Amiga Alternate History, What If MIPS ?

The Amiga computers were always tightly bound the the Motorola M68k range of processors, this eventually became a performance bottleneck, what if that never happened.

Amiga 1000 progress meeting, 1985. Much of the custom chips are in final development and testing but over in California MIPS Computer Systems Inc are about to announce their first designs. At the toss of a coin the Amiga hardware team decide to ditch the M68000 from the first design and go with the R2000 processor.

This caused considerable delays to both the hardware team, who had to remove the dependencies on M68k bus signals from the OCS chipset and to the operating system team who had to replace chunks of m68k assembler code with C. The delays meant that the Amiga 1000 launched in 1986, the same year as the first MIPS R2000 unix box.

The Amiga 1000 specs where:
256k of RAM
8mhz R2000 CPU
Kickstart 1.2 in ROM
OCS Chipset

The Amiga 1000 was like in true life way ahead of its time but sales were slow, supporting a new operating system with new hardware was always going to be difficult. But sales were good enough for Commodore to plan two new designs, a reduced cost games machine and a big box version for professional use.

The plans did not provide new chipset features and so resulted in two very similar models, which were;

The Amiga 500
512k chip RAM
8mhz R2000 CPU
Kickstart 1.3 in ROM
OCS Chipset

The Amiga 2000
512k chip RAM
15mhz R2000 CPU + R2010 FPU companion
Kickstart 1.3 in ROM
OCS Chipset
Zorro II expansion bus

The ‘Big Box’ Amiga 2000 main differentiators where its uprated CPU, which was the maximum R2000 clock frequency, the addition of the FPU companion and the Zorro II expansion slots.

This initially caused compatibility problems with software that presumed a certain CPU speed, however developers soon released updated versions and learned that using operating system timer routines was more reliable.

The Zorro II expansion slots sprang forth a new range of expansion cards for multimedia, audio, graphics, TV and other uses.

The Amiga 500 was a huge hit and sold millions around the world as a games machine that also had very strong multimedia capabilities. The Amiga 2000 was also a strong seller and a very profitable one for Commodore due to its high price.

The high margins from the big box Amiga pushed the AmigaOS developers in a new direction, retargetable graphics (RTG) and retargetable audio (RTA). Something that Commodore had long wanted but not been able to deliver was UNIX, it was decided that future MIPS processors (the R3000) would have an integrated MMU so a Unix port would be feasible.

By 1988 development was complete on a minor upgrade to the OCS chipset (ECS), MIPS had the R3000 available, AmigaOS 2.x now had RTG/RTA support. Commodore Unix (Amix) was also nearing completion. The early forced hurried re-write of assembler routines in C in AmigaOS was found to be a lucky stroke the minimal hardware dependencies allowed AmigaOS 2 to be simply developed for both the original and + Amiga's.

The Amiga 500 and Amiga 2000 where to be upgraded with '+' plus models providing these new features.

The Amiga 500+ specs where;
1mb chip RAM
20mhz R3000 CPU
Kickstart 2.0 in ROM
ECS Chipset

The Amiga 2000+ specs where;
1mb chip RAM
33.3mhz R3000 (inc FPU, MMU)
Kickstart 2.0 in ROM
ECS Chipset
Zorro II expansion bus

The Amiga 500 upgrades were minor, but the extra CPU performance helped with simulation games. Sales continued to be strong, it was backwards compatible with the Amiga 500, developers having long since learnt not to write code for a particular CPU speed. The extra RAM and ECS features provided small improvements to the graphics capabilities. At this time the Amiga 500/+ where the highest selling personal computer in major markets, such as the UK, Germany, Italy and France.

The Amiga 2000+ although a minor upgrade was a major breakthrough thanks to the RTG/RTA support which enabled large numbers of 3rd party manufacturers to develop add-on cards in a system compliant manner. This software stability encouraged developers to target AmigaOS and not any specific hardware platform.

The arrival of Commodore Unix (based on AT&T's System V SVR4 UNIX) allowed Commodore to join the ranks of MIPS CPU / Unix vendors, in a sensible move they decided to pool their resources with Ardent, NEC, Pyramid and a small company called Silicon Graphics. Although not a run-away success the sales were good enough and the overheads low enough to provide extra income to Commodore.

A specific Unix variant was produced called the A2000UX, although little more than a new label and a pre-built configuration with add-in cards (A2620 or A2630 processor card) and a hard drive controller which was the A2090 or A2091. Optional ARCNet A2060 network cards were also available.

However customers using AmigaOS for professional work asked that the MMU be utilised on that platform to increase their productivity and reduce risks. This provided two features; virtual memory and memory protection for application programs. This introduced some compatibility problems with software that presumed physical addresses. The low end machines did not run with this feature enabled by default.

