Pentium® Pro Processor Performance Brief

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INTRODUCTION

The Intel Pentium® Pro processor family delivers the performance required for the most demanding 32-bit applications. The Pentium Pro processor family consists of the following processors:

- Pentium Pro processor at 200 MHz (256K and 512K L2 cache)
- Pentium Pro processor at 180 MHz (256K L2 cache)
- Pentium Pro processor at 166 MHz (512K L2 cache)
- Pentium Pro processor at 150 MHz (256K L2 cache)

This report provides the latest results of benchmarks for the 200 MHz (256K and 512K L2 cache) and 180 MHz (256K L2 cache) on Pentium Pro processor-based systems using the latest Intel 440FX PCIset. Appendix A contains a comparison with the previous chipset, the Intel 450KX PCIset. Details of all system configurations are described in Appendix B.

Modern industry standard benchmarks were chosen to accurately demonstrate the superior performance of the Intel Pentium Pro processor family. Processor-intensive benchmarks such as SPECint95* and several 32-bit benchmarks highlight processor performance and as CPU benchmarks are appropriate for comparing processors, application benchmarks are the best method for overall system performance comparisons. Several popular Windows* software applications are used for this purpose.

As operating systems and applications have moved towards a 32-bit environment, they require system vendors and users to be cognizant of 32-bit workload performance. As such, most product planning and purchasing decisions are expected to be based on 32-bit benchmarks in order to ensure that these decisions are relevant for the entire life of a system. Intel is committed to using the most robust and relevant benchmarks in characterizing its products' performance and over time, Intel will adapt this mix as newer benchmarks appear.

Robust benchmark programs should be representative of how well the actual applications will execute. However, performance is often the combined characteristics of a given computer architecture and many other tightly coupled system software/hardware constituents rather than just the CPU. Operating system, compilers, libraries, memory design and I/O subsystem characteristics may well dominate the results and make comparisons difficult. This report is intended to show Intel Pentium Pro processor performance on a consistent set of benchmarks .

THE INTEL PENTIUM® PRO PROCESSOR

The Pentium Pro family of processors is the next generation of Intel's processor technology. Pentium Pro processors are designed for complete compatibility with all existing Intel Architecture-compatible software. The Pentium Pro processor is especially designed to deliver optimal performance for 32-bit software. This includes demanding software like CAD*, 3D*, and multimedia authoring applications running on performance desktops and workstations, as well as large database and enterprise applications on servers. The Pentium Pro processor delivers its superior performance through an innovation called Dynamic Execution.

The 200 MHz Pentium Pro processor with internal 512K L2 cache delivers outstanding integer and floating-point performance (See figures 2 and 3):

- SPECint95 rating is 8.58
- SPECfp95* rating is 6.48

The Pentium Pro processor may contain design defects or errors known as errata. Current characterized errata are available upon request from Intel.

PRODUCT FEATURE HIGHLIGHTS

- Fully compatible with an entire library of software based on operating systems such as Windows NT*, UNIX SVR4*, SCO UNIX*, OPENSTEP*, Sun Solaris*, and OS/2*, as well as Windows 95*, Windows for Workgroups 3.11*, Windows 3.1*, and DOS*.
- Dynamic Execution, which refers to these techniques:
  - Out-of-order execution
  - Register renaming
  - Speculative Execution
- Provides support for enhanced data integrity and reliability features: Error Checking and Correction (ECC), Fault Analysis & Recovery, and Functional Redundancy Checking.
- Integrated L2 and advanced transaction bus will greatly simplify the design of multiprocessing systems.

iCOMP® INDEX

The iCOMP® (Intel Comparative Microprocessor Performance) index provides a simple relative measure of microprocessor performance. It is not a benchmark, but a collection of benchmarks used to calculate an index of relative processor performance intended to help end users decide which Intel microprocessor best meets their desktop computing needs. Intel has updated the iCOMP Index to version 2.0. There are three major market and performance trends that have influenced the latest formula adjustment:

1. The development of benchmarks appropriate for emerging popular application profiles,
2. The accelerating transition to 32-bit operating systems and applications on the desktop.
3. Proliferation of multimedia, communications and 3D.

The iCOMP Index 2.0 ratings cannot be compared with the earlier version of iCOMP because different benchmarks are used.

The iCOMP Index 2.0 rating is based on the technical categories that encompass three separate aspects of 32-bit CPU performance: integer, floating-point, and multimedia. The multimedia portion is further divided into four components: Audio, Imaging, Video and 3-D (see Intel Media Benchmark section below). Each category and subcategory is weighted based on the estimated percentage of time it enters into the processing picture. The higher the iCOMP rating, the higher the relative performance of the microprocessor. Each processor's iCOMP Index rating is calculated at the time that processor is introduced except that ratings for processors introduced before iCOMP Index 2.0 were calculated when version 2.0 was released. Four standard benchmarks are used for 2.0 (CPUmark32*, Norton SI32*, SPECint95, SPECfp95) as well as the Intel Media Benchmark. Differences in system design (including software) and configuration will affect actual performance.

Figure 1 illustrates the iCOMP 2.0 ratings for three Intel microprocessors. The Intel Pentium Pro processor at 200 MHz has an iCOMP 2.0 rating of 220 (iCOMP Index 2.0 was measured only on the 200MHz Pentium Pro processor with the 256KB L2 cache configuration). System

configurations used in iCOMP Index 2.0 measurements are listed in Appendix B. For more information on iCOMP Index 2.0, contact Intel Corporation or visit the web site http://www.intel.com.

