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Title:

PERFORMANCE OF PENTIUM III XEON PROCESSORS IN A BUSINESS APPLICATION AT LOS ALAMOS NATIONAL LABORATORY

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Title: **Performance of Pentium III Xeon Processors in a Business Application at Los Alamos National Laboratory (LANL)**

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Submitted to: **DOE Office of Scientific and Technical Information (OSTI)**

Performance of Pentium III Xeon Processors in a Business Application at LANL

Robert T. Teller, Michael Calhoun, James Gore

Abstract

Los Alamos National Laboratory has a number of business applications and standard desktop software that must be available to Lab users. These applications are available through an array of terminal servers. Initially comprised of Pentium II processors, one terminal server was upgraded to the Pentium PIII Xeon processor to determine if performance increased.

The results were a 13 to 39 percent increase in performance during benchmarking tests. In addition, the number of sessions increased by at least 10 percent and users saw faster processing times.

This paper describes the tests, the environment, and the results.

1. Introduction

Los Alamos National Laboratory (LANL) has over 17,000 desktops. Approximately 70 percent are PCs, 20 percent Macs, and the remainder Unix machines. LANL has 13,000 employees of which 6,800 are University of California (UC) employees. UC is the contractor to DOE to manage LANL.

The Application Infrastructure Team (AIT) is responsible for Enterprise Information Applications (EIA). The AIT is part of the Computing, Information, and Communications (CIC) Division. Organizationally, it is the component of CIC-13 that is responsible for business information systems. EIA provides LANL users access to a wide variety of administrative information and resources. The applications have been designed to serve a wide range of users including clerical, management, and professional staff.

EIA does not include all the computer systems available at LANL. EIA's information systems are used by people "Labwide" as opposed to information systems used for special interest groups or computer systems used for scientific computing. Some of the applications, such as Time and Effort, Travel, and Employee Information, may be used by all employees. Other applications (e.g., Clearance) are specialized and require specific authorities for access.

Because technical support is a limited resource at LANL, the AIT staff has increased its productivity by hosting desktop applications on an array of terminal servers. This strategic change in direction allows the user to access applications through the terminal server. Windows NT 4.0 Terminal Server Edition and Citrix Meta-Frame are used to deliver this access to 5500 to 6000 users of business applications. This change means that AIT no longer needs to install software on each desktop, thus eliminating the inconvenience to the user of having a technician install software on his/her machine, decreasing overhead, and allowing the technical support to concentrate on other areas.

AIT's Desktop-On-Demand, a remotely accessible desktop that supports a Windows Office suite, allows non-Windows clients (Macs, Unix) to have Windows sessions. Now a user on a Unix box can open a Word document. The benefits are interoperability and cross platform access. Third party, shrink wrapped applications, are also available through Desktop-On-Demand.

In November 1998, AIT clustered 8 Compaq ProLiant servers to provide this two tiered service. Each machine has 4 Pentium II processors. Citrix Meta-Frame software load balances this array. Each server supports 80 to 90 connections or sessions per machine, with a connection defined as one user using a business application.

2. Upgrade to Pentium P3 Xeon Processors:

AIT had the opportunity in May 1999 to upgrade one server. Pentium III Xeon processors replaced the Pentium II Processors.

The immediate Pentium III benefits:

- The number of sessions per machine increased 10-15%.
- The users saw better performance doing the same function.
- AIT was able to take the one server offline, install the Pentium III processors, and power up, without any impact to the other 7 servers.

3. Testing Under Identical Conditions

To test both the Pentium II and Pentium III Xeon chips under the same conditions, it was decided to run a Budget Excel Macro after hours. This macro processes property vouchers and checks for variances. The Pentium III Xeon was 13 to 39 percent faster for actions that were performed free

of external dependencies. In addition, the Pentium III Xeon used more than one processor to make these calculations while the Pentium II used only one processor at 100 percent.

The times for the two machines were:

Action	**Pentium II**	**Pentium III Xeon**	**Percent Faster**
Checking/deleting current month and master list matched variances	10:47.47	9:21.21	13.3%
Processing any writeoff voucher variances	1:31.31	0:55.55	39.2%

The test results are in Appendix A.

