Technology Bytes

Bits, Bytes, Benchmarks and Beyond

by Propella Head

It wasn't that long ago that the dream of a computer based virtual studio was little more than a great idea, but one that would never realistically be a viable solution.

Technology's based around native CPU based real time processing and virtual instruments were emerging at a furious pace, and were quickly swamping the capabilities of the current

CPU technologies of the time, enabling the detractors of the new technology to claim that Native based solutions will never be able to handle the demands of a professional recording environment, let alone be able to become the basis of a true virtual studio.

Well times have definitely changed !

As the majority of musicians have discovered, the modern CPU technologies have allowed us to realize the dream of the virtual studio, combining our chosen Digital recording environment with an amazing amount of real-time DSP, Virtual Instruments, etc, something that was unheard of only a few short years ago. The CPU Power available today is simply amazing,

easily allowing (conservatively) 50 + Tracks of 24 Bit Audio, with all needed DSP, while running dozens of virtual instruments, samplers, etc. The dream of the virtual studio has definitely been realized.

With all of this available power, the old debate of which platform is better suited for Digital Audio production has raged unabated for years. There have been Pro's and Con's for

both Mac and PC , ferociously defended by both sides of the fence, with each side finding its own truths. The reality is that Both Platforms are viable solutions, the debate really isn't about stability, or power, (as much as some would believe) , but really more about what applications are being used, or as simple as what O.S environment is most comfortable for the end user to get around.

That being said, its still worth looking at the existing and emerging technologies, and get

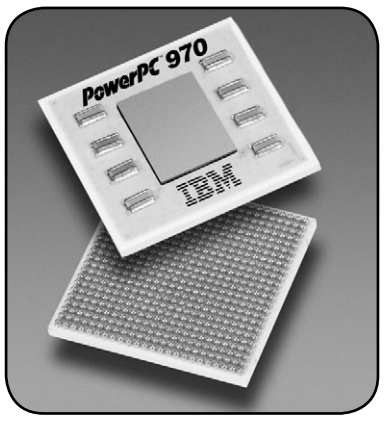
a better understanding on what's on offer. The battle ground for the fastest CPU has definitely stepped up since Apple managed to break the shackles of the aging Motorola G4, and by releasing the G5, have welcomed themselves back to the same playing fields as the X86 variants that had been literally leaving the hapless G4 in the dust . AMD have finally released the long overdue Hammer Series of Processors that like the G5 are also 32-64 bit hybrid processors. While Intel, although comfortably treading water at the moment with the current PIV line, have the Prescott variant of the PIV due for release in December. (Also rumoured to feature 64 bit extensions)

Lets take a closer look.

Apple G5: The Apple G5 is in reality the IBM 970, and has given Apple a much needed and long overdue update to its hardware line. While the Motorola G4 when first introduced promised much in the way of power and scalability, the reality proved quite the opposite when the limitation of the extremely short instruction pipeline resulted in the Processor failing to scale to the heights as expected, that coupled with limited FSB and memory bandwidth only emphasized the growing divide between the Apple Hardware and the competing X86 variants.

The IBM 970 has given Apple a welcome boost in both Power and Bandwidth, but contrary to Apples lofty claims , they have really only managed to level the playing field in regards to comparable performance, and not forged ahead as they would have us believe. All that aside, the G5 is an awesome improvement on the previous offering. Heres whats on offer.

The G5 is a hybrid 32bit/64bit System that comes in 3 Flavours, 1.6, 1.8 and Dual 2.0 Ghz models and features 512 L2 Cache, Dual Channel DDR 400 , 800Mhz - 1 Ghz FSB, Serial ATA Hard Drives , 8 X AGP, USB 2.0, and Firewire 800. With its extended 15 stage instruction Pipeline, the G5 should comfortably scale ,with Apple promising clock speeds of up to 3 Ghz around this time next year. " O.K time to put on the Propellor Cap." The G5 features two double-precision floating-point units, advanced branch prediction logic and support for symmetric multiprocessing, it also an optimised Velocity Engine that can execute more than 200 simultaneous in-flight instructions. The Processor can run both 32 bit and 64 bit code natively, and although the 64 bit landscape is in its infancy on the desktop, with the upcoming 64 bit Panther version of OSX, they have set the scene nicely for the emerging technology. More on the 64 bit landscape later.



They have also done an amazing job at quietening the systems down, whereas the previous G4's would at times resemble a leaf blower, the G5's with their thermally controlled cooling system, is whisper quiet for the vast majority of the time; (They do become noisier when under extreme load.) All this adds up to a Powerful , Flexible and Scalable architecture that has enabled Apple to at long last comfortably compete with the stampeding AMD and Intel offerings..

AMD: Athlon 64 / FX-51 : AMD have finally released their eagerly awaited and much delayed X86 –64 processor line. Now although Apple have gleefully been shouting from the rooftops about being the first 64 Bit desktop Processor, they were really only handed the mantle by default due to AMD dropping the ball and delaying the x86-64 line almost a year .Like the G5, the Athlon 64 can run both 32 bit and 64 bit code natively, which will make any future transition to 64 bit a lot smoother than would otherwise be so.