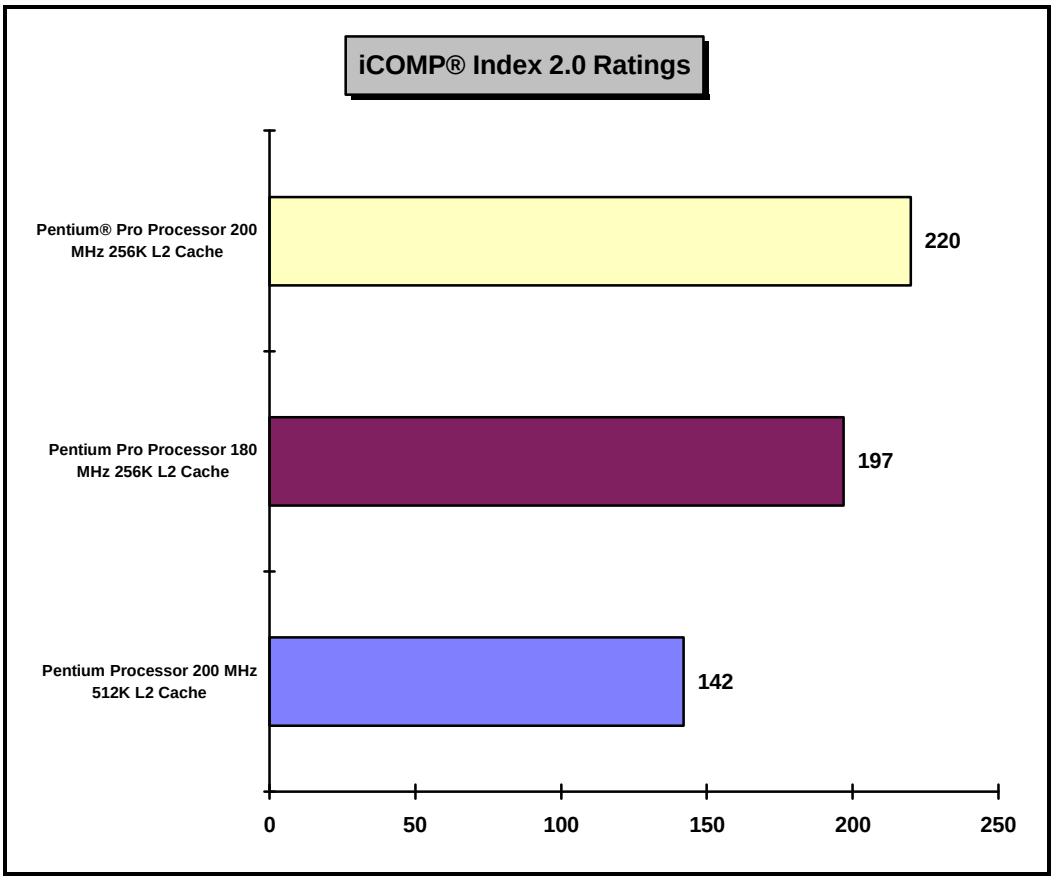

Figure 1. iCOMP® Index 2.0 Ratings for Intel Processors (System configuration for iCOMP 2.0 components is given in Appendix B).

MICROPROCESSOR PERFORMANCE SUMMARY

UNIX* Processor Benchmarks

SPEC CPU95* is a software benchmark product produced by the Standard Performance Evaluation Corp. (SPEC), a non-profit group of computer vendors, system integrators, universities, research organizations, publishers and consultants throughout the world. It was designed to provide measures of performance for comparing compute-intensive workloads on different computer systems. SPEC CPU95 consists of two suites of benchmarks: CINT95* for measuring and comparing compute-intensive integer performance, and CFP95* for measuring and comparing compute-intensive floating-point performance. The two suites provide component-level benchmarks that measure the performance of the computer's processor, memory architecture and compiler. SPEC benchmarks are selected from existing application and benchmark source code running across multiple platforms. Each benchmark is tested on different platforms to obtain fair performance results across competing hardware and software systems.

SPEC CPU95 is the third major version of the SPEC benchmark suites, which in 1989 became the first widely accepted standard for comparing compute-intensive performance across various architectures. The new release replaces SPEC CPU92*, which has been discontinued by SPEC. Performance results from SPEC CPU95 cannot be compared to those from SPEC CPU92, since new benchmarks have been added and existing ones changed.

The CINT95 suite, written in C language, contains eight CPU-intensive integer benchmarks. It is used to measure and calculate the following metrics:

- SPECint95 -- The geometric mean of eight normalized ratios (one for each integer benchmark) when compiled with aggressive optimization for each benchmark.
- SPECint_base95* -- The geometric mean of eight normalized ratios when compiled with the conservative optimization for each benchmark.

The CFP95 suite, written in FORTRAN* language, contains 10 CPU-intensive floating-point benchmarks. It is used to measure and calculate the following metrics:

- SPECfp95 -- The geometric mean of 10 normalized ratios (one for each floating-point benchmark) when compiled with aggressive optimization for each benchmark.
- SPECfp_base95* -- The geometric mean of 10 normalized ratios when compiled with conservative optimization for each benchmark.

Because today's commercial applications are comprised almost exclusively of integer-intensive programs, SPECint95 represents an appropriate instruction mix for commercial applications and is a much more effective benchmark to predict 32-bit business performance than SPECfp95. Figures 2 and 3 show the SPECint95 and SPECfp95 performances of the Pentium Pro processor compared with the fastest Pentium processor.

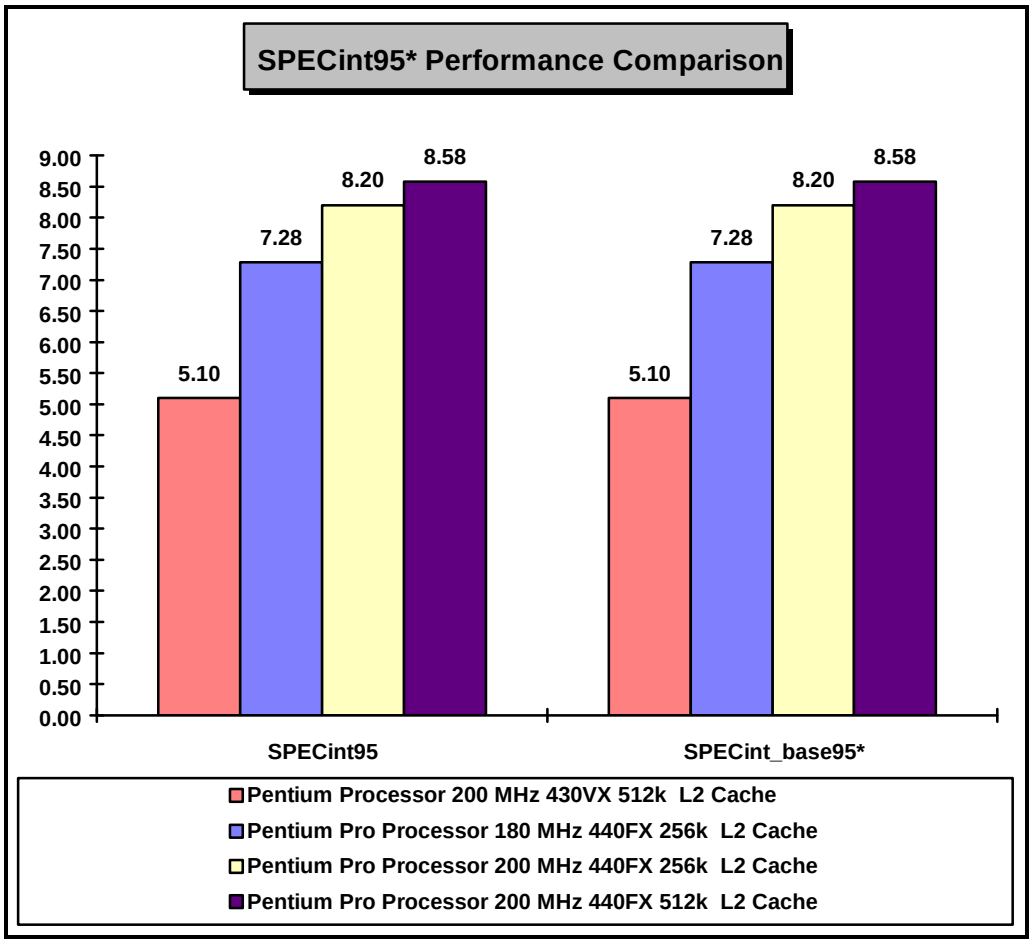

Figure 2. Intel Pentium® Pro Processor Performance for the UNIX* SPECint95* Benchmark[1]

Endnotes

[1]The highest Pentium Pro Processor SPEC numbers have been measured on server configurations. The Fujitsu/ICL numbers for the Pentium Pro processor 200MHz /512K are 8.71 for SPECint95 and SPECint_base95, 6.68 for SPECfp95 and 5.95 for SPECfp_base95. For the 166MHz/512K Pentium Pro processor the numbers are 7.28 for SPECint95 and SPECint_base95, 6.06 for SPECfp95 and 5.21 for SPECfp_base95.

