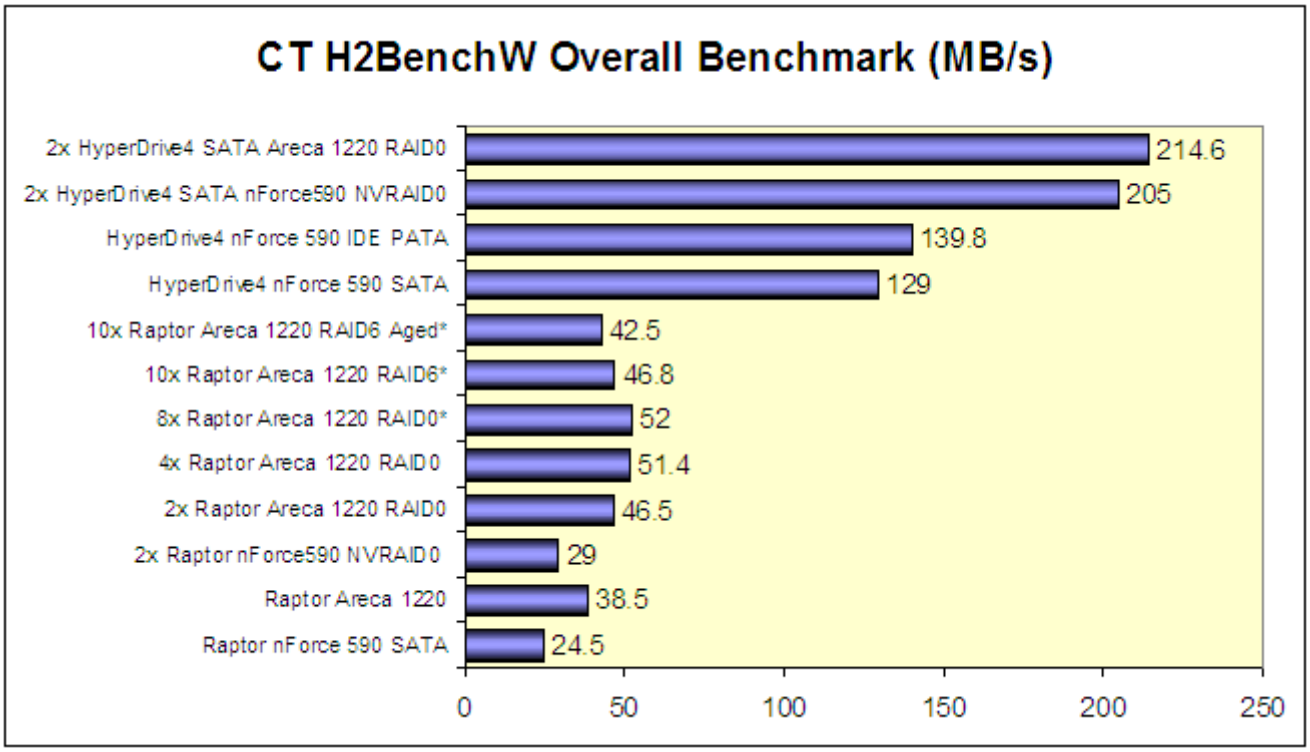
The second test was on an ASUS CrossHair Mobo with a dual core 2.6 GHz (5200 Intelahertz) Athlon 64 processor overclocked by 10% (i.e. 2.86 GHz and 5720 Intelahertz) and 1GB of 667 MHz DDR2 and a crummy Geforce6 Graphics card with no graphics drivers installed. We used the latest 9.35 nForce 590 Mobo drivers and the v1.02 Areca 1220 RAID driver (a lot better than the first version which used to cause a 2 second delay between the XP splash screen and the desktop). We ran Windows XP SP2 and Photoshop and the paging file entirely on the drive or drives being tested. We used a Raptor as the boot disk, with HyperOs 2007 SuperGeek to swap to the other copies of Windows on the HD4 and the RAID Raptors. The boot disk only uses the MBR, BOOT.INI, NTLDR and NTDETECT.COM, when booting XP resident on another disk, so it did not cause a measurable performance hit. These tests would have taken weeks to do without HyperOs 2007!

The true Hardware seek time of the New HyperDrive4 (revision2) as measured by the wonderful Data Transit Bus Doctor (30,000 Euro Bus testing hardware) is 1100 nanoseconds read and 250 nanoseconds write. HDtach3 gives a figure of 0.0 milliseconds. Computer Technical's H2BenchW gives a figure of 30 microseconds or occasionally of 20 microseconds, but these figures are just the minimum resolution of the Benchmark. IOmeter can be used to see seek times of around 10 microseconds by comparing the Input/Ouput operations (IOs) per second for sequential reading/writing of small files with random reading and writing of the same files. The trouble with using it to measure the seek time of one HD4 is that IOmeter takes longer to implement its randomization routine than the HyperDrive4 does to find a file to read from or to write to! IOmeter gives a larger IO per second to random read of 1K files than it does to a sequential read of those files with the HD4! So it cannot discern the seek time of an individual HyperDrive4 unit.

But it can see the seek time of 2 HyperDrive4s in nVidia RAID, since the software RAID slows down the seek time. In this case we got 90,000 IOps for a sequential read and 57000 IOps for a random read of 1KB files. So 33,000/90,000 or 0.367 seconds is taken up by 57,000 seeks. So there are 155,313 seeks per second. So the seek time is 6.4 microseconds by this calculation.

The HyperDream becomes a reality...

The Computer Technical Magazine H2BenchW Benchmark gives an overall basket of applications index. The apps emulated are Photoshop, Word, Swapping/Paging, Installing, Copying, and Virus Scanning. Here are the overall results...



Simply put, one HyperDrive4 is around 3 x faster than 10 RAID6 Raptors.

The Bar chart shows that the Areca card actually achieves more by having great caching capability than it does by having a multiplicity of hard disks. One Raptor on the Areca 1220 has an application index of 38.5 compared with 10 RAID6 Raptors on 46.8. We also included a 10% slower aged RAID6 array to take account of disk fragmentation which causes all Hard Disk based PCs to slow down over time. The HyperDrive4 being made of DDR (which is double data rate *random access* memory) is not affected by fragmentation at all!

We will go into more detail below. But to give the reader some ideas of how significant these results are to PC performance consider this. When we upped the processor speed from 2.0 GHz (3800 Intelahertz) to 2.86 GHz (5720 Intelahertz) the improvement on the Raptor Application Benchmarks which were carried out when testing the original Hyperdrive4 (revision 1) was negligible, at most 3 percent. And consumers pay hundreds or thousands of pounds to get those few percent. Photoshop image resolution changing on an NVIDIA SATA Raptor showed no change at 229 seconds and on a single Areca driven Raptor it improved from 226 seconds to 221 seconds.

But the HyperDrive4 gives an improvement not of 3% but of more than 500% when compared to the world's fastest Hard Disk for a general basket of popular everyday applications.

Incidentally we have just started doing some tests with Ziff Davis WinBench99, the other Benchmark recommended by www.storagereview.com, which also emulates commonly used Windows applications. We achieved similar, but not quite so spectacular, preliminary results (around 300% improvement for their general basket of apps - more later).

