Lenovo Group Limited

Lenovo System x3650 M5
(Intel Xeon E5-2648L v3, 2.50 GHz)

**SPECint**\_rate2006 = 844
SPECint\_rate_base2006 = 812

**CPU2006 license:** 9017

**Test sponsor:** Lenovo Group Limited

**Tested by:** Lenovo Group Limited

**Test date:** May-2015

**Hardware Availability:** Oct-2014

**Software Availability:** Sep-2014

---

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2648L v3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 2.50 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>1800</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>24 cores, 2 chips, 12 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Primary Cache:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache:</td>
<td>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3 Cache:</td>
<td>30 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>256 GB (16 x 16 GB 2Rx4 PC4-2133P-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 1000 GB SATA, 7200 RPM</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
</tbody>
</table>

---

### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>Red Hat Enterprise Linux Server release 7.0 (Maipo) 3.10.0-123.el7.x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>32-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>Microquill SmartHeap V10.0</td>
</tr>
</tbody>
</table>
Lenovo Group Limited

**SPEC int_rate2006 = 844**

**SPEC int_rate_base2006 = 812**

**Lenovo Group Limited**

Lenovo System x3650 M5
(Intel Xeon E5-2648L v3, 2.50 GHz)

**CPU2006 license:** 9017
**Test sponsor:** Lenovo Group Limited
**Tested by:** Lenovo Group Limited

**Test date:** May-2015
**Hardware Availability:** Oct-2014
**Software Availability:** Sep-2014

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Base</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>48</td>
<td>825</td>
<td>569</td>
<td>825</td>
<td>569</td>
<td>820</td>
<td>572</td>
<td>48</td>
<td>642</td>
<td>731</td>
<td>646</td>
<td>726</td>
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<tr>
<td>401.bzip2</td>
<td>48</td>
<td>1143</td>
<td>405</td>
<td>1148</td>
<td>404</td>
<td><strong>1143</strong></td>
<td><strong>405</strong></td>
<td>48</td>
<td>1103</td>
<td>420</td>
<td>1106</td>
<td>419</td>
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<tr>
<td>403.mcf</td>
<td>48</td>
<td>592</td>
<td>653</td>
<td>593</td>
<td>652</td>
<td>590</td>
<td>655</td>
<td>48</td>
<td>591</td>
<td>653</td>
<td>586</td>
<td>659</td>
</tr>
<tr>
<td>429.mcf</td>
<td>48</td>
<td>101</td>
<td>1090</td>
<td>401</td>
<td>1090</td>
<td>404</td>
<td>1080</td>
<td>48</td>
<td><strong>401</strong></td>
<td><strong>1090</strong></td>
<td>401</td>
<td>1090</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>48</td>
<td>950</td>
<td>530</td>
<td>949</td>
<td>531</td>
<td><strong>949</strong></td>
<td><strong>530</strong></td>
<td>48</td>
<td>943</td>
<td>534</td>
<td>944</td>
<td>533</td>
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<tr>
<td>456.hmmer</td>
<td>48</td>
<td>412</td>
<td>1090</td>
<td>405</td>
<td>1110</td>
<td>400</td>
<td>1120</td>
<td>48</td>
<td><strong>370</strong></td>
<td><strong>1210</strong></td>
<td>372</td>
<td>1200</td>
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<td>458.sjeng</td>
<td>48</td>
<td>1037</td>
<td>560</td>
<td>1037</td>
<td>560</td>
<td>1035</td>
<td>561</td>
<td>48</td>
<td>1002</td>
<td>580</td>
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<td>462.libquantum</td>
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<td>126</td>
<td>7900</td>
<td>126</td>
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<td><strong>126</strong></td>
<td><strong>7900</strong></td>
<td>126</td>
<td>7900</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>48</td>
<td><strong>1130</strong></td>
<td><strong>940</strong></td>
<td>1174</td>
<td>905</td>
<td>1125</td>
<td>944</td>
<td>48</td>
<td><strong>1133</strong></td>
<td><strong>938</strong></td>
<td>1140</td>
<td>931</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>48</td>
<td>609</td>
<td>492</td>
<td>608</td>
<td>494</td>
<td><strong>609</strong></td>
<td><strong>493</strong></td>
<td>48</td>
<td>587</td>
<td>511</td>
<td>580</td>
<td>517</td>
</tr>
<tr>
<td>473.astar</td>
<td>48</td>
<td>730</td>
<td>461</td>
<td>732</td>
<td>461</td>
<td>735</td>
<td>458</td>
<td>48</td>
<td>730</td>
<td>461</td>
<td>732</td>
<td>461</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>48</td>
<td>369</td>
<td>898</td>
<td>367</td>
<td>902</td>
<td><strong>369</strong></td>
<td><strong>899</strong></td>
<td>48</td>
<td>369</td>
<td>898</td>
<td>367</td>
<td>902</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

### Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

### Platform Notes

BIOS setting:
Operating Mode set to "Efficiency-Favor Performance"
Sysinfo program /SPECcpu/config/sysinfo_rev6914
$Rev: 6914 $ $Date:: 2014-06-25 $e3fbb8667b5a285932ceab81e28219e1 running on x3650M5 Tue May 12 16:36:06 2015

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:
http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo

- model name : Intel(R) Xeon(R) CPU E5-2648L v3 @ 1.80GHz
- 2 "physical id"s (chips)
- 48 "processors"
- cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

Continued on next page
Lenovo Group Limited
Lenovo System x3650 M5
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CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Platform Notes (Continued)

cpu cores : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

cache size : 15360 KB

From /proc/meminfo
MemTotal: 263581700 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*

os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.0 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.0"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.0 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.0:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.0:ga:server

uname -a:
Linux x3650M5 3.10.0-123.el7.x86_64 #1 SMP Mon May 5 11:16:57 EDT 2014 x86_64
x86_64 x86_64 GNU/Linux

run-level 3 May 12 16:28

SPEC is set to: /SPECcpu
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 239G 16G 223G 7% /

Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS IBM -[TCE103EUS-1.01]- 10/21/2014
Memory:
16x Hynix 484D4134324752374D4652344E2D54462020 16 GB 2 rank 2133 MHz
8x NO DIMM Unknown

(End of data from sysinfo program)
Lenovo Group Limited
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Test sponsor: Lenovo Group Limited
Test date: May-2015
Tested by: Lenovo Group Limited
Hardware Availability: Oct-2014
Software Availability: Sep-2014

General Notes
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/SPECcpu/libs/32;/SPECcpu/libs/64;/SPECcpu/sh"

Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB memory using RedHat EL 7.0
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
echo 1>/proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
umactl --interleave=all runspec <etc>

Base Compiler Invocation

C benchmarks:
icc -m32 -L/opt/intel/composer_xe_2015/lib/ia32

C++ benchmarks:
icpc -m32 -L/opt/intel/composer_xe_2015/lib/ia32

Base Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_IA32
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -Wl,-z,muldefs
-L/sh -lsmartheap

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca
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Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m32 -L/opt/intel/composer_xe_2015/lib/ia32
  400.perlbench: icc -m64
  401.bzip2: icc -m64
  456.hmmer: icc -m64
  458.sjeng: icc -m64

C++ benchmarks:
icpc -m32 -L/opt/intel/composer_xe_2015/lib/ia32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:
  400.perlbench: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
    -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
    -auto-ilp32
  401.bzip2: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
    -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
    -opt-prefetch -auto-ilp32 -ansi-alias
  403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div
  429.mcf: basepeak = yes
  445.gobmk: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -prof-use(pass 2)
    -ansi-alias
  456.hmmer: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
  458.sjeng: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
    -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
    -unroll4 -auto-ilp32

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**Peak Optimization Flags (Continued)**

462.libquantum: basepeak = yes

464.h264ref:
-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-unroll2 -ansi-alias

C++ benchmarks:

471.omnetpp:
-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-ansi-alias -opt-ra-region-strategy=block -Wl,-z,muldefs
-L/sh -lsmartheap

473.astar: basepeak = yes

483.xalancbmk: basepeak = yes

---

**Peak Other Flags**

C benchmarks:

403.gcc: -Dalloca=_alloca

---

The flags files that were used to format this result can be browsed at

http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-HSW-B.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-HSW-B.xml

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For other inquiries, please contact webmaster@spec.org.

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