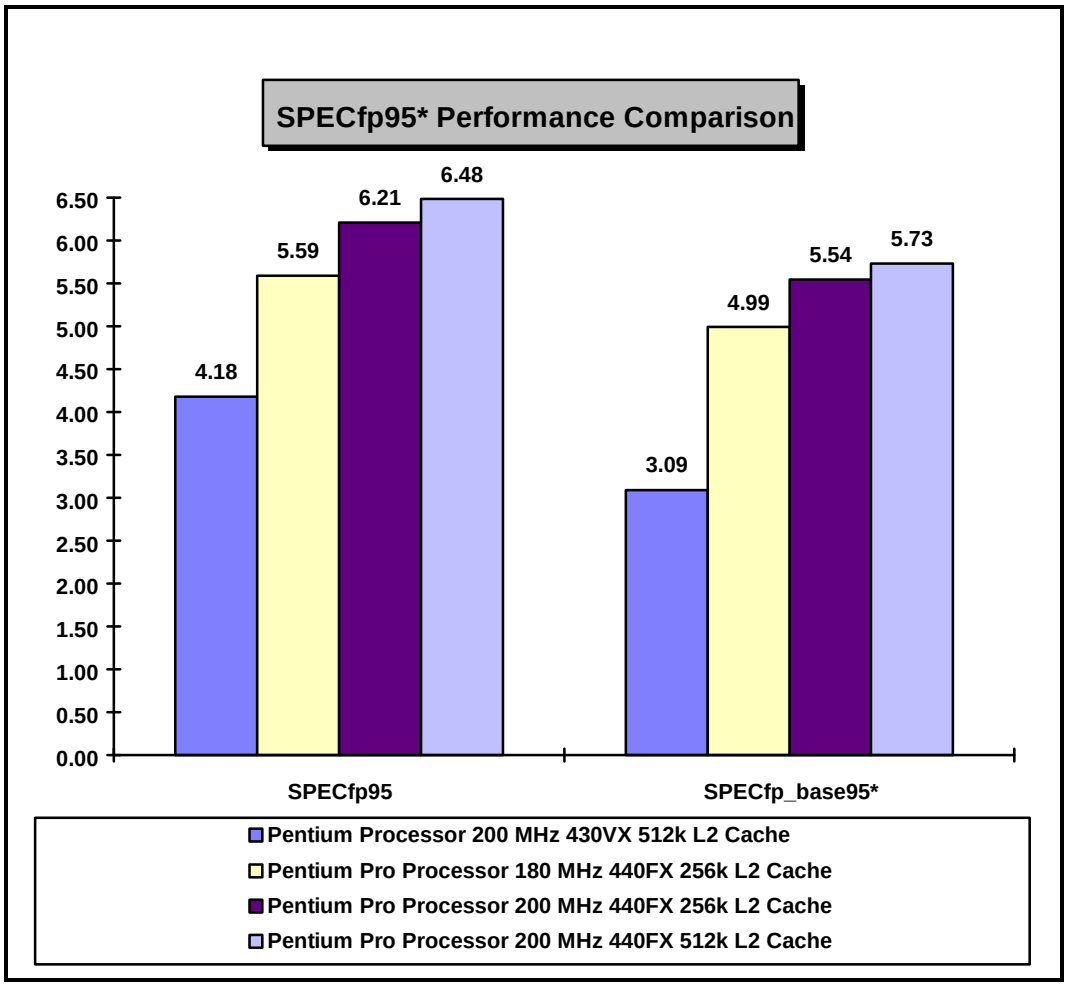

Figure 3. Intel Pentium® Pro Processor Performance for the UNIX* SPECfp95* Benchmark

DOS*/Windows* Processor Benchmarks

32-BIT CPU

The 32-bit integer Windows performance of the Pentium processor is illustrated by the commonly used Windows benchmarks presented. These benchmarks represent the high performance potential achieved with the Intel Pentium processor for running 32-bit applications.

CPUmark32* is a 32-bit Windows processor benchmark provided by Ziff-Davis Labs designed to measure the performance potential for running future 32-bit applications.

Norton SI32* is a new 32-bit Windows 95 benchmark designed to show the speed of a system (CPU, L2 cache, and memory), compared to the speed of other systems for running common 32-bit applications. This benchmark is part of the SYSINFO* module of the Norton Utilities* for Windows 95. SI16* is the 16-bit equivalent.

Figures 4 and 5 illustrate the Intel Pentium Pro processor performance when executing these two popular 32-bit benchmarks.

