

Entry Level and Midrange Servers

August 1996

Agenda

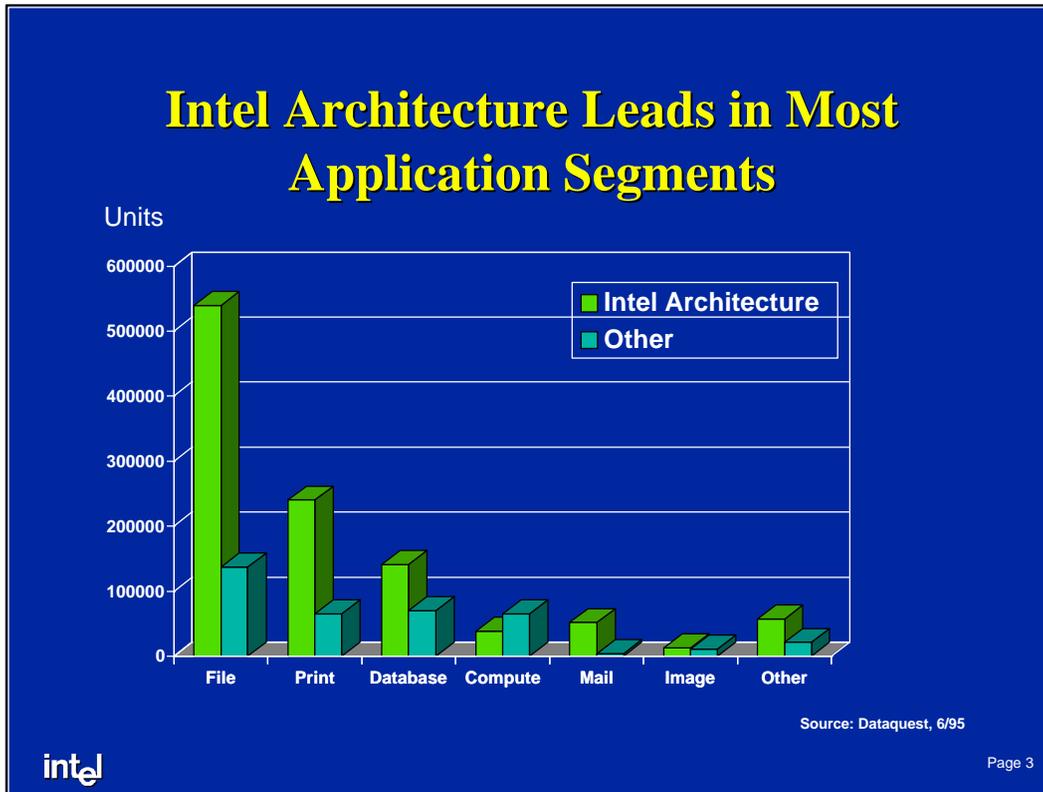
- **Server Market Segment Environment**
- **Server Solutions For Enterprise Needs**
- **Why Pentium® Pro processor for Servers?**



Today, we'll discuss how the latest server technologies can address your enterprise needs.

We'll touch on the server market segment environment. Then, we'll discuss enterprise needs that require today's server solutions. Finally, we'll talk about the Pentium® Pro processor for servers.

Entry-level & Midrange Servers Presentation



This chart shows 1994 server unit shipments. As you can see, in 1994 Intel architecture already led all other architectures combined in most server application areas. You may be surprised that Intel architecture was widely accepted in even the database application segment.

In 1995, as the Pentium® processor ramped, Intel architecture unit shipment in the server market was even higher than in 1994.

Server Solutions for Enterprise Needs

- LAN Consolidation
- Client/Server Messaging
- Intranet



The three enterprise issues best addressed by the latest server solutions are:

- 1) LAN consolidation (server and function consolidation)
- 2) client server messaging (versus DOS based file sharing email)
- 3) and the emergence of the Intranet

LAN Consolidation

- **Reduce the Number of Network Operating Systems (NOS)**
- **Replace with More Reliable Systems**
- **Centralize Management and Administration**
- **Improve Network Responsiveness**

Gain Control of the LAN



The really important themes for LAN Consolidation are:

- 1) Fewer servers are easier and thus less expensive to manage than many servers
- 2) Too many DIFFERENT operating systems also cause a rise in complexity and therefore costs - so standardize on 1 (or as few as possible)
- 3) Environments need to be standardized globally and managed both locally and remotely for them to be cost effective - control is a necessary evil...