As the 1980’s came to an end increasing competition from other games console suppliers forced Commodore to make a significant upgrade to the native graphics capabilities, C64 and C128 sales having dropped off to almost nothing. So around 1991 the new AGA graphics chipset was ready with more memory, more colours and bigger screens. One departure from the past was a recognition that the PC platform with its VGA graphics offered a chunky display mode that used more RAM but enabled much faster 3D-games. The Amiga engineers decided to implement a planear to chunky conversion into the AGA chipset.

For the big box amigas it was decided that in light of MIPS technologies planning a range of R4xxx processors it would be best to fit the next machine with a CPU socket to facilitate a range of processors without significant hardware changes. With the new processor came the need for a new 32 bit bus to allow higher performance cards, the backwards compatible Zorro III bus was devised to provide this expansion.

Other additions beyond the 2000/+ was the addition of an onboard SCSI controller, with the growing realisation that big box Amigas were being used mostly from hard disks. A Flicker fixer / scandoubler was also provided onboard to boost the Amiga native 15hz to the 31khz commonly used by workstation / IBM pc displays.

So in 1992 the Amiga 600 and Amiga 3000 where born. Running AmigaOS 3.x with its new MMU support. Alongside this AmigaOS 3 provided an Unix compatibility library ixemul that could be used to port Unix programs to AmigaOS with relative ease. These were also the

first ‘computer in keyboard’ Amiga’s with a FPU this was released with an updated mathieesingtrans library.

The Amiga 600 specs where;
2mb chip RAM
50mhz R4000 CPU
Kickstart 3.0 in ROM
AGA Chipset

The Amiga 3000 specs where;
2mb chip RAM
50-150mhz R4000 in CPU slot card (inc FPU, MMU)
Kickstart 3.0 in ROM
AGA Chipset
Zorro III expansion bus

Commodore released a number of CPU slot cards, the A4200 @100mhz and A4400 @ 150mhz

Commodore Unix was also released for the Amiga 3000, in parallel with Silicon Graphics and there Crimson workstation. By this point the relationship between SGI and Commodore was growing closer, the Elan graphics cards came in Zorro III variants and under the surface IRIX and Commodore Unix was the same, only different window managers differentiated them.

The A3000UX was again just a relabled A3000 with bundled add-in cards, A2065 Ethernet card, A3070 tape backup unit, etc. Although Amix was now based on System V SVR5 UNIX.

This relationship was tested when in 1992 MIPS computer systems having expended to much on R&D was in an unstable condition. But instead of entering into a bidding war SGI and Commodore decided to enter into a joint ownership agreement to promote and develop MIPS processors, compilers and Unix systems.

By now the Amiga 600 was the most powerful personal computer on the market with a strong market share and large developer base for games and applications. The Amiga 3000 turned into the go-to product for all forms of multimedia, TV and graphics work, the combination of SGI graphics and Amiga workstations proved very popular.

The basic 3D capabilities of the AGA chipset proved timely with the boom of 3D games taking off and 2D scrolling games falling out of fashion. When a group of engineers from SGI left to form 3Dfx it was clear that they would bring powerful 3D graphics to the PC platform in the next few years, this along with rumors of a new powerful console from Sony needed to be addressed if the Amiga was to maintain its position in gaming.

A joint development effort with SGI was started to produce the AAA chipset, it would need strong 3D and 2D performance to compete with future consoles. At the same time it was

decided to upgrade the audio capabilities which had been unchanged since the original A1000 back in 1986.

On the software side AmigaOS 4 was planned with two major objectives, Networking support and CDROM support, both of which were becoming more important.

The MIPS R8000 development project due to be complete in 1994 was to provide the CPU for the big box Amiga's. With such big plans for AAA it was decided to release a dedicated games console with CDROM support and onboard Ethernet on the big box Amiga's. For the first time PC based PCI cards where to be supported.

The systems released where;

The Amiga CD32 with;
4mb chip RAM
33mhz R3000 CPU
Kickstart 4.0 in ROM
AAA Chipset
IDE CDROM

The Amiga 1200 with;
4mb chip RAM
50mhz R4400 CPU
Kickstart 4.0 in ROM
AAA Chipset
IDE Controller for CDROM/HDD

The Amiga 4000 specs where;
4mb chip RAM
75mhz R8000* in CPU slot card (inc FPU, MMU)
Kickstart 4.0 in ROM
AAA Chipset
Zorro III expansion bus
PCI expansion bus
Wide SCSI Controller for CDROM/HDD
10/100mb Ethernet

Quickly it became clear that the R8000 CPU was a development dead end and R10000 CPU cards were quickly produced to provide lower cost and higher performance CPUs. Ethernet was becoming the industry standard and including an onboard network port opened up more possibilities for interaction with Unix and Windows systems.

The launch of the Playstation by Sony in 1995 caused a major shakeup of the gaming market, all the existing players, Sega, Nintendo and Commodore lost considerable market share to Sony. But due to the suspiciously compatible R3000 CPU most games for the playstation where ported to the Amiga and its market share began to recover and eclipse

both Sega and Nintendo. Indeed in some markets such as the UK the CD32 was the major seller.