In fact the HyperDrive4 will give you performance that is over 200% faster than it has ever been possible to achieve using any number of RAID 6 Raptors you like. This is due to the seek time wall in their performance characteristic. But what is more phenomenal for the future is that the HD4 with a read seek time of 1100 nanoseconds and write seek time of 250 nanoseconds has no such wall. So 4 HD4s in RAID0 would be literally four times as fast a one HD4, if the RAID cards on the market were fast enough, that is, but regrettably they are not.

The Areca card, and other Hardware RAID cards are good enough to handle the Sustained Transfer of 2, 4 and 6 RAID HD4s but not fast enough to handle the IOs resulting from their tiny seek time. The Areca RAID card has a minimum seek time of 50 microseconds, which is 50x slower than the HD4. That is why the NVIDIA RAID is not far behind it in performance. The NVIDIA RAID has no trouble with IOs because it is software RAID and uses the dual core Athlon 64 for its RAID CPU. But even with this monster processor it is not fast enough at 2.0 GHz to achieve an STR of more than 200 MB per second with 2 RAID0 HD4s when it should be 2x 115 = 230 MB per second which we see with the Areca card. Using a 2.86 GHz processor brings the STR of 2 RAID0 HD4s up to 214 MB per second. But this requires a very small 4K stripe and gives a slower STR with the longer HDtach3 bench test. So the nVidia RAID cannot manage the STR and the Areca RAID cannot manage the IOs!

This is not because the Athlon is slow. It is because its RAID driver and firmware were designed to handle two striped hard disks, not 2 striped Hyper Drives!

But if the industry would wake up to the new reality and make faster RAID cards then computers could be not merely 500% faster but actually 5000% faster by the end of the year. We just need a 500,000 IOps, 1000 MB per second, RAID card. The motherboards are good enough already for the STR!

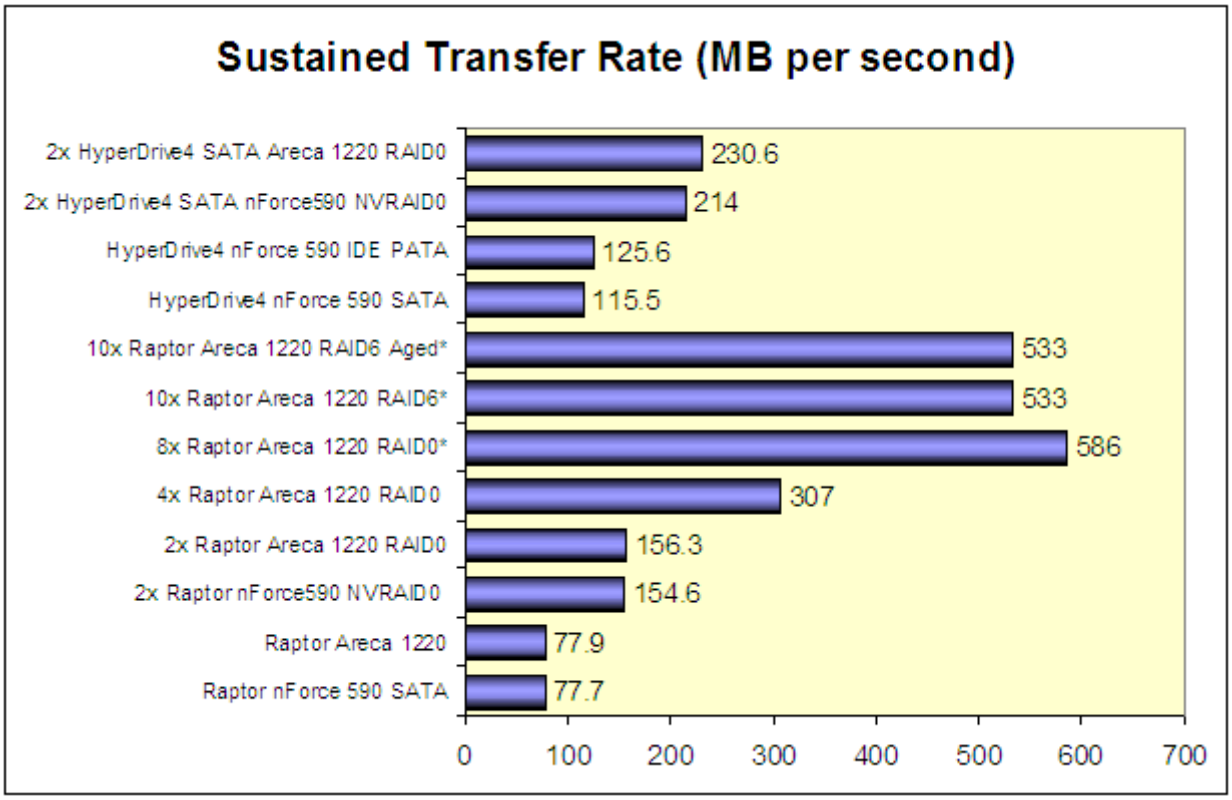
What amazes us at HyperOS Systems is that hundreds of millions are being spent all over the world on optical memory storage which promises seek times in the microseconds in the next decade, and we already have seek times in the nanoseconds today. On sale today.

Q: What does it take to wake up IBM, Dell, Microsoft, Intel, Apple, AMD, Samsung etc.?
A: You cannot manage a football team succesfully if you do not know how to play football. The bureacrats have stolen these technical companies from the technocrats who set them up. This needs to be reversed. Apple have learned this.

Well here are a few more bar charts. Maybe they will do the trick??

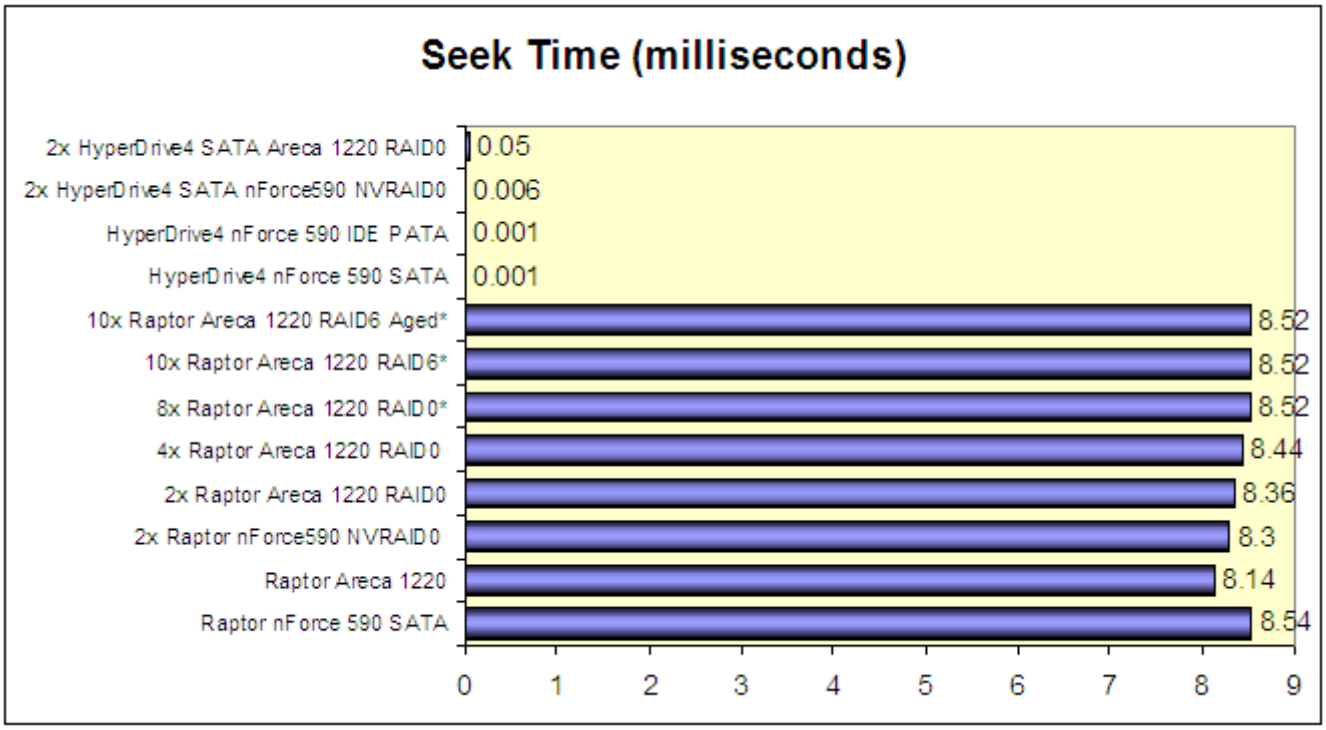
Here are the raw disk statistics...