You need the latest server solutions to consolidate and control your LAN!

Client/Server Mail

Yesterday (File sharing email):

- Simple Store and Forward Paradigm
- Limited Data Types
- Idea Sharing Only
- Attachments

Today (New Messaging Technologies):

- Lotus Notes* v4.x
- Microsoft Exchange*
- Novell GroupWise*
- SMTP Mail

Needs Latest Server Technologies



*Other brands and names are the property of their respective owners.

Page 6

Everybody's been 'doing' email - but the existing tools with which to do it are fundamentally limited (DOS* based ccMail*, etc). This store and forward technology was entirely I/O bound and did not require a lot of MIPS to run. BUT they did require a lot of small PC systems to scale the I/O throughput! That's why we've seen such a proliferation of mail servers!

However, it was okay when message volumes were low - and the data was basically just text - for simple idea sharing.

Then people started to use email as groupware to share files and rich content...it also became a mission critical app - it changed the way we do business.

Now, the same PC systems serving a small workgroup or department are being asked to serve the entire enterprise and handle richer and richer content, etc.

Hence the mail environment today looks very similar to the LAN environment in general - too many servers, too many packages, too hard to manage....

Today, the tools exist to do client server mail in a scalable and distributed fashion. Examples are Lotus Notes*, Microsoft Exchange*, Novell Group Wise*, and SMTP Mail.

*Other brands and names are property of their respective owners.

Why Intranet?

- **Anytime, Anywhere Global Access**
 - Better ties into Customers and Suppliers
 - All employees, local and remote
 - Collaboration spans OS, Site, Department, etc.
 - User access to Line of Business information
- **Information Management**
 - Better Faster Cheaper information dissemination
 - Intelligent search and filtering - tackle the Info Glut!
 - Reduce mail volumes (push to pull)
- **Standards Reduce Complexity and Cost**
 - Common User Interface

**But Requires Latest Server Hardware & Software
to Get the Most Benefits**

intel

Page 7

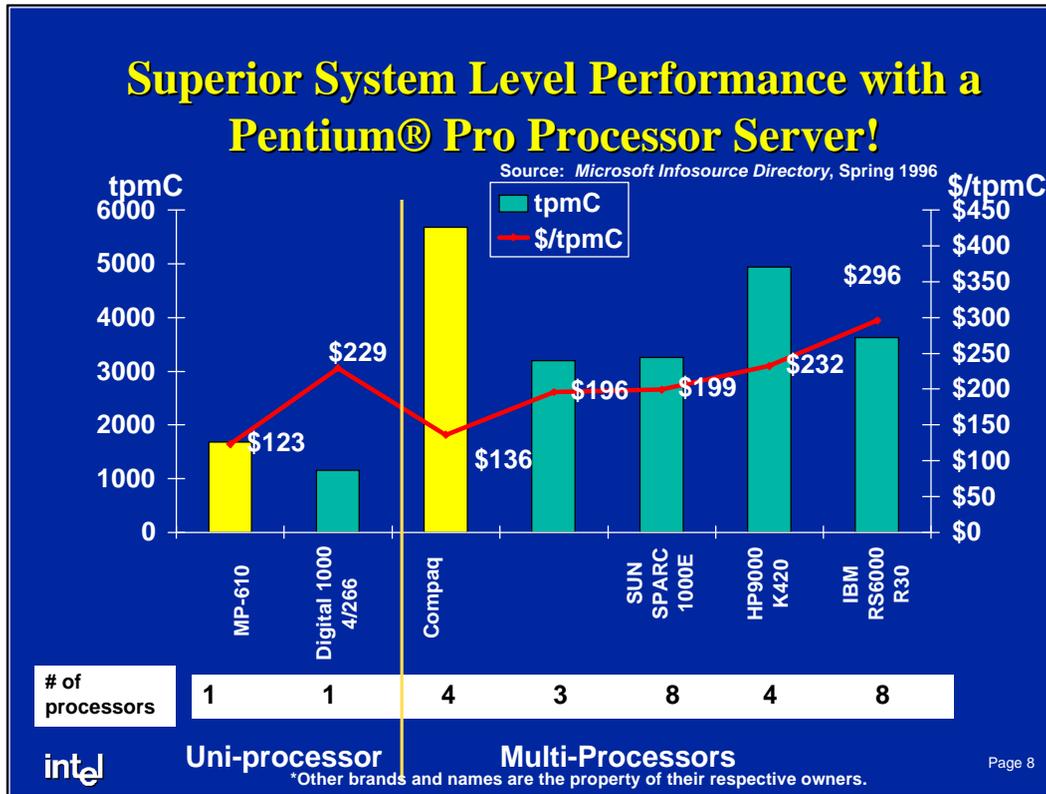
Inter/Intranet technology (new communications protocol: HTTP - Hypertext Transport Protocol, new presentation language: HTML - Hypertext Markup Language, powerful information management tools: search engines, smart agents, etc.) is a new abstraction layer in the 'solutions stack'.

