorporated several novel new technologies.

Like the other BOXX workstations before it, the 3DBOXX 3970 XTREME came housed in a beautiful, custom-designed aluminum chassis sporting a brushed aluminum front panel with the BOXX logo emblazoned in the middle. Above this panel are two 5.25-in. drive bays and a panel containing two USB 2.0 ports, two USB 3.0 ports and an IEEE 1394a (FireWire) port, as well as headphone and microphone jacks with jack retasking. The panel also includes a round power button, bright-white LED power indicator, blue hard drive light, and a small reset button. The top-most bay houses a 20X dual layer DVD +/- RW drive, while the second bay remains available. The sides of the 7.0x19.5x17.5-in. (WxDxH) tower case have removable black aluminum panels, while the top continues the brushed aluminum finish.

The rear panel provides six more USB 2.0 ports, two more USB 3.0 ports, and a Bluetooth 2.1 antenna. There's also an eSATA port, six audio connectors (separate microphone and line-in jacks, as well as jacks for front, center/subwoofer, side and rear output channels), an optical S/PDIF port, a RJ45 network connection, and DVI-D, HDMI and VGA video ports for the built-in Intel graphics processor that are separate from the NVIDIA Quadro 2000 graphics accelerator installed in our evaluation unit.

Smart Response Technology

The panels on either side of the case are held in place with captive thumbscrews. Removing the panel on the left reveals a spacious interior. The ASUSTek P8Z68-V Pro motherboard, based on an Intel Z68 chipset, takes up just a bit more than half of the case. Above this is a 620-watt Seasonic power supply. An Asetek liquid cooling module covers the single CPU, with its hoses routed to a front panel-mounted fan and radiator. A second front panel-mounted fan cools the rest of the interior.

Removing the panel on the right reveals the hard drives, which mount to the rear of the panel supporting the motherboard. Here we found what made this BOXX workstation unique: The 3DBOXX 3970 XTREME is the first workstation we've



The 3DBOXX 3970 XTREME workstation from BOXX Technologies houses an over-clocked Intel Core i7-2600K quad-core CPU in an attractive brushed aluminum case.

Photo courtesy of David Cohn.

reviewed to come equipped with an Intel solid state drive (SSD) taking advantage of Intel's new Smart Response Technology. The 3DBOXX 3970 XTREME comes standard with a 20GB Intel SSD 311 series drive, which is used as a cache for frequently accessed operations. Coupled with a standard hard drive, the addition of this inexpensive (around \$120) SSD speeds up hard drive/main memory interaction. This results in faster apparent hard drive speeds, reduced load and wait times, and maximized storage utilization. Overall system power consumption also goes down by reducing unnecessary hard drive spin.

Our evaluation unit also came with a 1TB, 7,200rpm Western Digital SATA drive with a 64MB cache. This speedy 3.5-in. drive features 4.2-millisecond nominal latency and a 128MB/second maximum transfer rate to help the 3DBOXX 3970 XTREME deliver excellent performance. The combination of the SSD and HD appear as a single drive, however, so that you only have to deal with a single drive identifier. The system automatically learns which files are accessed frequently and copies them from the HD to the SSD. The next time you access these files, the system loads them from the fast SSD rather than the slower hard drive.

The mounting panel provides a total of six drive bays, with power cables already in place. BOXX includes a bag full of ad-

