

# Opteron



# The Opterons have landed

After a long wait, **Paul Hudson** finally has two Opteron machines under his desk. *Linux Format* presents: the UK's first in-depth Opteron-on-Linux review...

## BUYER INFO

Two 1U 64-bit servers emerge to dominate a new market and leave the competition trailing in the dust.

- **SUPPLIER** RackSaver
- **PRICE** Price: \$4000 for the 242 machine, and \$2500 for the 240 machine.
- **WEB** [www.racksaver.com](http://www.racksaver.com)

**D**espite launching back on April 22nd, not all that many Opteron servers have managed to sell so far. This isn't because they're bad, mind you – simply because supplies have been short, as usual, particularly because many of the early releases go to the media for review purposes. And so here we are – RackSaver, the company who made such a storm by producing the highest-performing x86 servers around when Opteron launched – has been kind enough to send us two machines from its new Opteron range. Opterons, it seems, are like buses and Little Chef restaurants. The first machine is an Opteron 240 (that's 2 x 1.4GHz CPUs for non-AMD marketing

droids), 2GB ECC RAM, and a 40GB hard drive, and the second machine is an Opteron 242 (2 x 1.6GHz) with 4GB ECC RAM, and the same 40GB hard drive.

Both machines came with SLES8 / UnitedLinux pre-installed, however the installation certainly wasn't done very well, as the system was a *mess*. `/usr/bin/gcc` or even `/usr/bin/cc` didn't work, as, for some reason, `/usr/bin/cpp` was being used – naturally this managed to screw up most default compilations. To make things worse, 80% of the standard include files were missing, which meant that even after we'd sorted out the `gcc` mess, we still couldn't compile anything. As we had no CDs supplied, and the machine was set up to read from an

NFS store we didn't have, we were unable to use *YaST* to correct the problem. To be fair, these *were* review machines – if you buy one of these, they will almost certainly come properly configured. We got in touch with our friends at SuSE, who were more than happy to provide us with some SLES 8 for Opteron CDs.

## Performance

Normally the first thing we do is to go into all sorts of detail about the specifications of review machines, but just this once it's important to make an exception – I think everyone reading this wants to know how well Opterons perform!

The first test we ran was the *GCC* test, because this is where the key changes between x86-32 and x86-64 lie. As you may know, we use a compile of kernel 2.4.19 in our tests to get our benchmark figure, however, because that kernel version has no support for x86-64, we used 2.5.10 instead. 2.5.10 was chosen as it was the nearest in code size to 2.4.19, which, while not making it a direct comparison, is at least fairly close –



if anything, it will be slower, owing to the new code added in the experimental branch. Let me remind you that last issue we reviewed a dual 2.8GHz Xeon machine, which returned a score 1.74 for compilation, and that this Opteron machine has dual 1.6GHz CPUs – hardly a fair comparison, you might think!

You'd be wrong: the 242 machine returned a compilation score of 2.14, which blows the Xeons out of the water by a margin of around 22%, despite the much-vaunted

hyperthreading technology in the Xeons. As CPU scores scale linearly, users would need dual 3.4GHz Xeons to match Opterons running at less than half the speed. This incredible speed difference is again highlighted in the *oggenc* benchmark results, with the 1.6GHz Opteron returning 4.68 compared to our dual 2.8GHz machine from last issue returning "just" 4.04 – a 15% lead for AMD, again making their CPUs twice as fast as Intel's Xeon, clock for clock.

So, on raw CPU performance it's clear that Opteron is game, set, and match ahead of Intel. However, it doesn't stop there – with 2GB and 4GB of PC2700 RAM behind them respectively, the 240 and 242 machines have more than enough capacity to load vast amounts of data into RAM and serve it up without touching the hard disk. This is reflected in the *Apache* benchmark, where the 1.6GHz CPU returned a result of 5.5 – that's 5.5 times faster than our test machine, or 50% faster than the twin 2.8GHz Xeons. An incredible result, certainly, but it hides the only gremlin in this system – hard disk access.

The hard disk part of our test uses *hdparm* and *bonnie++* to measure overall hard drive performance. When just using *hdparm*, which tests buffered disk and disk cache reads only, returned a score of 3.19 – very respectable for a non-SCSI drive. However, the *bonnie++* test returned a measly score of 0.17, which is entirely unacceptable for departmental servers. We got in touch with both RackSaver and Arima (the makers of the motherboard) who did some research into the problem and said they would produce a fix for new

machines in the form of an updated BIOS, which, once installed, would correct the problem.

One minor peculiarity we noticed was in the MySQL test – the machine returned a score of 0.51, which is awful. However, when we took SLES off and put Red Hat Enterprise Linux WS on (a 32-bit OS) the score jumped to 2.99 – in line with what we would expect based upon the other scores. To add to the confusion, putting SuSE Pro Linux 8.2 (their 32-bit OS) on the machine caused the benchmark to *crash*. SuSE have yet to respond to what's causing the problem, however it's likely to be a fairly minor hardware support glitch.