Sustained Transfer...



The NVIDIA RAID figure of 214 MB per Second only applies in certain situations. It can fall right down to 120 MB per second under various workloads. All the other figures are universal.

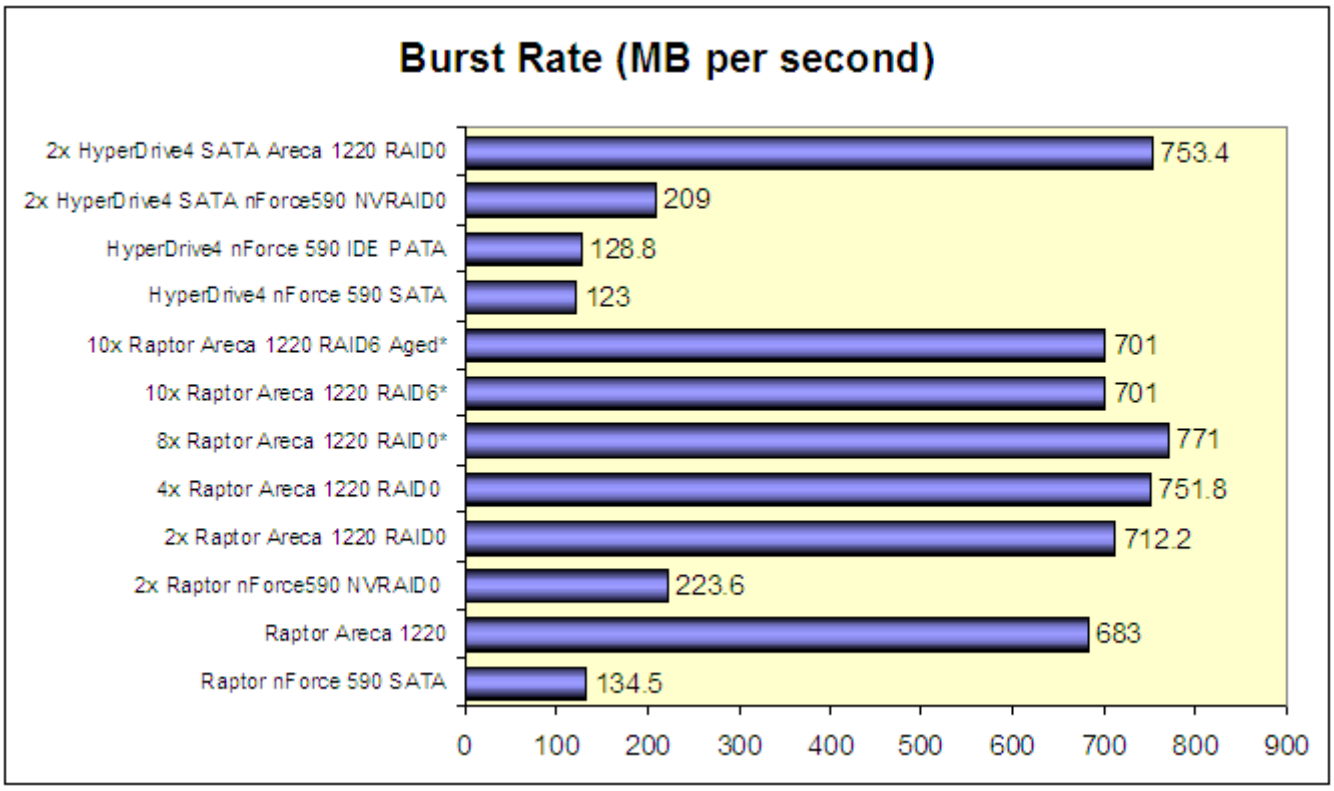
Seek Time...



It is hardly possible to represent the two devices on the same chart!

For completeness here is the Burst Rate comparison...

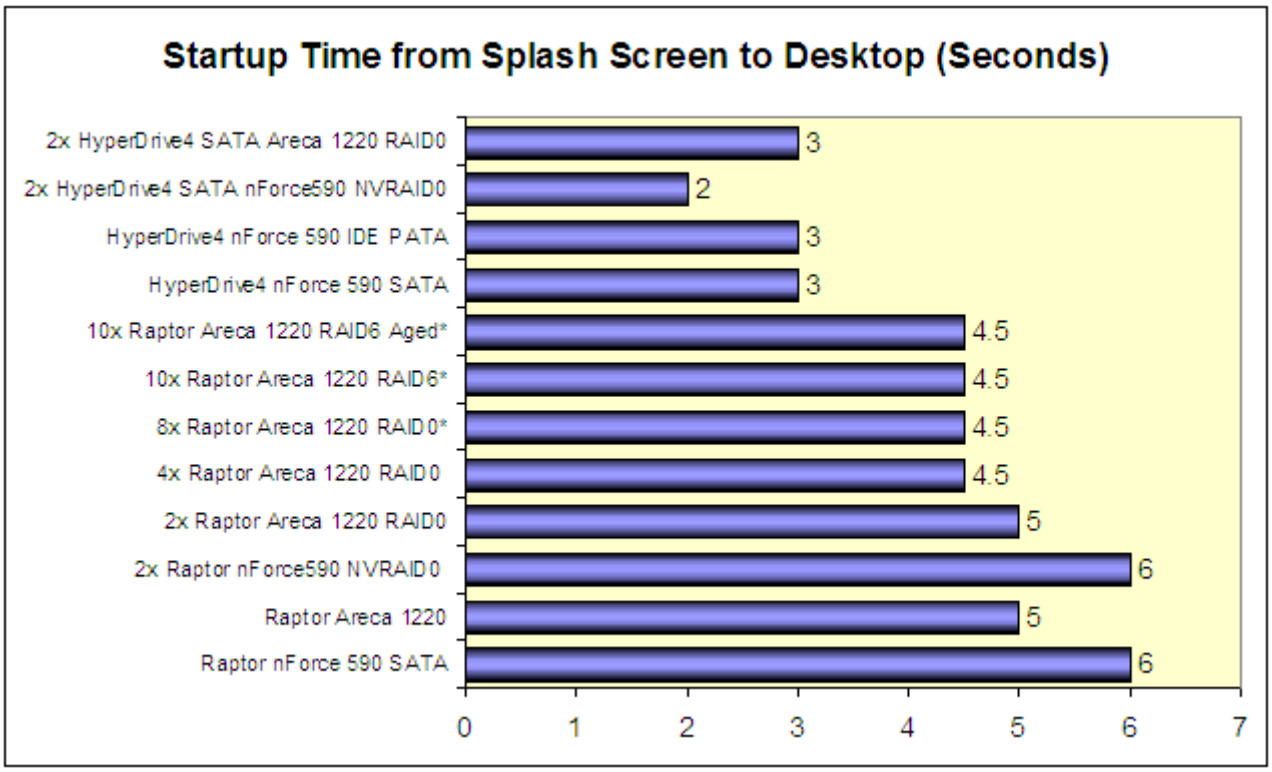
Burst Rate...