Since HTTP and HTML (etc) are easy to use, run on an array of different operating systems, and are so pervasive (they have rapidly emerged as standards), they allow IT shops to build common front ends to access their heterogeneous client server and legacy systems environments.

This new abstraction layer, the internet/intranet, if deployed with some level of control and forethought might indeed be the final step in bridging 'islands of information' or 'stovepipes of data.'

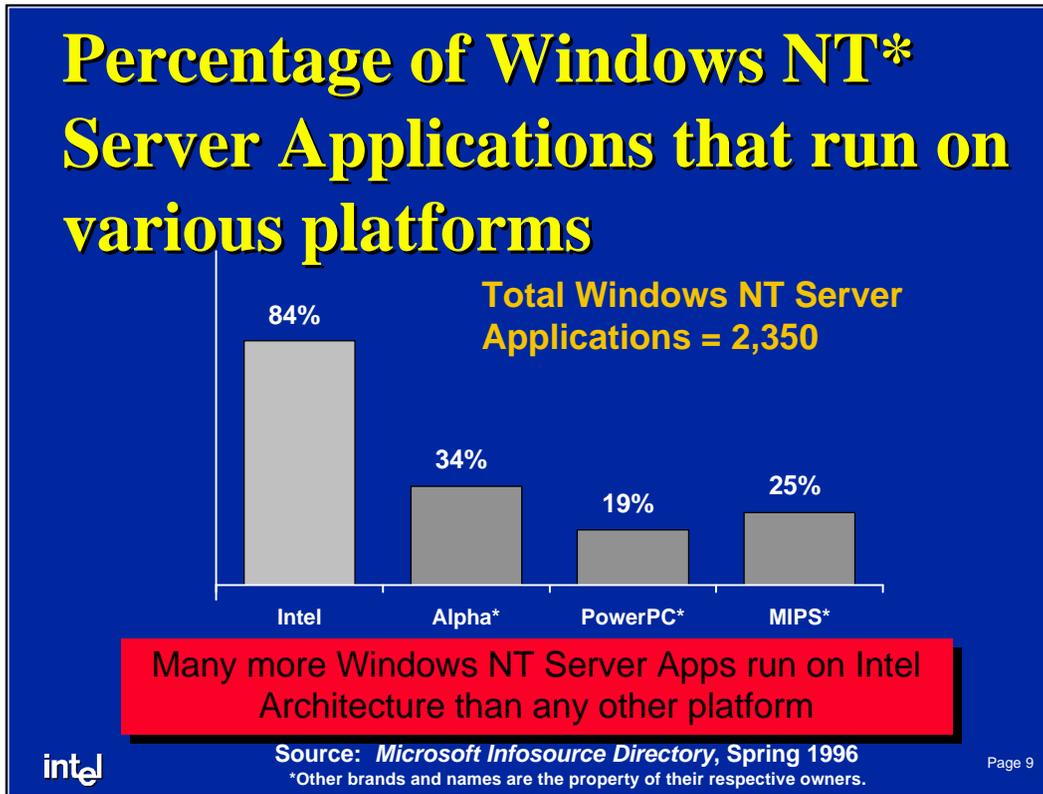
To take full advantage of the intranet, you'll need the latest hardware / software platform in order to get good performance as well as good networking and manageability capabilities.