### Hotter than hot

The machines both come with two network interfaces at the back, plus a standard floppy and CD-ROM at the front. Of interest, though, is the lack of a serial port at the front, which means that administrators who fix faulty rackmounted servers such as these by plugging a serial cable into them are out of luck. However, this could be considered as just an overdue step in the right direction – serial connections aren't really used all that much any more, particularly as SSH is so widespread now. With so few ports on this thing, it's basically a power machine – not designed for easy connectivity, but it crunches numbers faster than a speeding bullet.

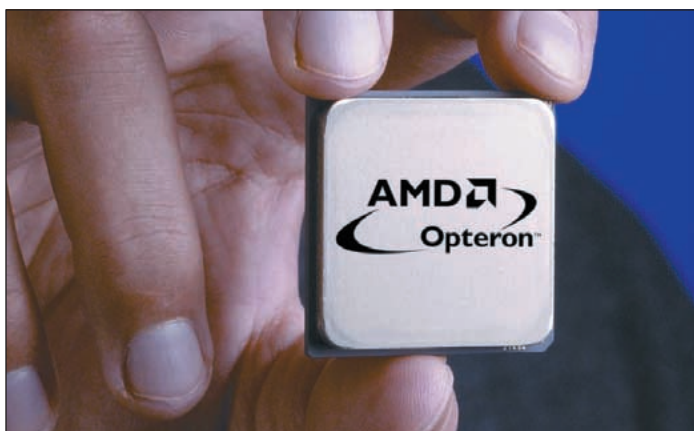
One particularly noticeable thing about these RackSaver machines is that they run incredibly hot – running one of them for 30 minutes or so made the top of the unit almost uncomfortable to the touch, which made us wonder how hot the machine would get if it were busy for a longer period of time, or indeed if there were more of them running at the same time.

Another very evident sign that the machines were turned on was the sheer amount of noise they make. With two fans on the front and another three to the right of the machines, there's certainly a lot of noise when powered on. In fact, these machines were so loud that, with only one of them turned on, we even had *Mac Format* staff (the nearest magazine to us here at LXF Towers) complaining that the noise drowned out their iPod tunes!



**“Linux Enterprise Server for AMD64 enables customers to combine the stability and security of Linux with the performance enhancements available only through the 64-bit architecture.”**

RICHARD SEIBT, CEO  
SUSE LINUX AG

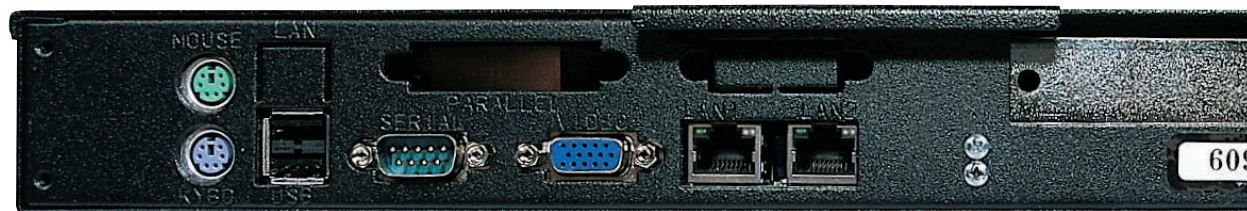


Sales of Opterons haven't been huge so far, but it is early days yet.





# Opteron

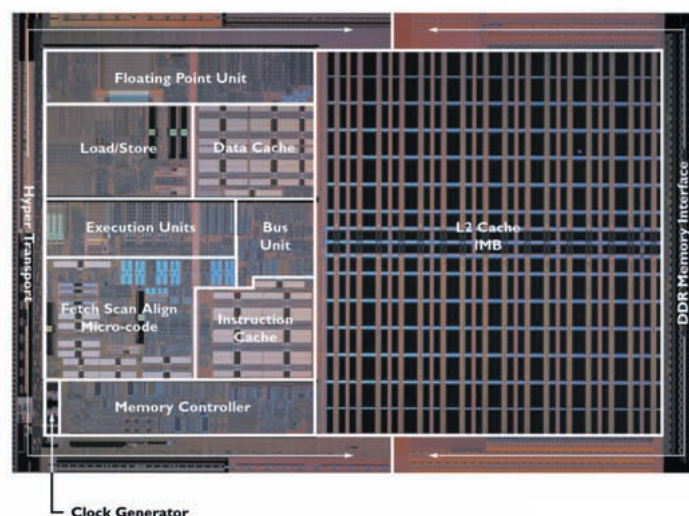


Because these machines are destined for large racks out of the way of staff, noise certainly isn't an issue. However, I must admit to being a little worried about the general heat level a rack of these machines would put out – if you intend on deploying several of these machines in one room, you would be wise to get a powerful cooling system installed.