The Athlon 64 comes in 2 Flavours , with the FX-51 featuring Dual Channel DDR support, while the standard has only single channel memory support. Both have been launched at a clock frequency of 1.8 - 2.2Ghz. Both feature AMD's proprietary x86-64 instruction set, which is an extension to the current x86 instruction set to enable 64bit operations and are built on a 0.13 micron process. The basic architecture of the Hammer processors are based around previous generation Athlon cores, with the addition of the x86-64 instruction set, it will also feature SSE-II,a larger L2 cache of 1Mb ,and a slightly longer pipeline to allow additional clock ramping (12 stages rather than 10 in the Athlon). The core additionally contains an on-die memory controller (as opposed to it being integrated into the North Bridge) for improved memory latency. In regards to Chipsets for the Hammer Line, most 3rd party manufacturers have one on offer, with Nvidea's nForce 3 being the favoured at the moment. The chipsets all feature an AGP hub (North Bridge, without the memory controller as this is now on-die), an I/O hub (South Bridge) and an optional PCI-X bridge. These chips are linked by AMD's HyperTransport technology,which interestingly is also used by Apple on the G5.

Performance Wise, these units are proving more than a match to both the current PIV line and the New G5. With the upcoming release of Windows XP64, and of course the future release of 64 bit applications, the horizon seems rosier for AMD than it has for quite a while.

Intel : Prescott:

As I said earlier, Intel is comfortably treading water with the current line of PIV's and have also arrogantly released a rebadged Xeon MP with 2Mb Level 3 Cache as a PIV Extreme Edition (some say Emergency Editon) just to steal poor old AMD's Athlon 64's thunder, and ensured itself maintaining the moniker of the fastest X86 desktop CPU. Their up coming Prescott series of CPU's are the successor to the current Northwood core PIV's and are expected to launch at clock speeds starting at 3.4Ghz. They will initially run on an 800Mhz Front Side Bus, and will be built on a .09 micron core.

Prescott features a number of architectural improvements, including larger 1Mb L2 and 16Kb L1 caches, an improved branch predictor and pre-fetcher, an expanded instruction set for accelerating media applications and improved Hyperthreading (due to two of the additional instructions centred around thread synchronisation). Prescott is expected to scale up to 5Ghz on a 800Mhz FSB and >5Ghz on the forthcoming 1066Mhz FSB speed. There is also growing evidence that the units feature a 64 bit extension to also allow them to run 64 bit code natively. Intel have been very secretive in regards to the 64 Bit capability of the upcoming units, buts as the release grows closer, more and more evidence is coming to light that suggests that the chips do in fact feature 64 Bit capability. With Microsoft's support of the X86-64 code, I would guess that Intel has little choice but to swallow its pride, and implement the x86 –64 developed by AMD, now called AMD64. Should be an interesting spin on that one.

OK, That's it for Part 1:

In Part 2 I'll cover the differences in the architectures of the competing CPU technologies, the apparent discrepancies in Clock Frequencies, and its relationship to overall Performance. I'll also cover comparative real world performance figures and have a few words on the dreaded benchmarks and the fallout created by the marketing departments being a little over zealous with their claims, and usually doing more damage than good. I'll also have an overview on the emerging 64 Bit landscape, and its significance in the short and long term.

Till next time

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Progressive Music And Beyond

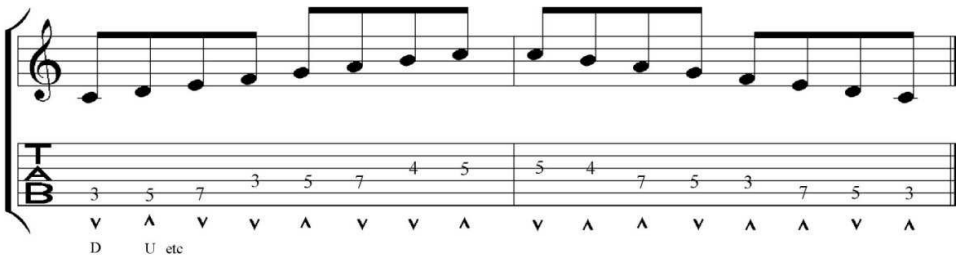
A discussion with Ivan Bertolla

Simplifying The Major Scale

I am sure most of you know how to play a major scale or at least are familiar with the sound of it . The major scale (in my eyes) is one of the most important elements of music. It is the axis of our musical system , language etc . Our chord spellings are derived from it and harmony is built from it . I would say that 99% of you out there that can play it on guitar do not play it in the most economical and efficient way. From my experience as a teacher I have seen only one student ever come to me playing it in the most efficient way. If you recall a few months ago when I discussed the semitone/chromatic scale it had alternate picking because each string had 4 notes to play .. hence "even" numbers. The problem with the major scale is that we have "odd" numbers to play on each strings whatever position you are in.

Now for my big whinge. When you go out and buy these American guitar handbooks they teach you to play every major scale in each key. In other words 12 scales with 12 different patterns. Now this is Ok for gaining knowledge on were notes are geographically placed on a guitar. I do not have a problem with that.. But what if you want to play at very fast speeds. You can forget about playing fast and efficiently using those shapes. So the pattern below never changes whatever key you are in. The other issue is that I bet that most of you who can play this pattern already do not play it with a sweep picking mentality. In other words do you still do alternate picking when you swap from interval 3 to 4 (E- F)?

In the diagram below the concept is simple. Whenever you swap strings you "strum". So when the scale descends in pitch you will do 2 "down picks" when changing strings ,when the scale ascends you will do 2 "up picks" when changing strings. If you have been doing alternate picking with this scale in the past it will take you a while to get used



to this pattern. And when you do watch how fast you end up playing. Also notice that your right hand is moving much less than it used to and you are playing faster. So you don't need to worry about RSI anymore.

Please note!!! The same applies with the minor scale . Same pattern per string except you flatten the 3rd , 6th, and 7th interval of the scale.

Until next month ..Have fun with this. Stay progressive!

Ivan Bertolla is a Melbourne based composer/producer/guitar instructor who has released his debut CD worldwide of cinematic music "Beyond The Skies Eternity". He runs Mastermind Productions and Macleod Guitar School and can be contacted at his web site www.bertolla.com