Single-Socket Workstations Compared

		BOXX 3DBOXX 3970 XTREME workstation (one 3.4GHz Intel Core i7-2600K quad-core CPU over-clocked to 4.5GHz, NVIDIA Quadro 4000, 8GB RAM)		Dell Precision T1600 workstation (one 3.4GHz Intel Xeon E3-1270 quad-core CPU, NVIDIA Quadro 2000, 4GB RAM)		@Xi Computer MTower workstation (one 3.4GHz Intel Core i7 2600K quad-core CPU over-clocked to 4.1GHz, NVIDIA Quadro 5000, 16GB RAM)		Digital Storm PROTUS 226060 workstation (one 3.33GHz Intel i7-X980 six-core CPU, NVIDIA Quadro FX 3800, 12GB RAM)		BOXX 3DBOXX 4860 XTREME workstation (one 3.33GHz Intel i7-X980 six-core CPU over-clocked to 4.15GHz, NVIDIA Quadro 5000, 12GB RAM)		BOXX 3DBOXX 8550XTREME workstation (two 3.33GHz Intel Xeon X5680 six-core CPUs over-clocked to 4.2GHz, NVIDIA Quadro 5000, 24GB RAM)		Dell T5500 workstation (two 3.33GHz Intel Xeon X5680 six-core CPUs, NVIDIA Quadro 5000, 6GB RAM)	
Price as tested		\$4,048		\$1,875		\$4,465		\$6,545		\$6,325		\$11,396		\$9,242	
Date tested		10/12/11		9/11/11		4/30/11		12/13/10		11/14/10		3/20/11		1/14/11	
Operating System		Windows XP	Windows 7 64-bit	Windows XP	Windows 7 64-bit	Windows XP	Windows 7 64-bit	Windows XP	Windows 7 64-bit	Windows XP	Windows 7 64-bit	Windows XP	Windows 7 64-bit	Windows XP	Windows 7 64-bit
SPECviewperf	higher														
3dsmax-04		n/a	99.03 ¹	83.61	81.72	n/a	89.36	88.15	87.07	n/a	90.25	95.97	95.44 ¹	76.05	78.72
catia-02		n/a	124.75 ¹	96.38	93.28	n/a	121.7 ¹	75.35	84.85	n/a	115.36	120.44	121.1 ¹	98.48	100.25
ensight-03		n/a	109.56 ¹	76.62	74.16	n/a	131.19 ¹	62.22	58.33	n/a	120.41	132.41	130.13 ¹	118.29	121.70
maya-02		n/a	399.43 ¹	297.27	270.53	n/a	465.88	174.45	218.33	n/a	458.21	529.89	476.95 ¹	490.95	435.44
proe-04		n/a	120.33 ¹	89.24	85.86	n/a	128.25	83.16	77.29	n/a	114.34	113.84	113.24	92.19	90.61
SW-01		n/a	231.44 ¹	169.31	160.61 ¹	n/a	239.78	174.74	157.70	n/a	233.03	221.31	214.06	180.49	169.75
tcvis-01		n/a	79.05 ¹	56.76	54.24	n/a	97.45	40.16	37.36	n/a	95.26	98.58	94.17	93.99	90.34
ugnx-01		n/a	65.91 ¹	43.40	42.47	n/a	88.87 ¹	37.46	35.49	n/a	88.75	89.32	86.90	89.31	87.95
SPECcapc SolidWorks	lower														
Score	seconds	n/a	n/a	106.63 ¹	n/a	n/a	n/a	106.51 ¹	n/a	n/a	n/a	106.56 ¹	n/a	146.86	n/a
Graphics	seconds	n/a	n/a	34.24 ¹	n/a	n/a	n/a	32.17 ¹	n/a	n/a	n/a	35.33 ¹	n/a	58.42	n/a
CPU	seconds	n/a	26.44 ¹	25.05 ¹	n/a	n/a	27.48 ¹	26.87 ¹	n/a	n/a	31.63	25.99 ¹	n/a	32.27	n/a
I/O	seconds	n/a	47.01 ¹	48.26 ¹	n/a	n/a	49.48 ¹	47.99 ¹	n/a	n/a	54.68	46.51 ¹	n/a	60.76	n/a
SPECcapc SolidWorks	higher														
Score	ratio	n/a	n/a	8.04 ¹	n/a	n/a	n/a	8.04 ¹	n/a	n/a	n/a	8.23 ¹	n/a	5.32	n/a
Graphics	ratio	n/a	n/a	5.74 ¹	n/a	n/a	n/a	6.07 ¹	n/a	n/a	n/a	6.08 ¹	n/a	3.23	n/a
CPU	ratio	n/a	12.20 ¹	12.88 ¹	n/a	n/a	11.74 ¹	12.01 ¹	n/a	n/a	10.20	12.61 ¹	n/a	10.00	n/a
I/O	ratio	n/a	6.73 ¹	6.56 ¹	n/a	n/a	6.40 ¹	6.60 ¹	n/a	n/a	5.79	6.81 ¹	n/a	5.21	n/a
Autodesk Render Test	lower														
Time	seconds	n/a	45.6 ¹	82.2 ¹	60.5 ¹	n/a	49.8 ¹	53.5 ¹	46.3 ¹	n/a	39.6 ¹	34.0 ¹	19.0 ¹	42.0 ¹	28.0 ¹

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

ditional power cables, as well as one more SATA cable, so you can easily add another hard drive. The company offers drives ranging from 250GB to 3TB, and will preconfigure systems with multiple drives and redundant arrays of independent disks (RAID).

Boosting Performance

The Intel Core i7-2600K CPU in our evaluation unit was also somewhat unique. While the Xi MTower workstation we reviewed in August also came equipped with this same processor, BOXX over-clocked its CPU to 4.5GHz. But over-clocking this quad-core “Sandy Bridge” processor works a bit differently than what we’ve seen in the past. The 2600K CPU, which is based on a 32nm process technology and has a maximum thermal design power (TDP) of 95 watts, has a clock speed of 3.4GHz and a

rated maximum turbo frequency of 3.8GHz. The “K” designation in the name indicates the CPU can be over-clocked. Thanks to the way BOXX has configured the basic input-output system (BIOS) of its 3DBOXX 3970 XTREME workstation, the Intel Core i7 CPU runs at 3.4GHz when not subject to significant computational loads—what Intel refers to as the idle, or C-state. But when pressed to do work, the processor shifts into a P-state, increasing both the voltage and frequency, so that all four cores—and with hyper-threading enabled, all eight threads—reach a maximum frequency of 4.5GHz. We confirmed this by running CPU monitoring software while performing some of our benchmark tests. In addition, when the system is truly idle, the CPU shifts into higher C-states, allowing the processor to turn off unused components to reduce power consumption.