Appendix A

Reported on \\EIA-TS3: **Pentium PIII Xeon Processors**
Date: 6/28/99
Time: 10:38:06 PM
Data: Current Activity
Interval: 10.000 seconds

		% Processor Time	% Privileged Time	% User Time	Private Bytes	Virtual Bytes
		EXCEL	EXCEL	EXCEL	EXCEL	EXCEL
		Process	Process	Process	Process	Process
Date	Time	\\EIA-TS3	\\EIA-TS3	\\EIA-TS3	\\EIA-TS3	\\EIA-TS3
6/28/99	10:24:50 PM					
6/28/99	10:25:00 PM	13.125	1.875	11.25	10317824	59023360
6/28/99	10:25:10 PM	0	0	0	10317824	59023360
6/28/99	10:25:20 PM	0	0	0	10317824	59023360
6/28/99	10:25:30 PM	0	0	0	10317824	59023360
6/28/99	10:25:40 PM	0	0	0	10317824	59023360
6/28/99	10:25:50 PM	0	0	0	10317824	59023360
6/28/99	10:26:00 PM	0	0	0	10317824	59023360
6/28/99	10:26:10 PM	0	0	0	10317824	59023360
6/28/99	10:26:20 PM	0	0	0	10317824	59023360
6/28/99	10:26:30 PM	281.242	21.438	259.804	11177984	59613184
6/28/99	10:26:40 PM	52.301	3.874	48.427	11210752	59613184
6/28/99	10:26:50 PM	0	0	0	11210752	59613184
6/28/99	10:27:00 PM	0.156	0.156	0	11210752	59613184
6/28/99	10:27:10 PM	0	0	0	11210752	59613184
6/28/99	10:27:20 PM	0	0	0	11210752	59613184
6/28/99	10:27:30 PM	0	0	0	11210752	59613184
6/28/99	10:27:40 PM	0	0	0	11210752	59613184
6/28/99	10:27:50 PM	0	0	0	11210752	59613184
6/28/99	10:28:00 PM	0	0	0	11210752	59613184
6/28/99	10:28:10 PM	0	0	0	11210752	59613184
6/28/99	10:28:20 PM	0	0	0	11210752	59613184
6/28/99	10:28:30 PM	0	0	0	11210752	59613184
6/28/99	10:28:40 PM	0	0	0	11210752	59613184
6/28/99	10:28:50 PM	0	0	0	11210752	59613184
6/28/99	10:29:00 PM	0	0	0	11210752	59613184
6/28/99	10:29:10 PM	0	0	0	11210752	59613184
6/28/99	10:29:20 PM	0	0	0	11210752	59613184
6/28/99	10:29:30 PM	0	0	0	11210752	59613184
6/28/99	10:29:40 PM	0	0	0	11210752	59613184
6/28/99	10:29:50 PM	0	0	0	11210752	59613184
6/28/99	10:30:00 PM	0	0	0	11210752	59613184
6/28/99	10:30:10 PM	0	0	0	11210752	59613184