The Amiga 1200 was very popular due to its compatibility with CD32 games and its TCP/IP stack builtin to enable access via a dialup modem. The Amiga 4000 was viewed more of an incremental upgrade although the PCI expansion ports opened up a large new market of expansion hardware.

In 1996 the USB standard was released and sensing its importance to unify future peripherals a quick release system update was released as AmigaOS 4.1 and reintroducing the + nomenclature. The main feature of AmigaOS 4.1 was USB support.

The Amiga CD32+ with;
4mb chip RAM
33mhz R3000 CPU
Kickstart 4.1 in ROM
AAA Chipset
IDE CDROM
USB 1.1 ports

The Amiga 1200+ with;
4mb chip RAM
75mhz R4400 CPU
Kickstart 4.1 in ROM
AAA Chipset
IDE Controller for CDROM/HDD
USB 1.1 ports

The Amiga 4000+ specs where;
4mb chip RAM
300mhz R12000 in CPU slot card (inc FPU, MMU)
Kickstart 4.1 in ROM
AAA Chipset
Zorro III expansion bus
PCI expansion bus
Wide SCSI Controller for CDROM/HDD
10/100mb Ethernet
USB 1.1 ports

The Amiga 4000+ now shipped with a R12000 CPU by default owing to the expense of the R8000 CPU's.

The relationship between Commodore and SGI was now very close and both sides saw an opportunity to pool their resources further. Commodore for its part was no longer getting

significant revenue from its PC division and SGI was moving into higher end workstations and mainframes.

A deal was ripe to be done, and in 1997 amid rumors that the MIPS technologies jointly owned subsidiary wanted a Re-IPO, MIPS tech, Commodore and SGI merged to create Amiga Graphics Technologies. The combined company would produce systems from the CD32 dedicated games console, the A1200 personal computer, the A4000 workstation, through the Octane range of high end workstations and the Origin Server systems. The Unix platforms where now identical with compatibility for AmigaOS applications across the range.

It was decided to push down some of the graphics technologies from SGI into the Amiga, OpenGL, and the IMPACT series of graphics cards. This would take some time to achieve but there were two well rumored developments that needed to be addressed. Microsoft would unite its Server (Windows 2000) and home PC (Windows 98/ME) operating systems together into one, and that Sony would release an upgraded version of its console with considerably improved graphics and performance.

By late 1998 it was clear that two major changes were afoot in the industry, firstly Microsoft was going to unify its desktop (win98) and server (winNT) operating systems which would give it an extremely strong position and secondly that Sony which had almost pushed Sega and Nintendo into minor players in games would release and updated and much more powerful console. Both these threats had to be countered, it would be at least two years before new products could be released so development had to start soon.

This time focus was on incremental core technology improvements, OpenGL 1.2 compatible graphics, with higher performance at higher resolutions. USB 2 and SATA the R5000 and R12000 processors were targeted for the low-end / high end platforms. CDROM's were upgraded to DVD's mostly to provide additional storage space for games on the elaborately titled CD64.

The push down of graphics technologies especially around 3D/OpenGL resulted in the new hombre chipset.

Changes to AmigaOS where mostly incremental to support new hardware, but special attention was given to Web / Internet applications and to interactive DVD applications.

The three product split was maintained and resulted in the following machines being introduced.

The Amiga CD64, with;
4mb chip / 32mb fast RAM
200mhz R5000 CPU
Kickstart 4.2 in ROM
Hombre Chipset
SATA DVD
USB 2 ports

The Amiga 1500 with;
4mb chip / 32mb fast RAM
200mhz R5000 CPU
Kickstart 4.2 in ROM
Hombre Chipset
SATA Controller for DVD/HDD
USB 2 ports

The Amiga 5000 specs where;
4mb chip / 128mb fast RAM
400mhz R12000A in CPU slot card (inc FPU, MMU)
Kickstart 4.2 in ROM
Hombre Chipset
Zorro III-X expansion bus
PCI-X expansion bus
SATA Controller for DVD/HDD
100/1000mb Ethernet
USB 2 ports

The boom of the internet and the increasing demand for online applications pressured AGT (Amiga Graphics Technologies) to introduce and Amiga rack server, this was mostly designed to run Commodore / SGI Unix, but a special version of AmigaOS was also available, its main feature was supporting dual processors and hot-swappable devices. It was released as follows in a 2U rack;

Amiga 5000 Server
4mb chip / 128mb fast RAM
Dual 400mhz R14000 in CPU's slot card (inc FPU, MMU)
Kickstart 4.3 in ROM
Hombre Chipset
Zorro III-X expansion bus
PCI-X expansion bus
SATA Controller for DVD/HDD
100/1000mb Ethernet
USB 2 ports