Our evaluation unit came equipped with 8GB of RAM, installed as a pair of 4GB DDR3 dual in-line memory modules (DIMMs). The ASUS motherboard can support up to 32GB of memory using 8GB memory modules. The motherboard also provides a total of seven expansion slots—three PCIe 2.0 x16 slots, two PCIe 2.0 x1 slots, and two PCI slots—and supports both NVIDIA SLI and ATI CrossFireX technology. There's also on-board SATA, LAN, Bluetooth, Realtek audio, FireWire, and USB controllers.

Although the Intel Core i7-2600K processor includes built-in HD Graphics 2000 with Intel InTru 3D technology, BOXX equipped our evaluation unit with an NVIDIA Quadro 4000 GPU. This mid-range graphics accelerator has 256 CUDA cores and a 2GB GDDR5 frame buffer; it provides two DisplayPort connectors and one dual-link DVI-I port.

Incredible Results

Because the 3DBOXX 3970 XTREME was equipped with just a single quad-core CPU, albeit one that was tweaked for very fast performance, we weren't expecting it to set any records—particularly when compared to other systems using one or even two six-core CPUs. But then again, we weren't quite sure what to expect with the addition of the SSD and Smart Response Technology.

To say that we were impressed with the performance of the 3970 XTREME would be an understatement. On the SPECviewperf test, the 3DBOXX 3970 XTREME equipped with the NVIDIA Quadro 4000 turned in some of the best results we've ever recorded, surpassing even dual-socket systems equipped with more expensive graphics boards on some datasets.

Unfortunately, the system came with only Windows 7 installed. This meant we were not able to obtain a complete set of meaningful results from our SPECapc SolidWorks benchmark, because 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 3970 XTREME proved to be faster than any other single CPU-based system we've ever tested. It rivaled the performance of some workstations equipped with two processors. In addition, the system ran nearly silent, except when accessing the DVD drive.

BOXX rounded out its workstation with a Logitech K120 104-key keyboard and a Logitech M500 laser mouse. Windows Professional 64-bit came pre-installed. BOXX Technologies backs its systems with a three-year limited warranty, which includes phone and email tech support Monday through Friday from 7 a.m. to 6 p.m. CST, and free return shipment if necessary during the first year of ownership.

Even more amazingly, the incredible performance of the

3DBOXX 3970 XTREME doesn't cost as much as you'd think. All 3970 XTREME workstations include the Intel Core i7-2600K CPU and 20GB Intel SSD. Prices start at \$2,862 for a system equipped with 4GB of memory, a 250GB hard drive, and an NVIDIA Quadro 600 graphics card. The NVIDIA 4000 adds \$816; doubling the memory raises the price another \$222; and moving up to the 1TB hard drive brought the total cost of our evaluation unit to \$4,048. Of course, you could add even more memory and a higher-end graphics card, but for most applications, that seems a bit too extreme. As configured, our 3DBOXX 3970 XTREME should more than meet the needs of most users—delivering one of the fastest systems available today without breaking the bank. **DE**

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INFO → BOXX Technologies Inc.: BOXXtech.com

BOXX 3DBOXX 3970 XTREME

Price: \$4,048 as tested (\$2,862 base price)

System Requirements:

- **Size:** 7.00x19.50x17.50-in. (WxDxH, w/handle) tower
- **Weight:** 27 lbs.
- **CPU:** one Intel Core i7-2600K (quad-core) 3.4GHz (over-clocked to 4.5GHz)
- **Memory:** 8GB DDR3 at 1,333MHz (up to 32GB supported)
- **Graphics:** NVIDIA Quadro 4000
- **Hard Disk:** Western Digital 1TB SATA 7,200rpm drive plus Intel 20GB SSD
- **Optical:** Pioneer 20X DVD+/-RW Dual-Layer
- **Audio:** onboard integrated high-definition audio (microphone and headphone on front panel; microphone, line-in, front, center/subwoofer, side and rear speakers on rear panel)
- **Network:** integrated 10/100/1000 LAN with RJ45 socket
- **Keyboard:** 104-key Logitech K120 USB keyboard
- **Pointing device:** Logitech M500 laser mouse
- **Other:** Two USB 2.0, two USB 3.0 and one 1394a (FireWire) on front panel; six USB 2.0, two USB 3.0, one eSATA, optical S/PDIF, DVI-D, HDMI and VGA on rear panel

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