## Docs and support

The two RackSaver machines came with nothing else in the box other than the usual rackmounting kit. No documentation, no CDs, not even an A4 sheet describing what the hardware actually was. This is quite a peculiarity, because RackSaver is known for having first-class support and help for customers. Again, this is likely to be down to the fact that these are review machines, but it would've been nice to have some documentation regardless.

Getting support from RackSaver was admittedly tricky because it doesn't have a UK office – when I sent emails off with questions, I would generally get responses the following morning or a day later. The problem lies in the fact that RackSaver's only office is in



**In case you were wondering what all the physical parts of the Opteron chips actually do, this should make it fairly clear.**

California, which puts it 8 hours behind us, and even more for those of you who are further east than the UK.

## SLES 8

We reviewed SuSE Linux Enterprise Server 8 back in issue 40, and it scored 8 out of 10 – a great distro with a few niggles. At the time of writing, SLES 8 is the only working Opteron-optimised Linux distribution available – we've yet to be able to get Mandrake Corporate Server 2.1 for AMD64 to work, and Red Hat's effort is still a long way off. As such, there is little choice for an operating system if you want to take full advantage of the Opteron hardware, but it's far from a sorry state of affairs because, excluding the performance problems already mentioned, SLES 8 for Opteron is as good in every area as its IA-32 cousin.

Despite these computers using the very latest hardware throughout, SLES 8 detected everything without bother, and very little was different from SLES for x86 – other than the big jump forward in performance. Using the 64-bit GCC, everything compiled was compiled with optimisation for the Opteron, which means that for all intents and purposes the CPU is transparent. This reflects very

well on SLES as a product – you really can use it on whatever hardware you've got, from aged 486s to top of the line Opterons, using the same skill set.

Naturally we'd prefer to have other working Opteron OSes on the market, to provide competition if nothing else. With SuSE selling thousands of copies of SLES thanks to its excellent Opteron support, Red Hat must be kicking itself for being so slow off the starting blocks.

## Conclusion

The Opterons we tested, despite being dragged back by sluggish hard disk performance before the BIOS patch, utterly crush the competition. Intel's Xeon CPU (its leading x86 workstation and server chip) doesn't come close to the Opteron when it comes to performance – our tests show that clock-for-clock the Opteron is twice as fast as the Xeon in many tests, and that's despite the fact that our Xeon test rig had a much higher-end storage solution behind it.

When it comes to price the situation is a little more confused. AMD has traditionally based its market position on "we're as good as Intel, and cheaper too". Naturally this mantra has been dropped with AMD64 – it's not too

## Kernel 2.4.21

From Kernel 2.4.21 onwards, the AMD64 platform is now supported fully. There have been a large number of fixes and optimisations made to the AMD64 kernel since SLES 8 was released, which means that you're likely to get even better performance than we did if you load the new kernel.

## What now for Opteron?

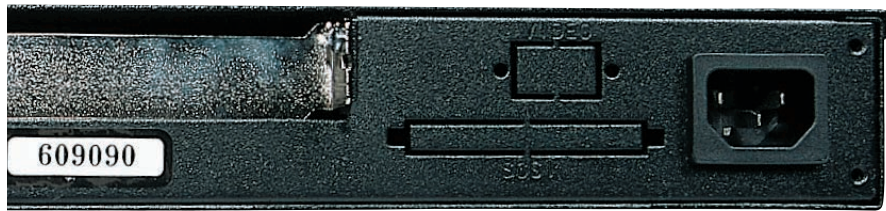
**Market-leading products should be reaping rewards...**

Are these RackSaver machines the beginning of a flood of Opteron servers? Well, with this stunning price/performance comparison, one would think so. However, here at LXF we're certainly not being inundated with offers of hardware, which points towards most suppliers still being a little hesitant about the platform. When RackSaver announced that its QuatreX-64 server had taken the lead in the TPCC 4-way scores despite coming in at under half the price of the nearest competitor, few seemed to notice. Even now that AMD's claims of supreme performance have been confirmed by independent tests,

there does still seem to be a notable lack in uptake from manufacturers.

Whether this is due to a continuing lack of parts from AMD, FUD being spread by AMD's competitors who realise they stand to be ousted from their most lucrative market, or something else – it's hard to say. While it's good to see that we're getting one Opteron review request for every one Xeon review request, the platform still deserves a lot more.

With Intel's Gallatin Xeon and the new Itanium 2 chip having been launched at the end of June, Intel has got one last chance to hold back the AMD64 tide – only time will tell how successful they will be.