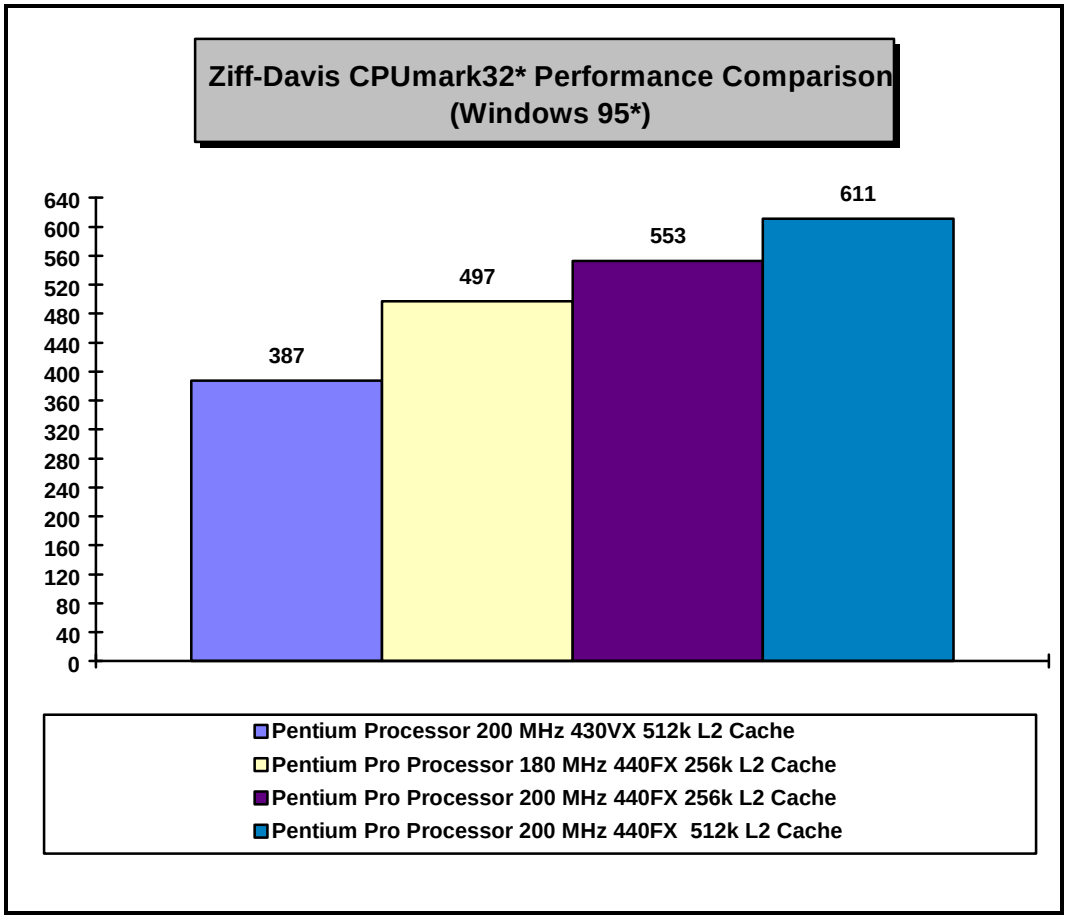

Figure 4. Intel Pentium® Pro Processor Performance for the Ziff-Davis CPUmark32* Benchmark

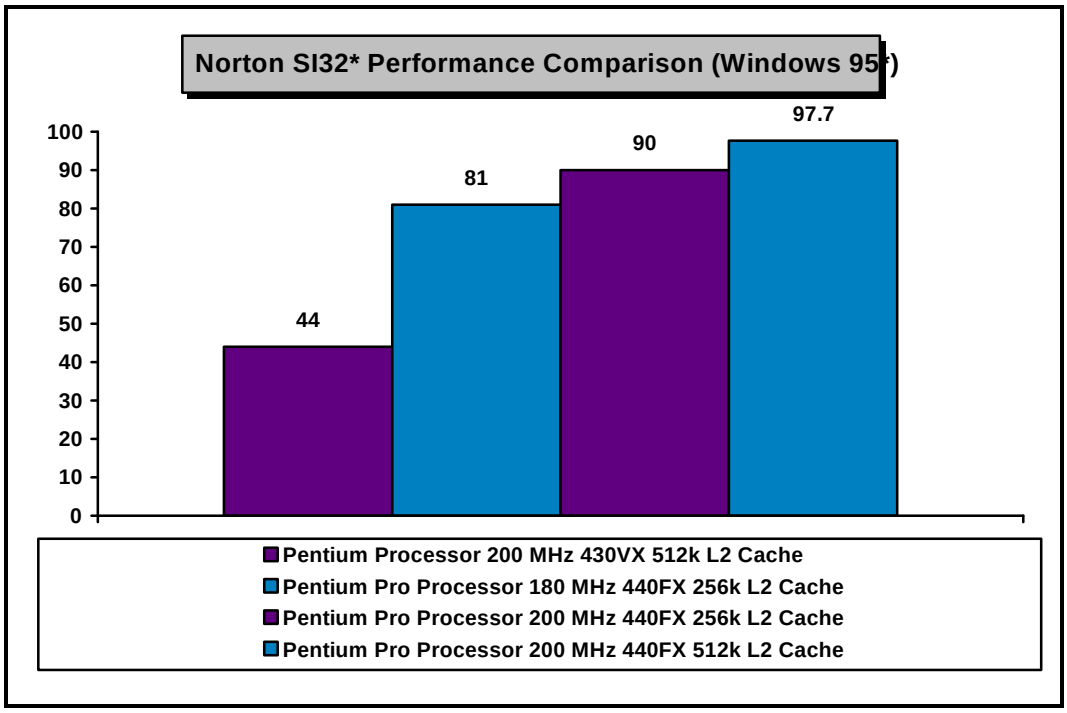

Figure 5. Intel Pentium® Pro Processor Performance for the Norton SI32* Benchmark

Intel Media Benchmark

Multimedia applications are proliferating rapidly. Intel developed the Intel Media Benchmark since an adequate industry standard multimedia benchmark does not currently exist to measure multimedia performance. The Intel Media Benchmark measures the performance of processors running algorithms found in multimedia uses. It incorporates audio and video playback, image processing, wave sample rate conversion, and 3D geometry.

The most probable anticipated use of the microprocessor in video applications will be to provide software decompression of video data. One algorithm, which is increasing in popularity, is the industry standard MPEG1 algorithm, such as that used by the popular Xing Technology decompression and the Berkeley MPEG1 shareware software. The video playback component of the Intel Media Benchmark implements the MPEG1 decompression algorithm (ISO11172-2). This benchmark focuses on the contribution of the processor in implementing a video player.

The audio component is based on the MPEG1 audio decompression definition (ISO11172-3). This component of the Intel Media Benchmark decompresses and plays a stereo audio clip. The audio component also includes sample rate conversion, special effects and stereo mixing.

The image processing component applies digital filters to true-color (24-bit) bitmap images. These filters include a box filter which is used to implement filters such as Gaussian blur and embossing, an image blending function used to combine two images into one, and a color space conversion function used to change an image's luminance.

The 3D component of the Intel Media Benchmark is based on Direct3D* and a geometry routine from the OpenGL* 3D Triangle benchmark. These tests are used to measure the geometry portion of a 3D workload.

Figure 6 Illustrates the Intel Pentium® Pro Processor Performance for the Intel Media Benchmark.