6/28/99	10:30:20 PM	0	0	0	11210752	59613184
6/28/99	10:30:30 PM	0	0	0	11210752	59613184
6/28/99	10:30:40 PM	0	0	0	11210752	59613184
6/28/99	10:30:50 PM	0	0	0	11210752	59613184
6/28/99	10:31:00 PM	0	0	0	11210752	59613184
6/28/99	10:31:10 PM	0	0	0	11210752	59613184
6/28/99	10:31:20 PM	0	0	0	11210752	59613184
6/28/99	10:31:30 PM	0	0	0	11210752	59613184
6/28/99	10:31:40 PM	0	0	0	11210752	59613184
6/28/99	10:31:50 PM	0.156	0.156	0	11210752	59613184
6/28/99	10:32:00 PM	0	0	0	11210752	59613184
6/28/99	10:32:10 PM	1.25	0	1.25	11210752	59613184
6/28/99	10:32:20 PM	202.085	1.535	200.55	11210752	59613184
6/28/99	10:32:30 PM	99.844	0	99.844	11210752	59613184
6/28/99	10:32:40 PM	58.918	0	58.918	11210752	59613184
6/28/99	10:32:50 PM	327.504	0	327.504	11210752	59613184
6/28/99	10:33:00 PM	59.008	0	59.008	11210752	59613184
6/28/99	10:33:10 PM	99.999	0	99.999	11210752	59613184
6/28/99	10:33:20 PM	327.568	0	327.568	11210752	59613184
6/28/99	10:33:30 PM	59.006	0	59.006	11210752	59613184
6/28/99	10:33:40 PM	99.998	0	99.998	11210752	59613184
6/28/99	10:33:50 PM	99.999	0.156	99.843	11210752	59613184
6/28/99	10:34:00 PM	99.999	0	99.999	11210752	59613184
6/28/99	10:34:10 PM	64.218	0.469	63.749	11214848	59613184
6/28/99	10:34:20 PM	263.173	1.536	261.637	11214848	59613184
6/28/99	10:34:30 PM	59.002	0	59.002	11214848	59613184
6/28/99	10:34:40 PM	99.217	0	99.217	11214848	59613184
6/28/99	10:34:50 PM	100	0	100	11214848	59613184
6/28/99	10:35:00 PM	99.998	0	99.998	11214848	59613184
6/28/99	10:35:10 PM	99.999	0	99.999	11214848	59613184
6/28/99	10:35:20 PM	327.826	0	327.826	11214848	59613184
6/28/99	10:35:30 PM	58.998	0	58.998	11214848	59613184
6/28/99	10:35:40 PM	327.858	0	327.858	11214848	59613184
6/28/99	10:35:50 PM	57.153	3.042	54.111	12419072	64987136
6/28/99	10:36:00 PM	98.749	6.406	92.343	12439552	64987136
6/28/99	10:36:10 PM	98.905	7.344	91.562	12476416	64987136
6/28/99	10:36:20 PM	99.061	6.875	92.186	12513280	64987136
6/28/99	10:36:30 PM	99.218	7.344	91.874	12558336	64987136
6/28/99	10:36:40 PM	76.249	8.594	67.656	12476416	60854272
6/28/99	10:36:50 PM	0.781	0.625	0.156	12476416	60854272
6/28/99	10:37:00 PM	0.469	0.312	0.156	12476416	60854272
6/28/99	10:37:10 PM	0	0	0	12476416	60854272
6/28/99	10:37:20 PM	0	0	0	12476416	60854272
6/28/99	10:37:30 PM	0	0	0	12476416	60854272
6/28/99	10:37:40 PM	0.469	0.156	0.312	12447744	60788736
6/28/99	10:37:50 PM	0	0	0	12447744	60788736
6/28/99	10:38:00 PM	0	0	0	12447744	60788736

Reported on \\EIA-TS5: **Pentium II Processors**
Date: 6/28/99
Time: 10:54:37 PM
Data: Current Activity
Interval: 10.000 seconds

		% Processor Time	% Privileged Time	% User Time	Private Bytes	Virtual Bytes
		EXCEL	EXCEL	EXCEL	EXCEL	EXCEL
		Process	Process	Process	Process	Process
Date	Time	\\EIA-TS5	\\EIA-TS5	\\EIA-TS5	\\EIA-TS5	\\EIA-TS5
6/28/99	10:42:05 PM					
6/28/99	10:42:15 PM	97.813	4.844	92.969	11161600	63635456
6/28/99	10:42:25 PM	99.531	4.219	95.312	11182080	63635456
6/28/99	10:42:35 PM	16.719	0.781	15.938	11186176	63635456
6/28/99	10:42:45 PM	0	0	0	11186176	63635456
6/28/99	10:42:55 PM	17.5	0.625	16.875	11194368	63635456
6/28/99	10:43:05 PM	0	0	0	11194368	63635456
6/28/99	10:43:15 PM	0	0	0	11194368	63635456
6/28/99	10:43:25 PM	0	0	0	11194368	63635456
6/28/99	10:43:35 PM	0	0	0	11194368	63635456
6/28/99	10:43:45 PM	0	0	0	11194368	63635456
6/28/99	10:43:55 PM	0	0	0	11194368	63635456
6/28/99	10:44:05 PM	0	0	0	11194368	63635456
6/28/99	10:44:15 PM	0	0	0	11194368	63635456
6/28/99	10:44:25 PM	0	0	0	11194368	63635456
6/28/99	10:44:35 PM	0	0	0	11194368	63635456
6/28/99	10:44:45 PM	0	0	0	11194368	63635456
6/28/99	10:44:55 PM	0	0	0	11194368	63635456
6/28/99	10:45:05 PM	0	0	0	11194368	63635456
6/28/99	10:45:15 PM	0	0	0	11194368	63635456
6/28/99	10:45:25 PM	0	0	0	11194368	63635456
6/28/99	10:45:35 PM	0	0	0	11194368	63635456
6/28/99	10:45:45 PM	0	0	0	11194368	63635456
6/28/99	10:45:55 PM	0	0	0	11194368	63635456
6/28/99	10:46:05 PM	0	0	0	11194368	63635456
6/28/99	10:46:15 PM	0	0	0	11194368	63635456
6/28/99	10:46:25 PM	0	0	0	11194368	63635456
6/28/99	10:46:35 PM	0	0	0	11194368	63635456
6/28/99	10:46:45 PM	0	0	0	11194368	63635456
6/28/99	10:46:55 PM	0	0	0	11194368	63635456
6/28/99	10:47:05 PM	0	0	0	11194368	63635456
6/28/99	10:47:15 PM	0	0	0	11194368	63635456
6/28/99	10:47:25 PM	0	0	0	11194368	63635456
6/28/99	10:47:35 PM	0	0	0	11194368	63635456
6/28/99	10:47:45 PM	0	0	0	11194368	63635456
6/28/99	10:47:55 PM	0	0	0	11194368	63635456