Again the Areca Card really scores here. But Burst Rate is Windows dressing to a large extent. The two figures that matter are seek time and STR. Seek time is how fast your librarian can run and STR is how many books per day you can borrow from the library. Burst Rate is now many books you can steal from the library and bring back without getting noticed!

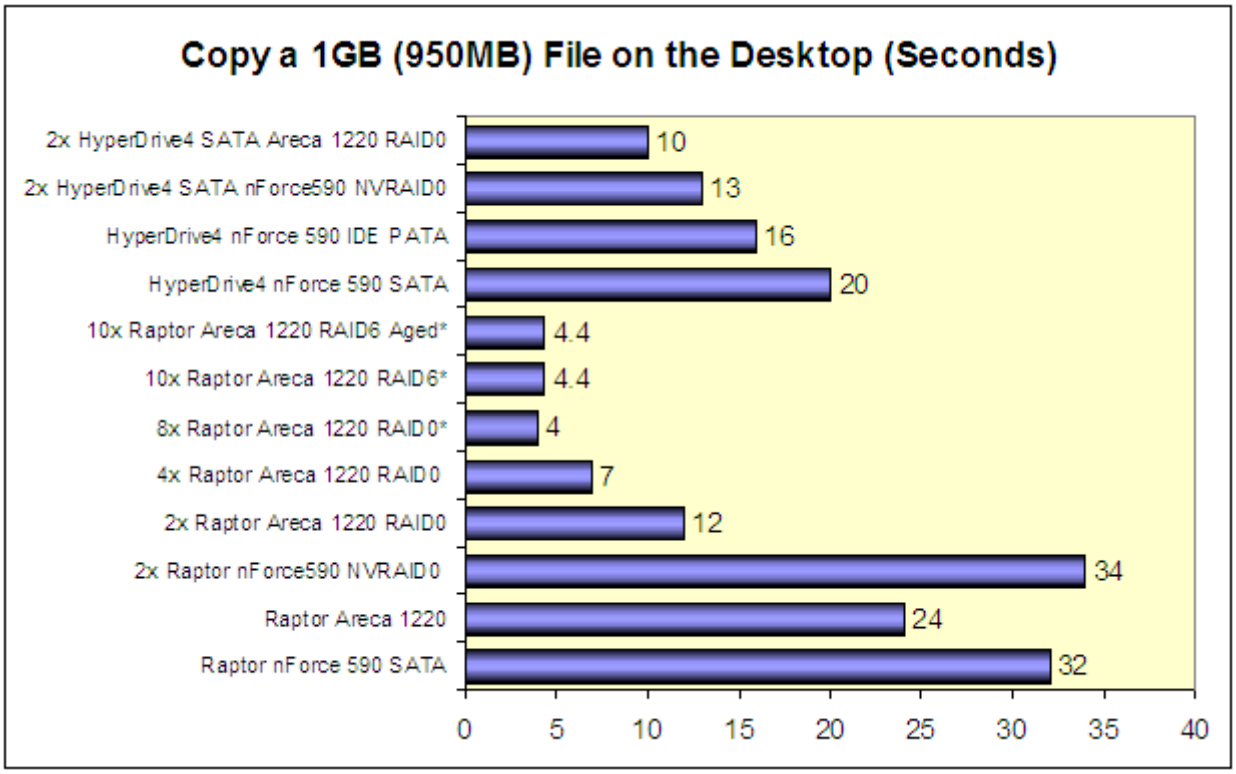
Here are the booting time comparisons which are important to HyperOs users!

Booting up...

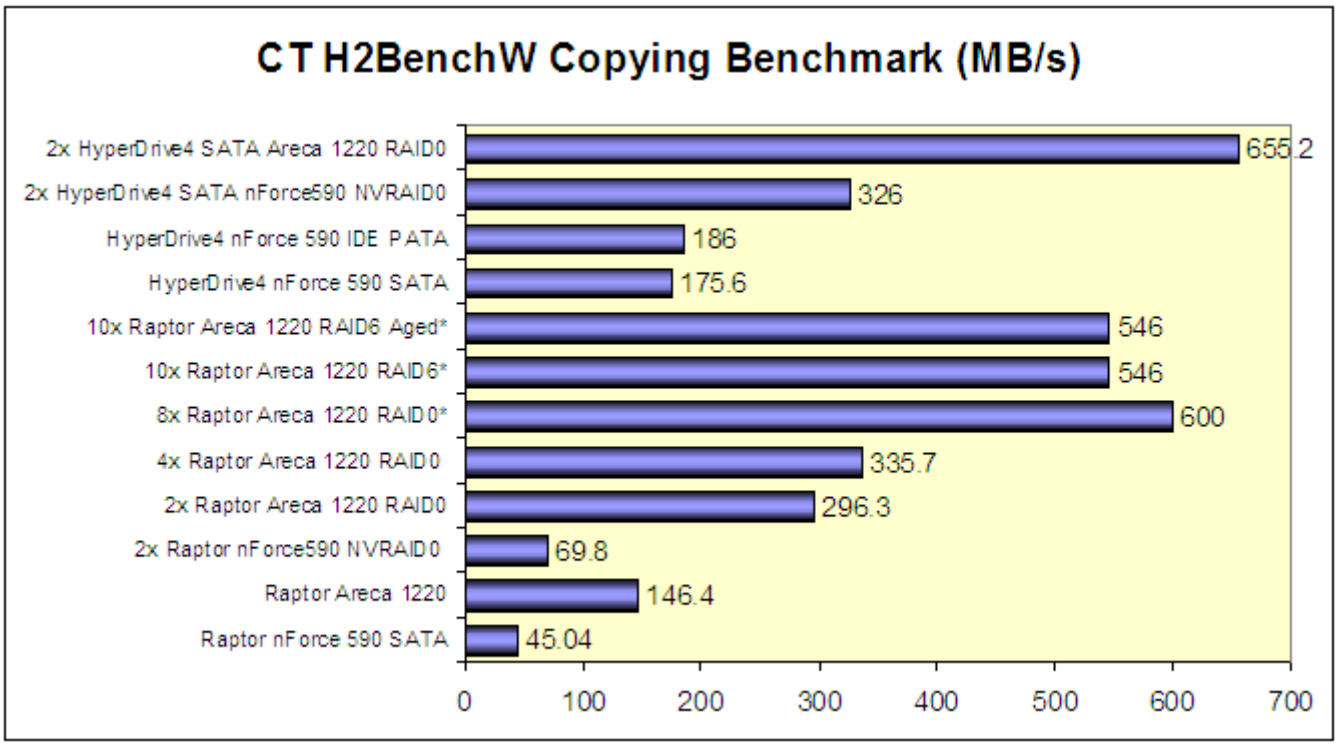


Boot up times are actually dependent on the response time of your hardware to the polling from XP more than they are on the performance of the HD4! Here are the copying comparisons.