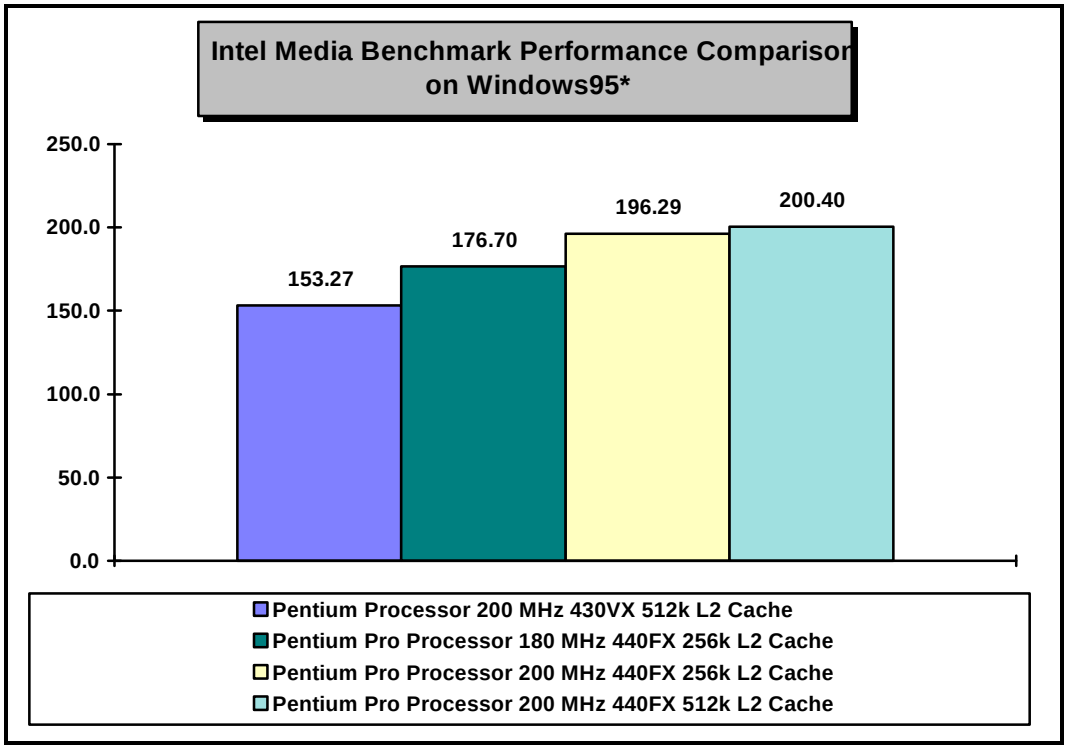

Figure 6. Intel Pentium® Pro Processor Performance for the Intel Media Benchmark

SYSTEM LEVEL BENCHMARKS

To measure realistic application performance, SYSmark32 for Windows 95 and Windows NT, SYSmark for Windows NT (32-bit applications) and High-End applications under Windows NT 3.51 were chosen to gauge the performance of Intel Pentium Pro processor-based systems.

SYSMARK32* FOR WINDOWS 95* AND WINDOWS NT*

SYSmark32 for Windows 95 and Windows NT is a suite of application software and associated benchmark scripts that have been developed by the Business Applications Performance Corporation (BAPCo), a non-profit consortium of PC OEMs, software vendors, semiconductor manufacturers and industry publications, in order to provide a tool for accurate and realistic measurement of personal computer performance running popular business-oriented applications in the Microsoft Windows operating environment. The scripts are developed to reflect usage patterns of PC users in a business-oriented environment.

SYSmark32 includes 32-bit benchmark scripts for the following applications selected from six categories of application software:

- Word-processing — Microsoft Word* 7.0 and Lotus WordPro* 96.
- Spreadsheet — Microsoft Excel* 7.0.
- Database — Borland Paradox*.
- Desktop Graphics — Corel CorelDraw* 6.0.
- Desktop Presentation — Microsoft PowerPoint* 7.0 and Lotus Freelance* 96.
- Desktop Publishing — Adobe Pagemaker* 6.0.

Figures 7, 8 and 9 illustrate the SYSmark32 ratings under Windows 95, Windows NT 3.51 and Windows NT 4.0, respectively for the Intel Pentium Pro processor.

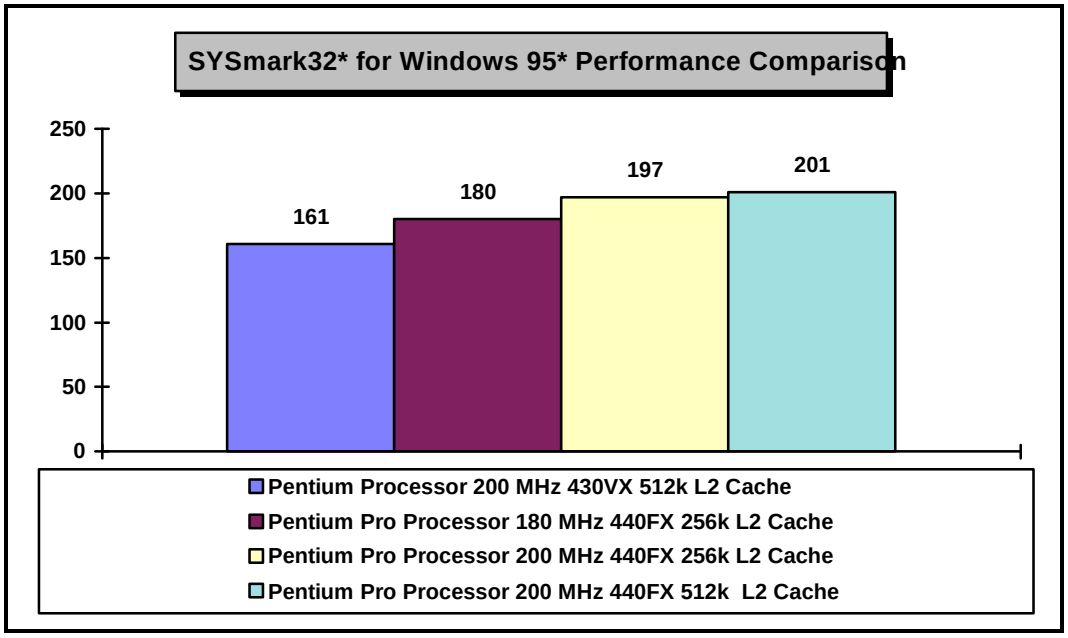

Figure 7. Intel Pentium® Pro Processor Performance for SYSmark32 on Windows 95*

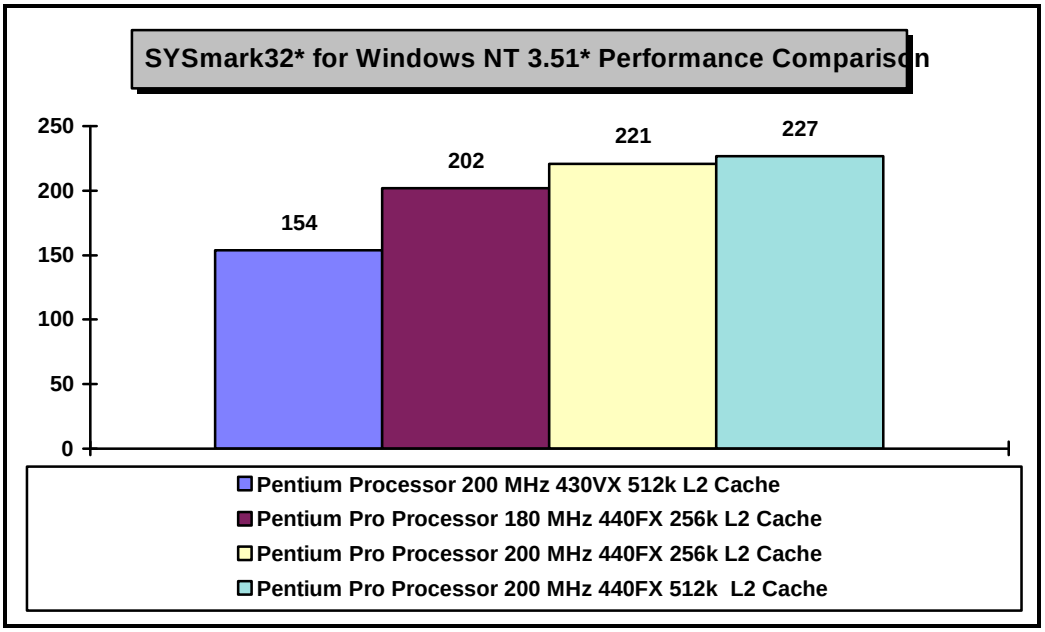

Figure 8. Intel Pentium® Pro Processor Performance for SYSmark32* on Windows NT 3.51*