Entry-level & Midrange Servers Presentation



TPC-C* is the most common benchmark for measuring server system performance. It measures transaction per second. \$/tpmC is the actual price of the complete system divided by the system's tpmC, and is a true price/performance measurement. As you can see, the Intergraph and Compaq systems shine! Note that the Digital systems are their best performing Windows NT* systems available. They have systems with higher tpmC, but these only run Digital Unix*. These systems were selected because they were similarly priced systems circa 7/1/96.

Company	System Operating System	Qty/Processors/MHz	Total Sys.	Database Software Cost
>>Intergraph	InterServe* MP-610 Server	1/Pentium® Pro/200MHz	\$206,345	MS SQL* Server 6.5
Digital	AlphaServer* 1000 4/266 c/s	1/DECchip* 21064A/266MHz	\$264,653	MS SQL Server 6.5
>>Compaq	ProLiant* 5000 5/166 Model 2 c/s	4/Pentium Pro/166MHz	\$770,272	MS SQL Server 6.5
Digital	AlphaServer 2100 5/300 c/s	3/DECchip 21164/300MHz	\$626,214	
Sun	SPARCserver* 1000E c/s	8/SuperSPARC* II RISC/85MHz	\$646,820	DB2 for Solaris* V2
HP	HP 9000 Model K420 c/s	4/PA-RISC* 7200/120MHz	\$1,144,200	Oracle*7 7.3
IBM	RS 6000 Server Model R30 c/s	8/PowerPC* 601/75MHz	\$1,075,443	Oracle7 7.3



Intel's investments attract the investments of numerous systems and software vendors (who are responding to volume business opportunities). Windows* NT-based software developers are a case-in-point: according to Microsoft's *Infosource* directory, nearly all Windows NT* Server based software (84%) targets IA, while only 34% can run on Alpha-based systems.

A key point to make is: while the port of an application from IA Windows NT to Alpha or PPC Windows NT is relatively straightforward (days or weeks of labor), the real cost prohibitor is the service and support of the application over its useful life. Application maintenance tends to account for 60-80% of the total cost of an application to a software vendor. Given the relatively small volumes of other microprocessor architectures sold, few ISVs, as the chart illustrates, are making alternative ports.

Data Source: Microsoft Infosource Directory, Spring 96

Product Category	Total Apps	Alpha*	Intel	MIPS*	Powerl
Total Client / Server Applications for Windows NT Server	2350	796	1982	599	457
Percent of Client / Server (only Windows NT) Applications	100%	34%	84%	25%	19%

*Other brands and names are property of their respective owners.

Entry-level & Midrange Servers Presentation

Manageability

Enterprise Tools: Tivoli* TME, CA* Unicenter, Microsoft* SMS, HP* Openview, Novell* NMS, LANdesk Management Suite

Workgroup/LAN: LANdesk Workgroup Manager, Microsoft* SMS, IBM* Netfinity

NOS: Windows NT*, NetWare*

Pentium® Pro processor: Temperature, Voltage, Easy SMP, Board HW/BIOS

Desktop Management Interface (DMI) / Remote Desktop Management Interface (RDMI), Plug n Play

“The product offerings, centered around the industry standards created by Intel and Microsoft, provide a wide array of compatible, business critical computing solutions.”

intel

T. Harvie, VP, Auto Warehousing

Page 10

Third party brands and trademarks are the property of their respective owners

Pentium® Pro processor based platforms together with standards based management deliver a more manageable desktop. As IT continues their move to 32-bit NOSs and 32 client/server applications and more manageable environments the logical HW platform will be the Pentium Pro processor. This is because it has been optimized for 32-bit code and because these platforms will include the most up-to-date set of management features.

- Pentium Pro processor based platforms will include the most up-to-date set of management features (buyer security).