Copying files...

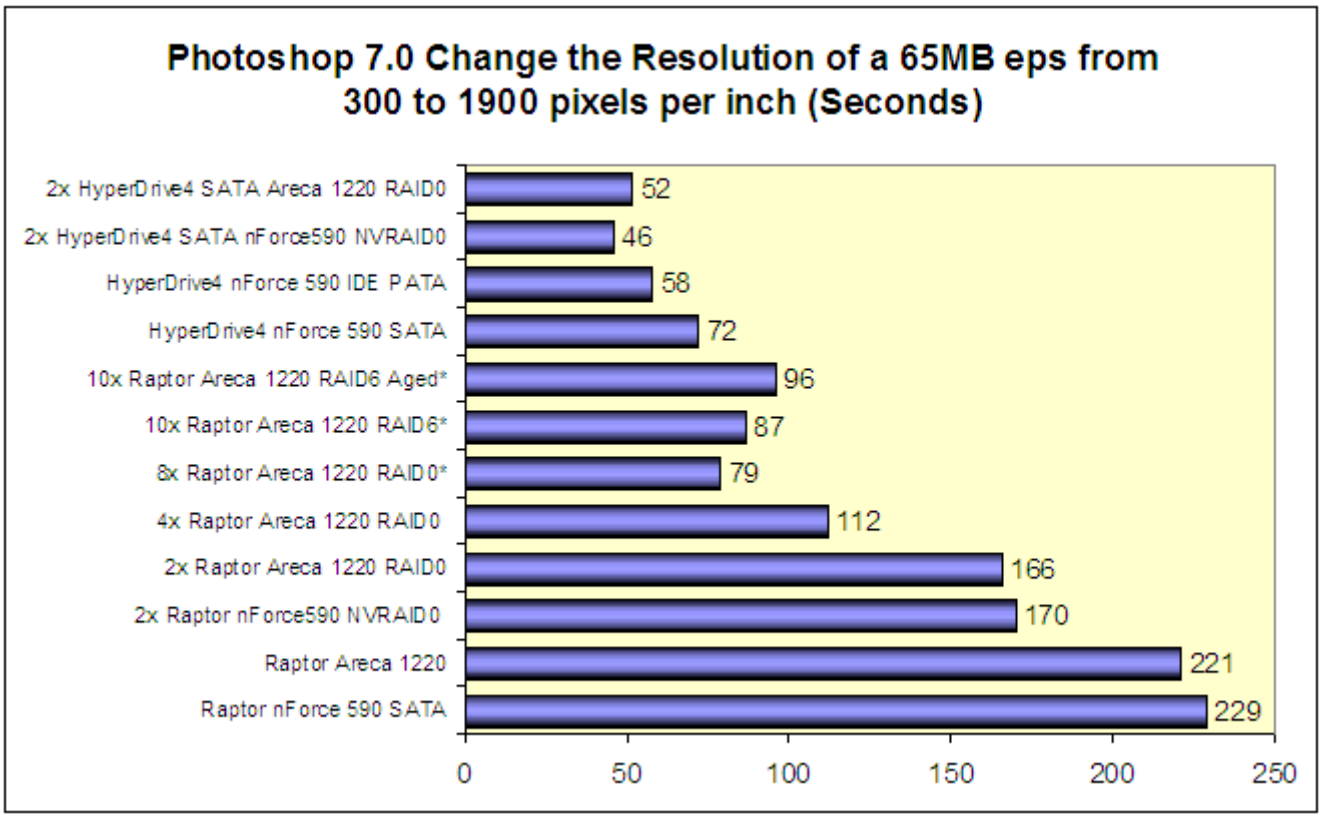


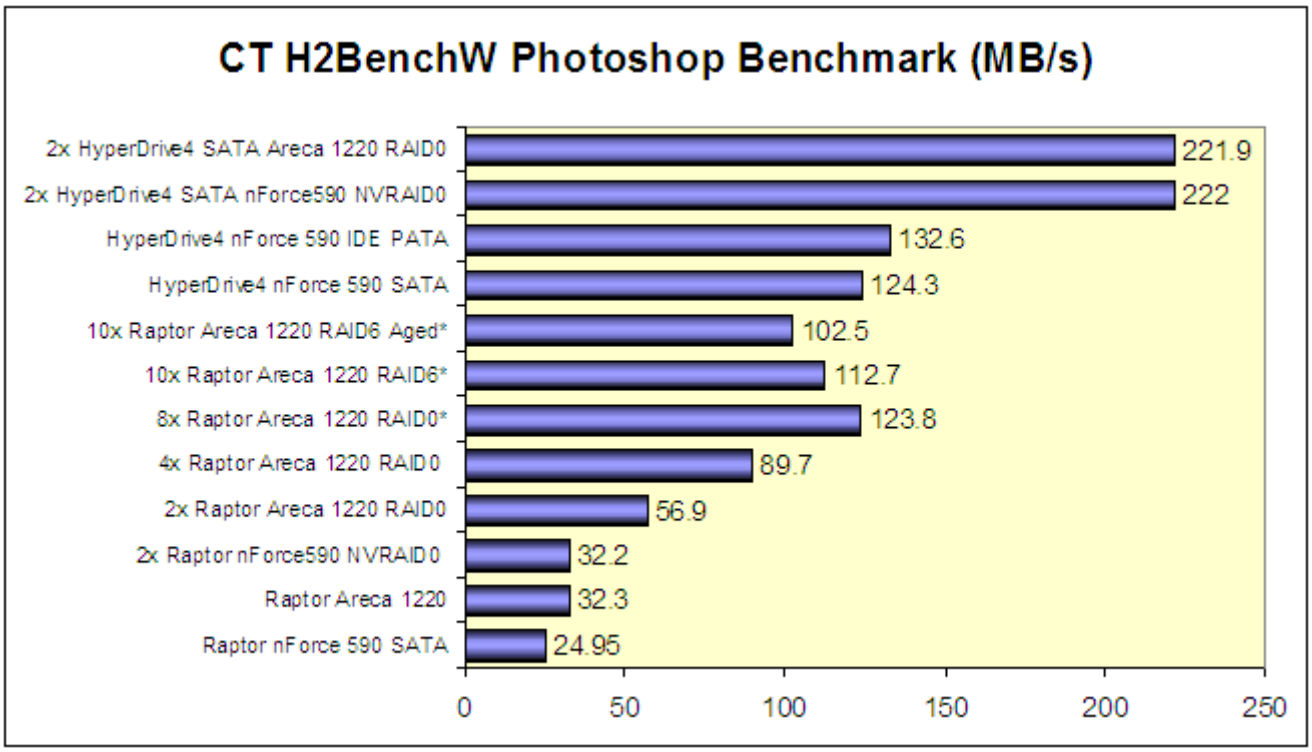
The Areca card really performs well here. It is the master of Sustained Transfer, but the poor relation of IOps. Likewise the nVidia RAID0 is awful at STR taking 34 seconds to copy a 1GB file, and being even slower than one Raptor. This is because RAID0 STR figure of 214 MB per second only applies with certain workloads. Software RAID is good, but was not designed for devices with a 1 microsecond seek time or a 125 MB per second STR.