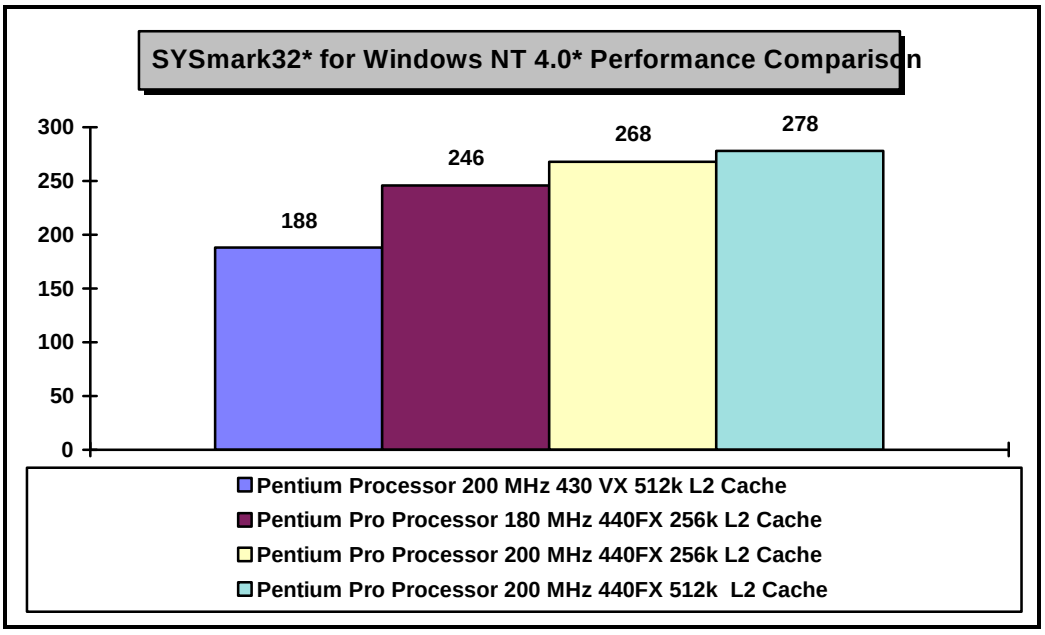

Figure 9. Intel Pentium® Pro Processor Performance for SYSmark32* on Windows NT 4.0*

SYSMARK* FOR WINDOWS NT*

Workloads for SYSmark for Windows NT were developed based on BAPCo's standardized practice of surveying users to determine how they exercise popular applications in day-to-day work. The applications selected for testing had to be able to run across all three popular architectures. SYSmark for Windows NT can generate performance metrics as a composite of all the different applications or for a specific application, such as word processing or spreadsheets. The following applications are included in SYSmark for Windows NT.

- Word-processing — MS Word* 6.0 (native 32-bit on all architectures)
- Spreadsheet — MS Excel* 5.0 (native 32-bit on all architectures)
- Project Management — Welcom Software Technology Texim Project 2.0e* (native 32-bit on all architectures)
- Computer-Aided Design — Orcad MaxEDA 6.0* (PCB design tool) (native 32-bit on all architectures)
- Presentation Graphics — MS PowerPoint* 4.0 (16-bit Windows emulation)

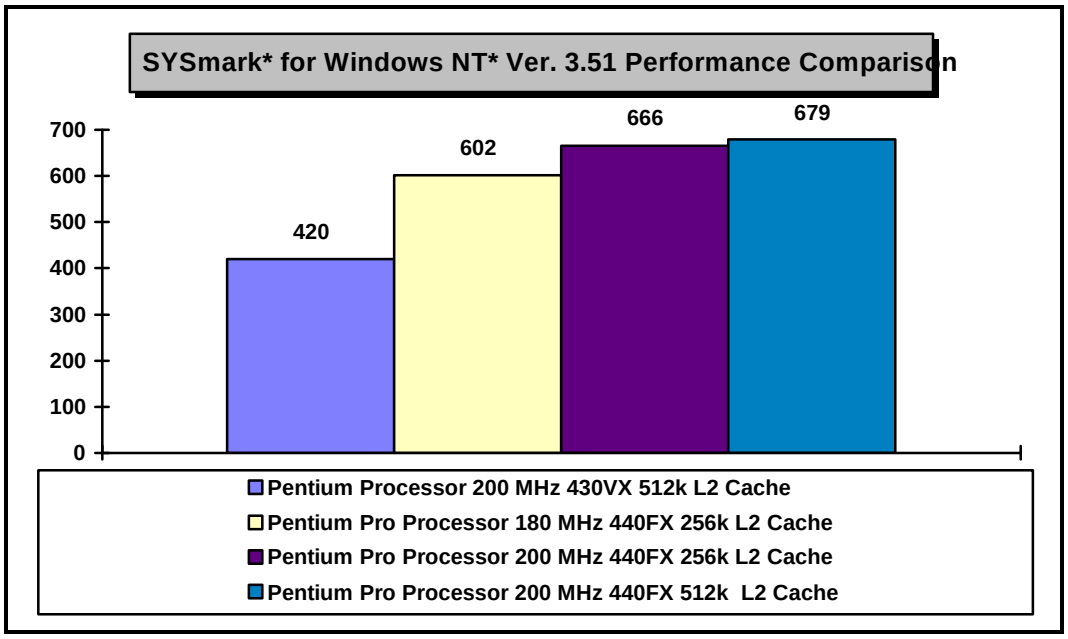

Figure 10. Intel Pentium® Pro Processor Performance for SYSmark* for Windows NT* Benchmark

HIGH-END APPLICATIONS UNDER WINDOWS NT 3.51*

In this section, we present the performance of demanding 32-bit Windows NT 3.51 applications running under the Windows NT environment. The workloads for these applications are sample demos created by Intel designed to exercise the 32-bit performance of the Intel Pentium processor.

Elastic Reality* creates special effects for animation. You can use this tool to create still (single frame) and moving (multiple frame) warps and morphs by drawing shapes (outlining the various features to transform) with familiar structured drawing tools.

Extreme 3D* is a tool used to create 3D modeling, animation, rendering, and composite effects to designs and productions. It is used by graphic artists, multimedia developers, and video professionals.

Photoshop* is a professional-level program for desktop image design and production. Designers and photographers can create original artwork, correct color, retouch and composite scanned images, and prepare professional-quality separations and output.

Pixar Typestry* is a program for creating 3D text with shading, perspective, and light effects. Five basic steps are included to create a picture: type in text, position text, apply a surface to the text, add lights and render text.

Vistapro* is a 3D landscape simulation program. Using U.S. Geological Survey data converted into Digital Elevation Model files, Vistapro can accurately recreate real world landscapes. As a fractal landscape design generator, Vistapro can create imaginary landscapes from a random seed.

MathCAD* is one of the world's leading technical calculation software programs. MathCAD allows technical professionals and educators to perform numeric and symbolic calculations, solve differential equations, and handle advanced matrix operations. Graphics features let you visualize data and functions in 2-D and 3-D with point-and-click ease--including polar, contour and parametric plots. Figure 11 illustrates the 32-bit application performance under Windows NT for Pentium Pro processors scaled with respect to the Pentium processor at 200 MHz.