- DMI (Desktop Management Interface) compliance, service layer to access information, instrumentation

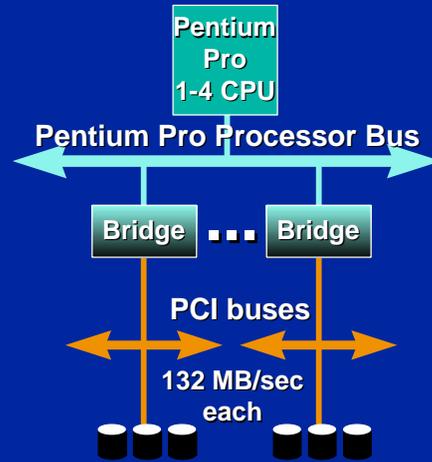
- Hardware monitor for thermal and voltage conditions

- Hard disk fault detection

- Basic agents (e.g. virus protection, remote access interface) in lieu of the existing enterprise solution

Fast, Scalable I/O

- Pentium® Pro processor Bus Protocol superior to Pentium processor for I/O
 - Pentium Pro processor bus will not saturate as quickly as Pentium processor bus
 - Allows higher performance I/O Subsystems
- Multiple peer to peer PCI
- Scalable from file to Enterprise class servers
- Superior I/O performance



Pentium® Pro Processor + PCI Deliver Best in Class I/O Performance



Servers are very I/O sensitive in many cases. We are talking about high bandwidth, high throughput, . . . , highly configurable I/O's. The Pentium® Pro processor architecture with its bus protocol allows high performance I/O subsystems. It now really makes sense to put multiple peer to peer PCI channels, multi-peer PCI channels, some sort of high performance serial interface, etc. The processor is not going to saturate easily as we may have seen with Pentium. The Pentium Pro processor architecture demands better I/O's, which will overall generate a server that can run enterprise applications.

I20: Intelligent I/O: Due to Pentium Pro processor architecture, I20 system performance is superior on a Pentium Pro processor vs a Pentium processor.

Server Roadmap

Pentium® and Pentium Pro Processor roadmap

	System Price Point	Q3 1996	Q4 1996 Forecast
Database ↑ Application ↓	1-4 Multi-processors > \$10K	Pentium Pro proc. - 200 512K, 166 512K	Pentium Pro proc. - 200 512K, 166 512K
	1-2 Dual processors \$5 - 10K	Pentium Pro proc. - 200 256K, 180 256K Pentium processor - 166	Pentium Pro proc. - 200 256K, 180 256K
Multi-function ↓	Uni-processors < \$5K	Pentium processor - 166, 133	Pentium Pro proc. - 180 256K Pentium processor -166, 133

Pentium® Pro processor based servers are mainstream enterprise solutions



Source: Intel, as of July 1, 1996

Page 12

'Multifunction' servers replace simple file and print, and represent a customer's ability to do more with fewer, more manageable Pentium® Pro processor based servers, replacing older less functional servers.

Pentium processors will continue to be the engines for low-end file and print servers through Q1.

An aggressive ramp and pricing adjustments have made Pentium Pro systems available in the volume and entry-level market segments.

Pentium Pro processor - 200 and 166 MHz processors with 512K caches will fill the application and database server space, while aggressive pricing on 180 MHz 256K cache Pentium Pro processors will move systems based on this processor into the file/print space by late 96. Pentium Pro processor 180MHz will be the cost reduced system on the low end.

Although it may seem counter-intuitive, the Pentium Pro processor 166 MHz with 512K cache is better suited for application and database servers than is the Pentium Pro processor 200 MHz with 256K cache. This is due to the nature of server operating systems which rely on a lot of swapping of data in and out of the processor. Here, a larger on-chip cache is important to reduce the need for calls to the L3 cache or main memory. In this environment, the larger, faster L2 cache boosts overall system performance.

Conclusion: The BEST Business Server

The diagram features a central 'intel inside' logo with 'PENTIUM PRO PROCESSOR' written below it. To the left is an icon of a computer system labeled 'System Management'. To the right is the text '32-bit OS & Applications'. Yellow double-headed arrows connect the computer icon to the processor logo, and the processor logo to the OS & Applications text. Below the processor logo, two horizontal yellow arrows point in opposite directions, with 'Intel Manageability Technology' written between them.

Pentium® Pro processor based servers delivers solutions :

- Greatest Selection of Software Solutions
- Superior System Price/Performance
- Excellent Performance

intel Page 13

- The BEST platform for business will be Pentium® Pro processor based systems, combined with 32 bit applications and operating systems and system management tools

Entry-level & Midrange Servers Presentation