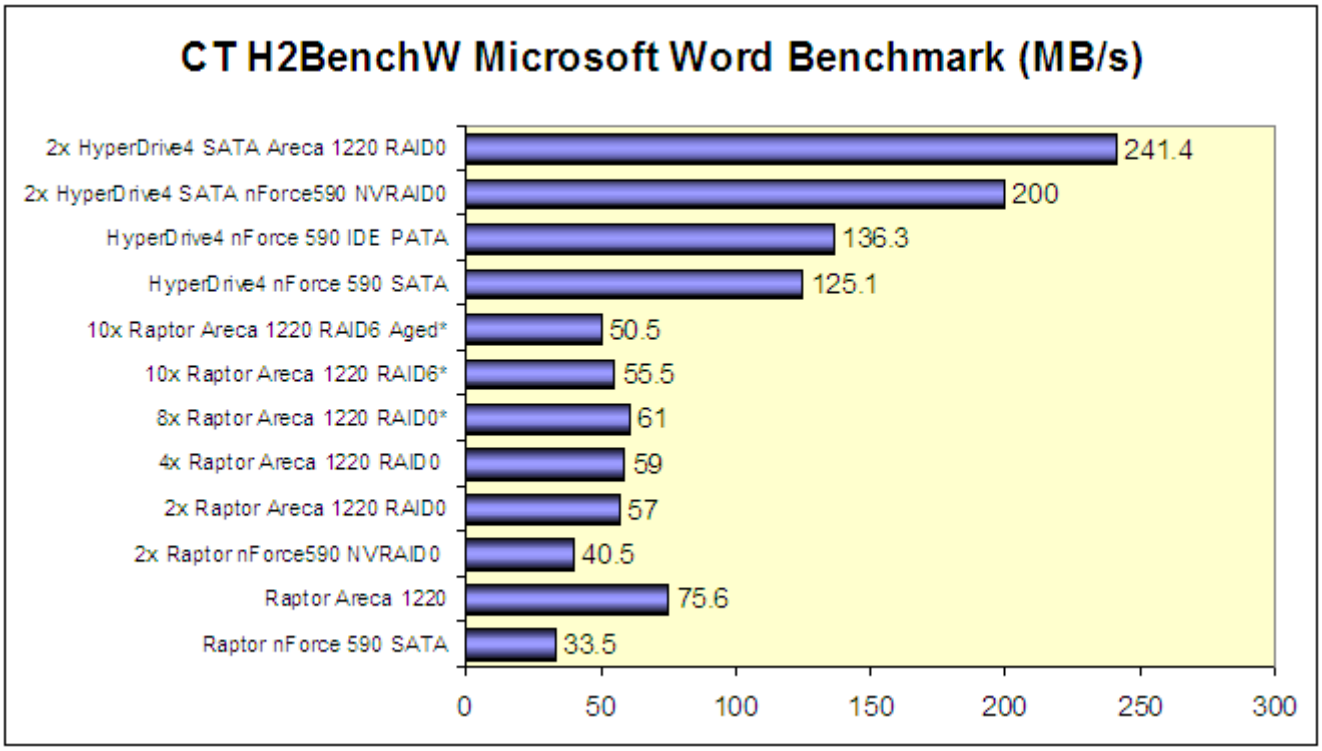
Here now are the individual application Benchmarks.

Photoshop...

