PowerPC Processors (Overview)

The PowerPC™ is a series of CPUs created by the industry alliance of IBM®, Apple®, and Motorola®. The goal is to have RISC processors used in mainstream PCs. The PowerPC processors are based on IBM's existing POWER™ (Performance Optimization With Enhanced RISC) architecture used in the RS/6000. The PowerPC family will power everything from PDAs to supercomputers.

PERFORMANCE COMPARISONS

		SPECint92	SPECfp92
PowerPC 601	50 MHz	40	60
PowerPC 601	66 MHz	62	72
PowerPC 601	80 MHz	77	93
PowerPC 601	100 MHz	105	125
PowerPC 603	66 MHz	60	70
PowerPC 603	80 MHz	75	85
PowerPC 604	100 MHz	160	165
PowerPC 604	150 MHz	200	265
PowerPC 620		Twice as fast as 604	
		Four times faster than 601	

The PowePC 601 at 66 MHz runs X86 software under emulation at about the same speed as a 486DX2 at 66/33 MHz

The PowePC 604 at 100 MHz runs X86 software under emulation at about the same speed as a Pentium™ at 66 MHz

601	64 bit Data path 32 bit Processor 32 bit Address path Target system: low-end desktop Available: late 1993	
603	64 bit Data 32 bit Processor 32 bit Address path Target system: notebook Available: mid-1994	
604	64 bit Data path 32 bit Processor 32 bit Address path Available: late 1994	✧ Bigger pipeline, higher parallelism ✧ Advanced branching techniques for higher performance ✧ Target system: next-generation desktop
620	64 bit Data path 64 bit Processor 80 bit Address path Available: late1994	✧ Multiple levels of parallelism ✧ Will use a different processor bus ✧ Target system: high-end workstation and server

OPERATING SYSTEM SUPPORT

The following operating systems are being ported to the PowerPC:

➭ Apple's System 7.1.2 or higher
  - Runs native 68000 binaries (Mac appls) via emulation software
  - ISV's can rewrite Mac appls to work natively (so much faster)
  - Runs DOS and Windows appls via emulation using Insignia Solutions Inc.'s SoftWindows
➭ IBM's WorkPlace OS (OS/2 for PowerPC); available late 1994
  - Runs recompiled 32 bit OS/2 appls
  - DOS appls will be supported via same type of Multiple Virtual DOS machines as on OS/2 2.1
  - Windows appls run as on OS/2 2.1
➭ IBM's AIX® 3.2.5 and 4.x
  - AIX appls run natively
  - Mac appls run on AIX using a Mac emulator
  - DOS appls are supported via PC Sim
  - Windows appls use Wabi
➭ SunSoft®'s Solaris® 2.4 (available 1995)
  - Runs recompiled Solaris (UNIX) appls
  - Windows appls use Wabi ™
➭ Taligent® (object oriented system); available 1996
➭ The PowerOpen™ compliant operating systems (a common ABI ensures that any PowerOpen appl will run on any PowerOpen operating system). An optional MAS (Macintosh Application Services) architecture will let PowerOpen run 680x0 or 601-based Mac appls.
➭ Microsoft® Windows NT ™
  - Runs recompiled NT appls
  - DOS appls support is the same as for all versions of NT
  - Windows appls is the same as for all versions of NT
➭ DOS and Windows™ applications via an emulator (as fast as a 486)

The above operating sytems run on any hardware (IBM or another vendor) that conforms to IBM's PowerPC Reference Platform (PReP).

IBM Power Personal Systems Division's PowerPC systems design is based on PReP and utilizes industry standard interfaces such as PCI, ISA, PCMCIA and SCSI. The first products to comply with this open platform will ship in the second half of this year.

The PReP is a set of open technical specifications which provide a standard computer design. This will enable vendors to manufacture systems that can use the same hardware and software, making them compatible with other systems that comply with this standard.

The Apple Power Macintosh™ does not adhere to PReP, so it only runs System 7.1.2 and not the other operating systems listed above.

The PowerPC has a large number of registers and larger internal cache (compared to CISC processors). This reduces memory accesses (less delays interfacing with memory) and cache references to help performance. It also reduces the need for L2 cache.