6/28/99	10:48:05 PM	0	0	0	11194368	63635456
6/28/99	10:48:15 PM	0	0	0	11194368	63635456
6/28/99	10:48:25 PM	0	0	0	11194368	63635456
6/28/99	10:48:35 PM	12.969	0.313	12.657	11194368	63635456
6/28/99	10:48:45 PM	100	0.156	99.844	11194368	63635456
6/28/99	10:48:55 PM	100	0	100	11194368	63635456
6/28/99	10:49:05 PM	99.846	0	99.846	11194368	63635456
6/28/99	10:49:15 PM	100	0	100	11194368	63635456
6/28/99	10:49:25 PM	100	0	100	11194368	63635456
6/28/99	10:49:35 PM	99.996	0	99.996	11194368	63635456
6/28/99	10:49:45 PM	99.85	0.156	99.693	11194368	63635456
6/28/99	10:49:55 PM	100	0	100	11194368	63635456
6/28/99	10:50:05 PM	100	0	100	11194368	63635456
6/28/99	10:50:15 PM	100.001	0	100.001	11194368	63635456
6/28/99	10:50:25 PM	99.998	0.156	99.842	11194368	63635456
6/28/99	10:50:35 PM	99.847	0.781	99.065	11194368	63635456
6/28/99	10:50:45 PM	100	0	100	11194368	63635456
6/28/99	10:50:55 PM	100	0.781	99.219	11194368	63635456
6/28/99	10:51:05 PM	80.313	0.625	79.688	11198464	63635456
6/28/99	10:51:15 PM	100	0.313	99.688	11198464	63635456
6/28/99	10:51:25 PM	100	0	100	11198464	63635456
6/28/99	10:51:35 PM	100.001	0	100.001	11198464	63635456
6/28/99	10:51:45 PM	99.844	0	99.844	11198464	63635456
6/28/99	10:51:55 PM	100	0	100	11198464	63635456
6/28/99	10:52:05 PM	100.002	0	100.002	11198464	63635456
6/28/99	10:52:15 PM	99.999	0	99.999	11198464	63635456
6/28/99	10:52:25 PM	100	0.156	99.844	11198464	63635456
6/28/99	10:52:35 PM	100	0.469	99.531	11198464	63635456
6/28/99	10:52:45 PM	99.846	0	99.846	11198464	63635456
6/28/99	10:52:55 PM	98.438	3.906	94.531	12382208	64815104
6/28/99	10:53:05 PM	99.373	4.687	94.686	12386304	64815104
6/28/99	10:53:15 PM	48.907	2.188	46.72	12398592	64815104
6/28/99	10:53:25 PM	99.688	4.375	95.313	12423168	64815104
6/28/99	10:53:35 PM	99.375	7.031	92.344	12443648	64815104
6/28/99	10:53:45 PM	100	8.125	91.875	12468224	64815104
6/28/99	10:53:55 PM	99.531	6.562	92.969	12492800	64815104
6/28/99	10:54:05 PM	99.217	6.875	92.342	12525568	64815104
6/28/99	10:54:15 PM	98.911	6.875	92.036	12550144	64815104
6/28/99	10:54:25 PM	53.906	6.875	47.031	12464128	60854272
6/28/99	10:54:35 PM	1.875	0.781	1.094	12464128	60854272