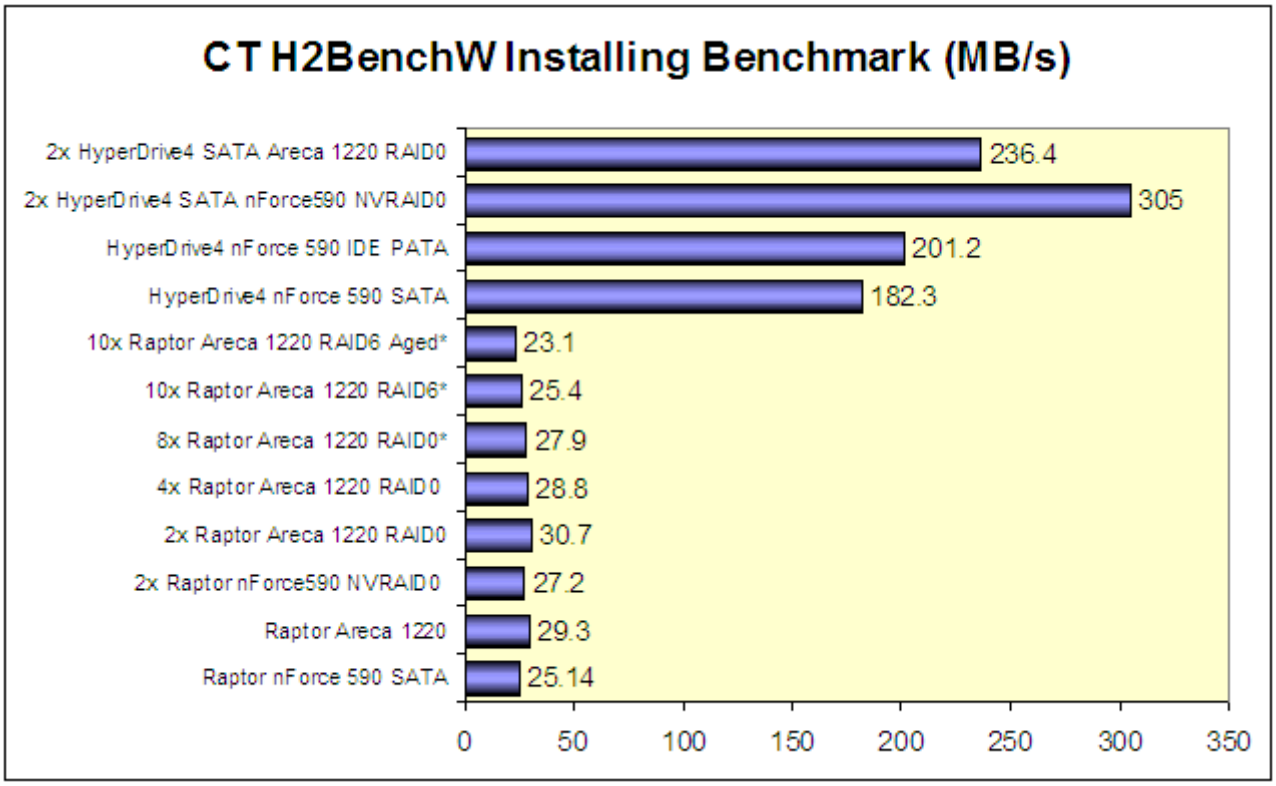




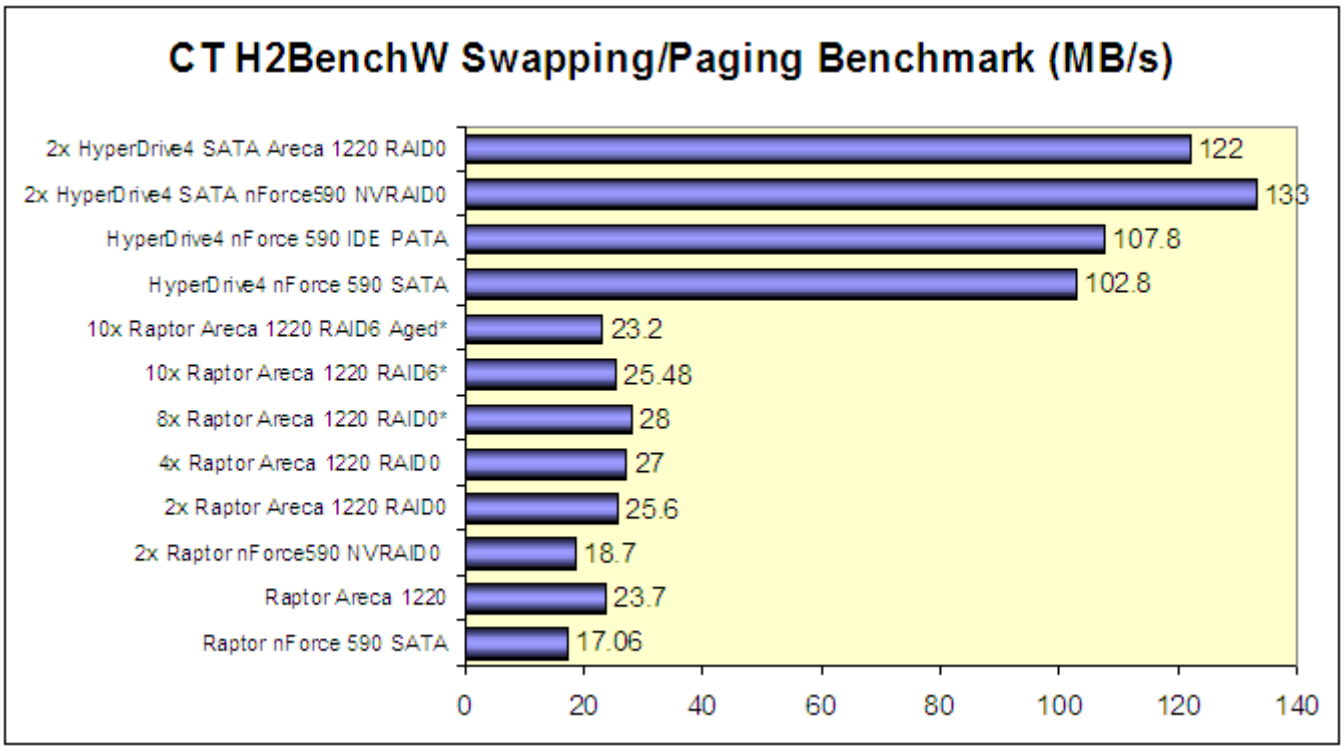
Microsoft Word...



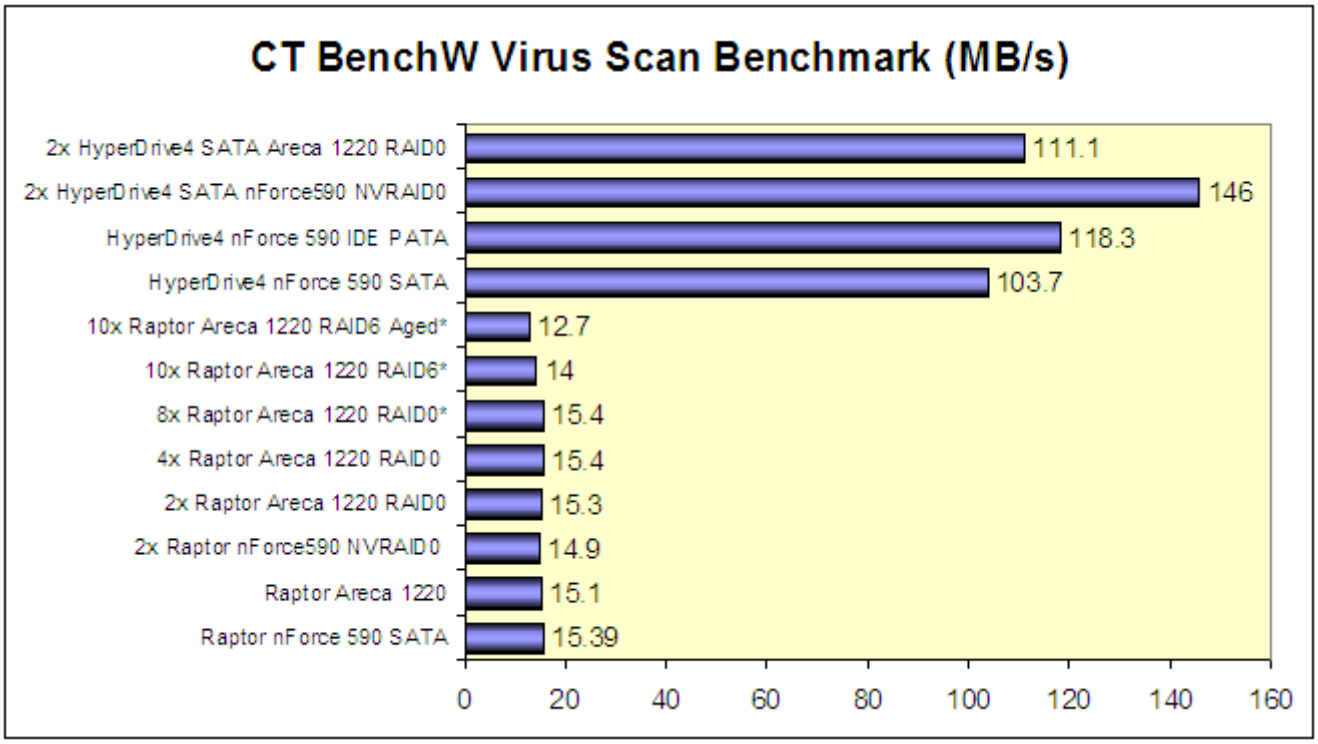
Installing...



Swapping and Paging...

