Lenovo Group Limited

Lenovo ThinkServer TS150
(3.00 GHz, Intel Xeon E3-1220 v5)

SPECint_rate2006 = 204
SPECint_rate_base2006 = 198

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

Hardware:
- CPU Name: Intel Xeon E3-1220 v5
- CPU Characteristics: Intel Turbo Boost Technology up to 3.50 GHz
- CPU MHz: 3000
- FPU: Integrated
- CPU(s) enabled: 4 cores, 1 chip, 4 cores/chip
- Primary Cache: 32 KB I + 32 KB D on chip per core
- Secondary Cache: 256 KB I+D on chip per core
- L3 Cache: 8 MB I+D on chip per chip
- Memory: 32 GB (4 x 8 GB 2Rx8 PC4-2133P-U)
- Disk Subsystem: 1 x 800 GB SATA SSD
- Other Cache: None

Software:
- Operating System: SUSE Linux Enterprise Server 12 (x86_64)
- Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux
- Auto Parallel: No
- File System: xfs
- System State: Run level 3 (multi-user)
- Base Pointers: 32-bit
- Peak Pointers: 32/64-bit
- Other Software: Microquill SmartHeap V10.2
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Test date: Dec-2015
Hardware Availability: Oct-2015
Software Availability: Aug-2015

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>4</td>
<td>248</td>
<td>158</td>
<td>249</td>
<td>157</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>4</td>
<td>432</td>
<td>89.3</td>
<td>430</td>
<td>89.8</td>
</tr>
<tr>
<td>403.gcc</td>
<td>4</td>
<td>210</td>
<td>153</td>
<td>209</td>
<td>154</td>
</tr>
<tr>
<td>429.mcf</td>
<td>4</td>
<td>140</td>
<td>261</td>
<td>141</td>
<td>259</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>4</td>
<td>371</td>
<td>113</td>
<td>371</td>
<td>113</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>4</td>
<td>120</td>
<td>310</td>
<td>121</td>
<td>309</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>4</td>
<td>378</td>
<td>128</td>
<td>378</td>
<td>128</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>4</td>
<td>41.4</td>
<td>2000</td>
<td>41.5</td>
<td>2000</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>4</td>
<td>347</td>
<td>255</td>
<td>346</td>
<td>256</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>4</td>
<td>258</td>
<td>96.8</td>
<td>258</td>
<td>96.8</td>
</tr>
<tr>
<td>473.astar</td>
<td>4</td>
<td>261</td>
<td>108</td>
<td>260</td>
<td>108</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>4</td>
<td>103</td>
<td>268</td>
<td>103</td>
<td>268</td>
</tr>
</tbody>
</table>

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

Submit Notes
The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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"
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

Platform Notes
BIOS Configuration:
   EIST Support set to Enabled
   C1E Support set to Enable
   C State Support set to Enabled
   Turbo Mode set to Enable
   Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on TS150 Thu Dec 31 05:19:47 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

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**Test sponsor:** Lenovo Group Limited

**Tested by:** Lenovo Group Limited

**Test date:** Dec-2015

**Hardware Availability:** Oct-2015

**Software Availability:** Aug-2015

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**Platform Notes (Continued)**

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) CPU E3-1220 v5 @ 3.00GHz
  1 "physical id"s (chips)
  4 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
  cpu cores : 4
  siblings : 4
  physical 0: cores 0 1 2 3
  cache size : 8192 KB
```

From /proc/meminfo

```
MemTotal:       32933544 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

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

```
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 0
  # This file is deprecated and will be removed in a future service pack or release.
  # Please check /etc/os-release for details about this release.

os-release:
  NAME="SLES"
  VERSION="12"
  VERSION_ID="12"
  PRETTY_NAME="SUSE Linux Enterprise Server 12"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12"
```

```
uname -a:
  Linux TS150 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014 (9879bd4)
  x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 28 11:32
```

**SPEC is set to:** /home/cpu2006-1.2-ic16.0

**Filesystem**  
**Type**  
**Size**  
**Used**  
**Avail**  
**Use%**  
**Mounted on**

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda3</td>
<td>xfs</td>
<td>693G</td>
<td>27G</td>
<td>667G</td>
<td>4%</td>
<td>/home</td>
</tr>
</tbody>
</table>

**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 LENOVO FWKT32A 12/25/2015**

Memory:

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Lenovo Group Limited

Lenovo ThinkServer TS150 (3.00 GHz, Intel Xeon E3-1220 v5)

**SPEC CINT2006 Result**

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CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
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**Platform Notes (Continued)**

4x Samsung M378A1G43DB0-CPB 8 GB 2 rank 2133 MHz

(End of data from sysinfo program)

**General Notes**

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006-1.2-ic16.0/libs/32:/home/cpu2006-1.2-ic16.0/libs/64:/home/cpu2006-1.2-ic16.0/sh"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/transparent_hugepage/enabled

**Base Compiler Invocation**

C benchmarks:
icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

C++ benchmarks:
icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

**Base Portability Flags**

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -D_FILE_OFFSET_BITS=64
403.gcc: -D_FILE_OFFSET_BITS=64
429.mcf: -D_FILE_OFFSET_BITS=64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -D_FILE_OFFSET_BITS=64
458.sjeng: -D_FILE_OFFSET_BITS=64
462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
464.h264ref: -D_FILE_OFFSET_BITS=64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -D_FILE_OFFSET_BITS=64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX

**Base Optimization Flags**

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-opt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-opt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh -lsmartheap
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**Software Availability:** Aug-2015

### Base Other Flags

C benchmarks:

- 403.gcc: `-Dalloca=_alloca`

### Peak Compiler Invocation

C benchmarks (except as noted below):

- `icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`
- `400.perlbench: icc -m64`
- `401.bzip2: icc -m64`
- `456.hmmer: icc -m64`
- `458.sjeng: icc -m64`

C++ benchmarks:

- `icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`

### Peak Portability Flags

- `400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64`
- `401.bzip2: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64`
- `403.gcc: -D_FILE_OFFSET_BITS=64`
- `429.mcf: -D_FILE_OFFSET_BITS=64`
- `445.gobmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64`
- `456.hmmer: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64`
- `458.sjeng: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64`
- `462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64`
- `464.h264ref: -D_FILE_OFFSET_BITS=64`
- `471.omnetpp: -D_FILE_OFFSET_BITS=64`
- `473.astar: -D_FILE_OFFSET_BITS=64`
- `483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX`

### Peak Optimization Flags

C benchmarks:

- `400.perlbench: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe (pass 1)`
- `-ipo (pass 2) -03 (pass 2) -no-prec-div (pass 2)`
- `-par-num-threads=1 (pass 1) -prof-use (pass 2) -auto-ilp32`

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</tbody>
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**Peak Optimization Flags (Continued)**

401.bzip2: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe (pass 1)
-ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2)
-par-num-threads=1 (pass 1) -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:threadsafe (pass 1)
-prof-use (pass 2) -par-num-threads=1 (pass 1) -ansi-alias
-opt-mem-layout-trans=3

456.hmmer: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32

458.sjeng: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe (pass 1)
-ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2)
-par-num-threads=1 (pass 1) -prof-use (pass 2) -unroll4
-auto-ilp32

462.libquantum: basepeak = yes

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

C++ benchmarks:

471.omnetpp: -xCORE-AVX2 (pass 2) -prof-gen:threadsafe (pass 1)
-ipo (pass 2) -O3 (pass 2) -no-prec-div (pass 2)
-par-num-threads=1 (pass 1) -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
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The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml

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