Not many ports compared to some of the competitors, but you can always expand connectivity using some sort of external hub.

## In line with expectations?

LXF double-checks the performance figures

In *LXF41* where we tried to estimate the performance improvement we'd see when switching to 64-bit. The conclusion was that the extra registers would likely give a 10-15% speed up, with even more being possible for computationally intensive code and code that can take advantage of SSE2 instructions.

At first, you might think "Those *Linux Format* monkeys were completely wrong – the Opteron is twice as fast as the Xeon, not 15% faster!" However, that's essentially comparing chalk and cheese – after all, the Opteron is largely the same as the Athlon processor. Remember that, although AMD may print its latest CPU as being 3200+, in reality it only runs at 2.2GHz, so it's only 400MHz faster than the fastest Opteron currently available – a difference of about 20%.

The performance difference between Opteron and Athlon is at its least where computationally intensive code is few and far between – particularly the *Apache* benchmarks. However, wherever the Opteron gets the chance to tear away – particularly in MySQL, where there's a lot of 64-bit integer mathematics – it surges forward.

We have to admit we were surprised when we totted up the figures at quite *how much* difference in speed the Opteron gives, particularly when concerning intensive code. The extra registers, the new flat memory model, the integrated memory controller, the innate 64-bit operation, and the other tweaks AMD made to the Opteron mean that this CPU isn't just a little faster than the next best thing – it's a lot faster, *and then some*.

smart to compete on price in a marketplace where the main requirement is quality. As such, the Opteron CPUs are quite a long way from cheap, but that's more than justified by the performance they earn you. At the time of writing we found 242 Opterons on sale for \$726 each (in quantities of one) with 3.0GHz Xeons on sale for \$688 each (also in quantities of one). As you can see from the results above, a 242 Opteron runs a great deal faster than a 3.0GHz Xeon, so when it comes to price/performance AMD still has Intel beaten hands down.

However, when it comes to the price of a complete machine, the difference becomes quite noticeable – the Sharq server we reviewed last month was £4640, whereas the cheaper of these two RackSaver machines we tested is \$2500. Once converted to sterling and import tax is added, the 240 machine is likely to come in a little over £2000, which means you can get two of the 240 machines for the price of one Sharq, and *still* have change left over,

despite the fact that just one of the 240 machines beats the Sharq server on everything but hard disk performance.

When it comes down to your choice of operating system, the way is very clearly led by SuSE Enterprise Linux 8 – SuSE have done a lot of work to make the system suitable for people at all technical levels whilst also making sure they take advantage of the new technology offered by the CPU. The RackSaver machines we tested came with a very poorly installed set up, but it's almost certain that that's because they were review machines – RackSaver has worked very closely with both Red Hat and SuSE to make sure that its machines are compatible.

Neither of these machines came with a high-performance storage solution, which means that you should consider other options if you want SCSI or RAID – here at LXF we'd be very interested to see these same machines in a 2U format, backed by a set of high-powered hard drives, as we think

there'd be another big performance jump. In fact, based upon these prices it seems quite likely that a 244 machine with a set of SCSI hard drives in a 2U machine will still come in at under £4000 including tax.

It's clear to see that Opteron is a superior platform right now, and not just because of its price. On the performance front, no x86-compatible machine comes close to Opteron, despite the fact that we didn't even review the most powerful Opterons on the market. Furthermore, the mere fact that Opteron is x86-compatible is a huge boon in itself, because there's an increasing number of proprietary programs for our OS which won't come out in an Opteron-optimised form just quite yet. We tried Red Hat Enterprise Linux WS on the machines (look for a full RH WS review next issue) to test out 32-bit performance and it was just as impressive as the 64-bit performance – these Opterons take whatever you throw at them, regardless of the bit-size.

AMD took a huge risk with Opteron, and it seems to have paid off better than any AMD exec could have hoped for. RackSaver, for its part, is showing full commitment to the new platform, and are producing machines that are set to take the world by storm. If you have recently splashed out £5000 on a new Xeon server, or, worse, £20,000 on a new Itanium server, don't worry – I imagine its bulk will prop doors open remarkably well. **LXF**

**"On the performance front, no X-86-compatible machine comes close to Opteron, despite the fact that we didn't even review the most powerful Opterons on the market."**

### BENCHMARK: 240

hd	1.66
apache	4.9
mysql	2.6
compile	1.88
oggenc	4.11
Overall	3.03

### BENCHMARK: 242

hd	1.68
apache	5.5
mysql	2.99
compile	2.14
oggenc	4.68
Overall	3.4

### VERDICT

Ease of use	9/10
Features	10/10
Performance	10/10
Value for money	10/10

Two very capable, very affordable machines. If you were thinking of buying a Xeon server, you'd be crazy not to reconsider and plump for these.

### LINUX FORMAT RATING

////////// 9/10