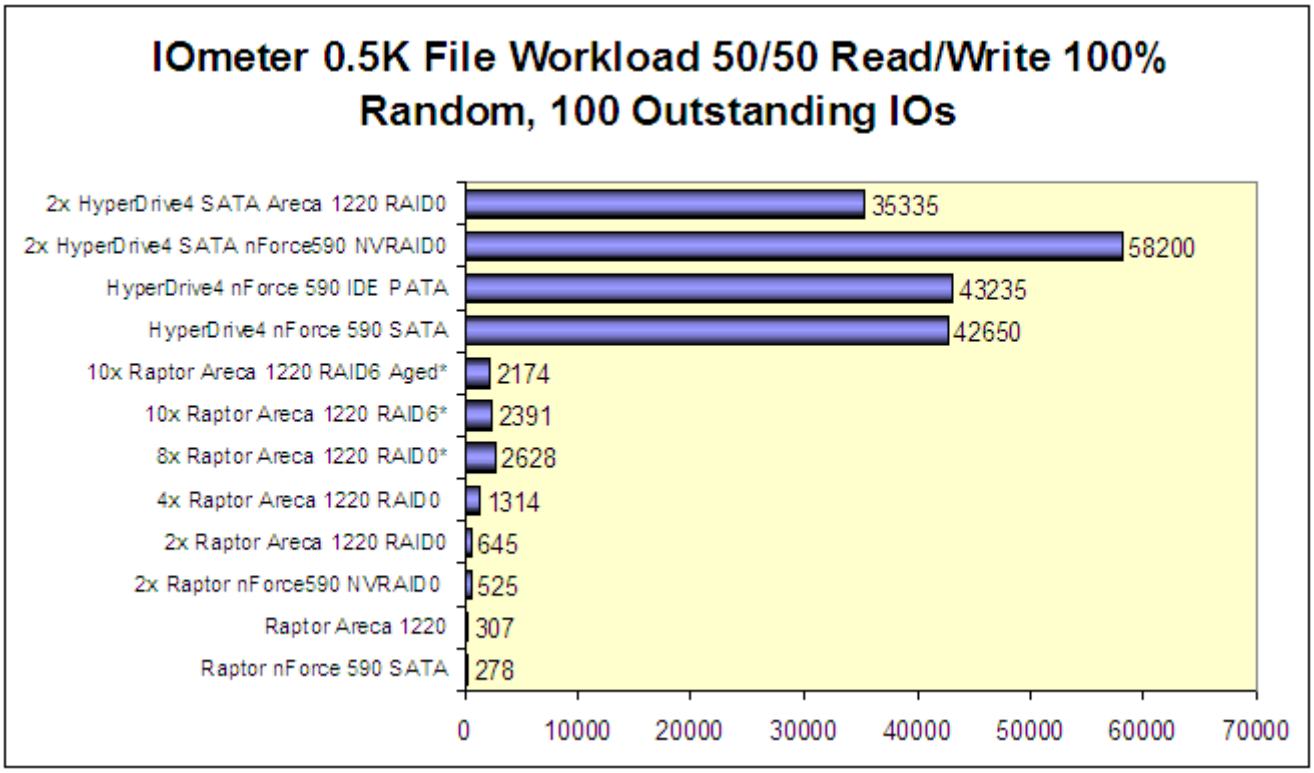


Virus Scanning...

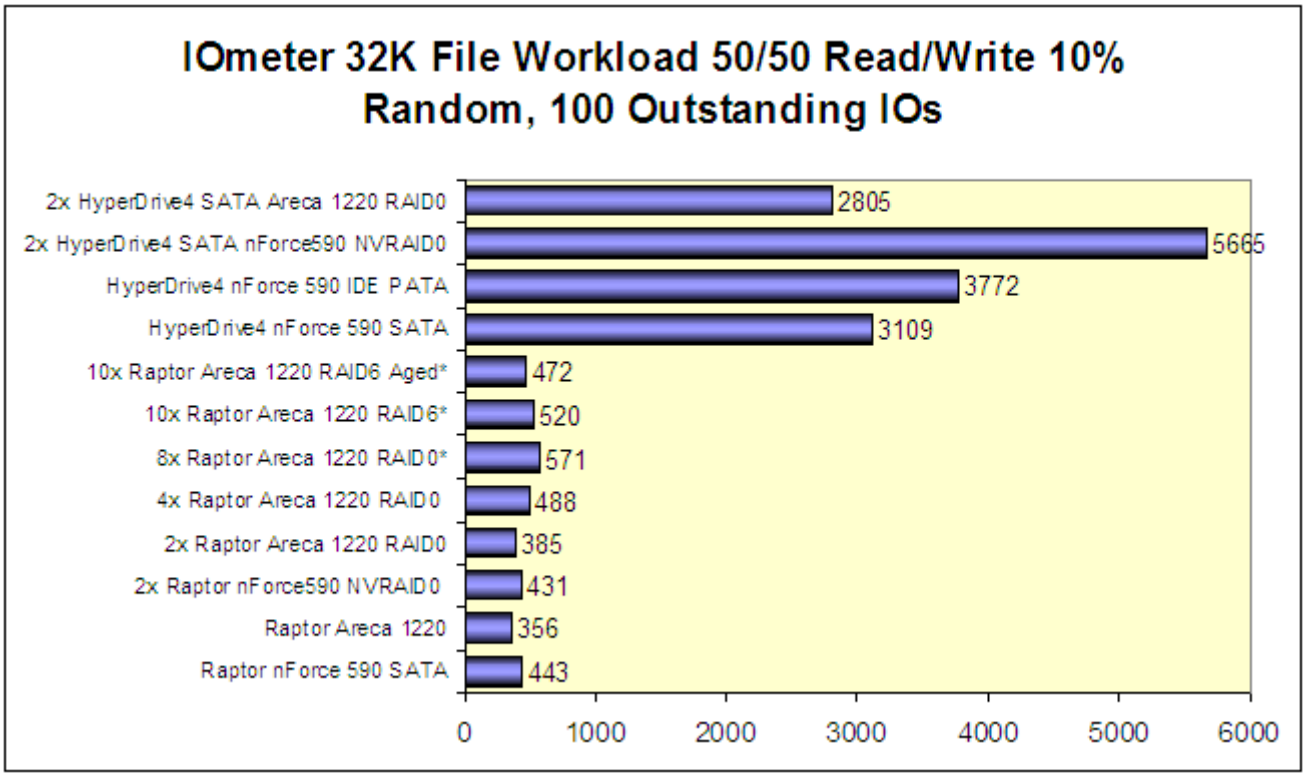


IOmeter Server Tests...

Finally Iometer shows us what the HD4 is really about. If you are searching through thousands of little emails in random order for the words 'Bin Laden' or for the word 'misunderestimated' for example you need a HyperDrive4. It is 100 x faster at reading little files than a Raptor!



And for the larger file operations even when they are 90% sequential the HD4 is still 800% faster than its dinosaur cousin.



Conclusion...

One HyperDrive4 is 500% faster than one of the very latest Western Digital Raptors at running a basket of popular applications (H2BenchW). And it is at least 200% faster than any number of the world's fastest Hard Disk Drives in any configuration you like. It is the revolution that the IT industry overlooked. If you are 'waiting for your screen to come up' you are using gramophone technology. You need to try Silicon.

You will not get these kinds of performance improvements from a faster processor or a better graphics card or a better motherboard or a faster DDR stick or a bigger name PC or the PC that won the most awards last week. The bottleneck in the PC is the mechanical latency of the hard drive. The faster the silicon becomes the more apparent this will be.

The WD Raptor is a brilliant piece of technology and incidentally it is way faster than your regular hard disk as all its reviewers have found. But if you have read this far you will realize that from a technological standpoint the hard disk is now obsolete and even the mighty Raptor is now extinct as an Operating System and Application platform. Mind you there is a lot of money in hard disks. It is a $35 billion industry. So, yes, the technical battle is won, but the commercial battle is just beginning.