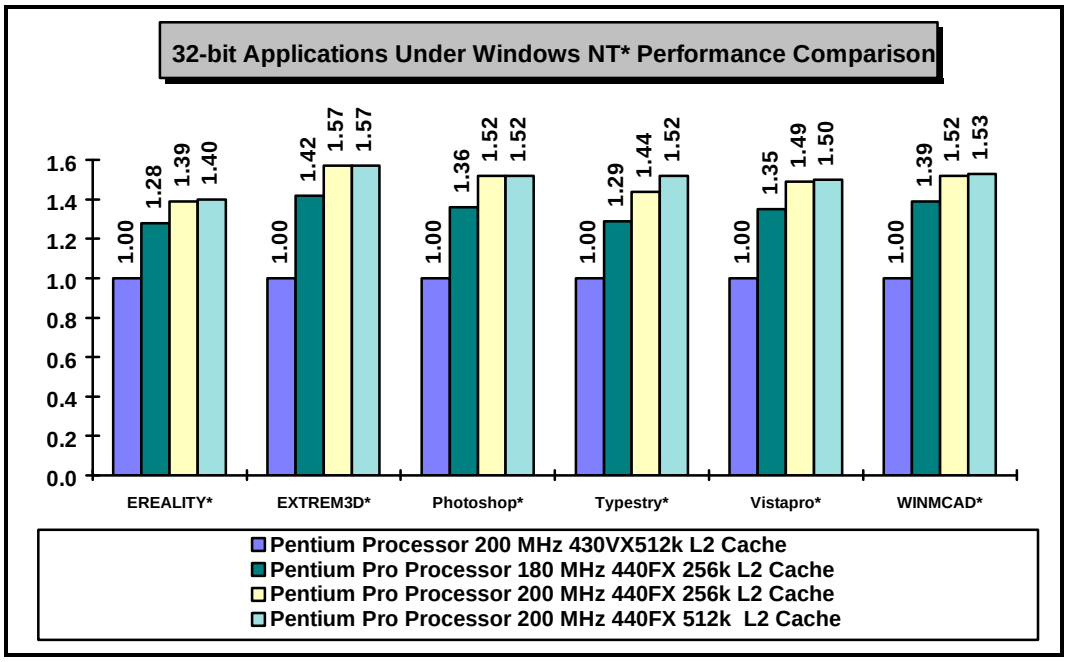

Figure 11. Intel Pentium® Pro Processor Performance for 32-bit Applications Under Windows NT 3.51* normalized to the 200MHz Pentium Processor*

Summary

Table 1 summarizes the microprocessor benchmark performance results for the Intel Pentium Pro processor family. (Higher the number better the performance).

Table 1: Microprocessor Benchmark Performance Results

Processor Benchmarks	Pentium Processor 200 MHz Intel 430VX	Pentium Pro Processor 180 MHz Intel 440FX Dell Dimension	Pentium Pro Processor 200 MHz Intel 440FX Dell Dimension	Pentium Pro Processor 200 MHz 512k L2 Intel 440FX Dell Dimension
SPEC CPU95*/UNIX*				
SPECint95*	**5.10**	**7.28**	**8.20**	**8.58**
SPECint_base95*	5.10	7.28	8.20	8.58
SPECfp95*	**4.18**	**5.59**	**6.21**	**6.48**
SPECfp_base95*	**3.09**	**4.99**	**5.54**	**5.73**
Intel Media Benchmark/Windows 95	**153.27**	**176.70**	**196.29**	**200.40**
Video	151.03	145.02	160.97	162.80
Image Processing	158.55	199.86	222.04	223.03
3D Graphics	156.05	190.90	212.41	219.18
Audio	152.53	215.54	239.27	245.65
Norton System Index*/Windows 95				
SI32* (Win 95)	**44.0**	**81.0**	**90.0**	**97.6**
Ziff-Davis/Windows 95				
CPUmark32	**387**	**497**	**553**	**611**

Table 2 summarizes the System-Level Benchmark performance for the Intel Pentium processor using SYSmark32 for Windows 95 and Windows NT 3.51, SYSmark for Windows NT 3.51 and SYSmark95 for Windows for Workgroups.

Table 2: SYSmark/NT* for Windows NT 3.51*, SYSmark32 Results

System-Level Benchmarks	Pentium Processor 200 MHz Intel 430VX	Pentium Pro Processor 180 MHz Intel 440FX Dell Dimension	Pentium Pro Processor 200 MHz Intel 440FX Dell Dimension	Pentium Pro Processor 200 MHz 512k L2 Intel 440FX Dell Dimension
SYSmark/NT*/ Windows NT 3.51	**420**	**602**	**666**	**679**
Spreadsheet	382	538	587	613
Project Management	347	756	838	836
Word Processing	431	558	622	638
Presentation	513	639	705	724
CAD	408	545	606	610
SYSmark32*/ Windows 95	**161**	**180**	**197**	**201**
Publishing	152	164	176	181
Graphics	151	157	181	177
Presentation	170	189	207	210
Word Processing	161	179	193	196
Spreadsheet	164	191	210	217
Database	147	159	174	180
SYSmark32*/ Windows NT 3.51	**154**	**202**	**221**	**227**
Publishing	190	244	265	269
Graphics	186	260	289	269
Presentation	174	219	242	246
Word Processing	169	220	239	245
Spreadsheet	120	164	180	188
Database	155	194	213	220
SYSmark32*/ Windows NT 4.0	**188**	**246**	**268**	**278**
Publishing	232	299	316	335
Graphics	219	291	322	332
Presentation	206	257	280	288
Word Processing	194	256	276	286
Spreadsheet	165	226	246	257
Database	182	230	251	266

APPENDIX A — PCISET COMPARISONS

In this section, we compare the performance of Intel 440FX PCIset with the older Intel 450KX PCIset for the Pentium Pro processor.

Intel 440FX PCIset

The Intel 440FX PCIset is a highly integrated chip set solution for delivering Pentium Pro processor performance to mainstream business systems. This second-generation PCIset for Pentium Pro processors delivers world-class performance at an affordable price. The 440FX PCIset optimizes system performance for 32-bit application software in 32-bit operating system environments, and supports Universal Serial Bus (USB) capabilities for Plug and Play connectivity "outside the box."

Intel 450KX/GX PCIset

The Intel 450KX/GX PCIsets are targeted to OEMs and motherboard manufacturers designing and manufacturing Pentium Pro processor servers that deliver superior performance and upgradability through multiprocessing.

The 450KX/GX are comprised of four components: a PCI Bridge, a Data Path (DP), a Data Controller (DC), and Memory Interface Component (MIC). Options for QFP (Quad Flat Pack) or Ball Grid Array (BGA) packaging are available on the PCI Bridge and the DP. BGA permits OEMs and motherboard manufacturers to use less space in their design and offer greater manufacturing robustness.

The 450's high reliability and scalability is obtained through ECC from the Pentium Pro processor data bus out to memory and parity protection on the Pentium Pro processor address and control bus and all PCI signals. In addition, single-bit error correction is provided thereby avoiding downtime due to this error. Scalability is ensured through upgradable memory of up to 4Gbytes with 4-way interleaving for X-1-1-1 clock data bursts with 450GX.

Table 3: SYSmark/NT* for Windows NT 3.51*, SYSmark32* Results for the Intel 450KX PCIset

System-Level Benchmarks	Pentium Pro Processor 180 MHz Intel 440FX Dell Dimension	Pentium Pro Processor 200 MHz Intel 440FX Dell Dimension	Pentium Pro Processor 200 MHz 512k L2 Intel 440FX Dell Dimension	Pentium Pro Processor 180 MHz Intel 450KX Hewlett Packard	Pentium Pro Processor 200 MHz Intel 450KX Hewlett Packard	Pentium Pro Processor 200 MHz 512k L2 Intel 450KX Hewlett Packard
SYSmark/NT*/ Windows NT 3.51	**602**	**666**	**679**	**601**	**655**	**665**
Spreadsheet	538	587	613	535	577	604
Project Management	756	838	836	760	833	836
Word Processing	558	622	638	555	600	593
Presentation	639	705	724	635	694	715
CAD	545	606	610	546	603	607
SYSmark32*/ Windows 95	**180**	**197**	**201**	**176**	**191**	**196**
Publishing	164	176	181	162	172	178
Graphics	157	181	177	162	180	180
Presentation	189	207	210	184	201	205
Word Processing	179	193	196	174	186	190
Spreadsheet	191	210	217	187	204	213
Database	159	174	180	156	167	172
SYSmark32*/ Windows NT 3.51	**202**	**221**	**227**	**202**	**220**	**227**
Publishing	244	265	269	245	267	275
Graphics	260	289	269	258	285	293
Presentation	219	242	246	202	219	223
Word Processing	220	239	245	221	241	249
Spreadsheet	164	180	188	178	193	200
Database	194	213	220	191	209	217
SYSmark32*/ Windows NT 4.0	**246**	**268**	**278**	**245**	**265**	**274**
Publishing	299	316	335	299	318	338
Graphics	291	322	332	289	321	331
Presentation	257	280	288	249	271	277
Word Processing	256	276	286	255	275	285
Spreadsheet	226	246	257	228	246	252
Database	230	251	266	232	250	264

APPENDIX B — TEST CONFIGURATIONS

UNIX SYSTEM CONFIGURATIONS

Processor	Pentium® Pro processor 180 and 200 MHz	Pentium Processor 200 MHz
System/Chipset	Dell Dimension (Intel 440FX) Hewlett Packard (Intel 450KX)	Dell Dimension XPS 166S (Intel 430VX) - modified
FPU	Integrated	Integrated
Primary Cache	16 KB (8 KB I + 8 KB D)	16 KB (8 KB I + 8KB D)
Secondary Cache	256 KB WB / 512 KB WB (200 MHz only)	512 KB WB
Memory Size	64 MB EDO (Dell Dimension) 64 MB ECC Fast Page (Hewlett Packard)	64 MB SDRAM
Hard Disk Controller	Integrated	Integrated
Hard Disk	Quantum Fireball 1080AT E-IDE	Quantum Fireball 1080AT E-IDE
Operating System	UnixWare 2.0	UnixWare 2.0
C Compiler	Intel C Ref. Compiler 2.3	Intel C Ref. Compiler 2.3
FORTRAN Compiler	Intel FORTRAN Ref. Compiler 2.3	Intel FORTRAN Ref. Compiler 2.3

WINDOWS* SYSTEM CONFIGURATIONS

Processor	Pentium® Pro processor 180 AND 200 MHz	Pentium Processor 200 MHz
System/ PCI Chipset	Dell Dimension (Intel 440FX) Hewlett Packard (Intel 450KX)	Dell Dimension XPS 166S (Intel 430VX)
FPU	Integrated	Integrated
Primary Cache	16 KB (8 KB I + 8 KB D)	16 KB (8 KB I + 8KB D)
Secondary Cache	256 KB WB / 512 KB WB (200 MHz only)	512 KB WB
Memory Size (SYSmark/NT and HIGH-END only)	64 MB EDO (Dell Dimension) 64 MB ECC Fast Page (Hewlett Packard)	64 MB SDRAM
Memory Size (all other benchmarks)	32 MB EDO (Dell Dimension) 32 MB ECC Fast Page (Hewlett Packard)	32 MB SDRAM
Hard Disk Controller/Bus	Adaptec2940UW SCSI/PCI	Adaptec2940UW SCSI/PCI
Hard Disk/Speed	Seagate ST31250W	Seagate ST31250W
Graphics	1024x768 Resolution, 256 Colors	1024x768 Resolution, 256 Colors
Operating System 1	**DOS 6.22/Windows NT 3.51**	**DOS 6.22/Windows NT 3.51**
Video Controller/Bus/Drivers	Matrox Millennium/PCI/ Ver 2.10	Matrox Millennium/PCI/ Ver 2.10
Video Memory Type/Size	2 MB WRAM	2 MB WRAM
Operating System 2	**DOS 6.22/Windows 95**	**DOS 6.22/Windows 95**
Video Controller/Bus/Drivers	Matrox Millennium/PCI/ Ver 2.3	Matrox Millennium/PCI/ Ver 2.3
Video Memory Type/Size	2 MB WRAM	2 MB WRAM

System Configuration used in iCOMP® Index 2.0 Ratings

PENTIUM® PROCESSOR

System	Dell Dimension* XPS 133c (modified)
CPU	Pentium processor at 200 MHz
FPU	Integrated
Primary Cache	16 KB (8 KB I + 8 KB D)
Secondary Cache	512K WB Burst
Hard Disk	Quantum Fireball EIDE with Integrated EIDE disk controller
Video	Matrox Millennium PCI
Audio	Creative Labs Sound Blaster 16
For SPEC95:	
Memory Size	64 MB EDO
Operating System	UnixWare 2.0
C Compiler	Intel C Ref. Compiler 2.3
FORTRAN Compiler	Intel FORTRAN Ref. Compiler 2.3
For all other benchmarks:	
Memory Size	32 MB EDO
Operating System	Windows 95*
Graphics	All benchmarks except Intel Media Benchmark - 1024x768 Resolution, 256 Colors Intel Media Benchmark - 1024x768 Resolution, 16-bit color

PENTIUM® PRO PROCESSOR

System	Dell Dimension* XPS Pro (modified)
CPU	Pentium pro processor at 200 MHz
FPU	Integrated
Primary Cache	16 KB (8 KB I + 8 KB D)
Secondary Cache	256K WB Burst
Hard Disk	Quantum Fireball EIDE with Integrated EIDE disk controller
Video	Matrox Millennium PCI
Audio	Creative Labs Sound Blaster 16
For SPEC95:	
Memory Size	64 MB EDO
Operating System	UnixWare 2.0
C Compiler	Intel C Ref. Compiler 2.3
FORTRAN Compiler	Intel FORTRAN Ref. Compiler 2.3
For all other benchmarks:	
Memory Size	32 MB EDO
Operating System	Windows 95*
Graphics	All benchmarks except Intel Media Benchmark - 1024x768 Resolution, High Color (16 bit) Intel Media Benchmark - 1024x768 Resolution, 16-bit color