# Lenovo Group Limited

**Lenovo ThinkServer RD550 (Intel Xeon E5-2630L v3, 1.80 GHz)**

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<tr>
<th>Test sponsor</th>
<th>Lenovo Group Limited</th>
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<tr>
<td>Tested by</td>
<td>Lenovo Group Limited</td>
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<tr>
<td>CPU2006 license</td>
<td>9017</td>
</tr>
<tr>
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<td>Nov-2014</td>
</tr>
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<td>Sep-2014</td>
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<td>Jan-2014</td>
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## SPECint2006 Result

- **SPECint2006 = 52.9**
- **SPECint_base2006 = 49.8**

### Software

- **Operating System:** Red Hat Enterprise Linux Server release 6.5 (Santiago) 2.6.32-431.el6.x86_64
- **Compiler:** C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux
- **Auto Parallel:** Yes
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 32/64-bit
- **Peak Pointers:** 32/64-bit
- **Other Software:** Microquill SmartHeap V10.0

### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon E5-2630L v3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 2.90 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>16 cores, 2 chips, 8 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>1.2 chip</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>20 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, running at 1866 MHz)</td>
</tr>
<tr>
<td>Disk Subsystem</td>
<td>1 x 800 GB SATA SSD</td>
</tr>
<tr>
<td>Other Hardware</td>
<td>None</td>
</tr>
</tbody>
</table>

### Benchmarks

- **400.perlbench**
  - 32.8
- **401.bzip2**
  - 21.5
- **403.gcc**
  - 21.3
- **429.mcf**
  - 58.1
- **445.gobmk**
  - 18.9
- **456.hmmer**
  - 58.0
- **458.sjeng**
  - 28.2
- **462.libquantum**
  - 34.4
- **464.h264ref**
  - 48.3
- **471.omnetpp**
  - 48.5
- **473.astar**
  - 56.7
- **483.xalancbmk**
  - 56.5

**SPECint_base2006 = 49.8**

**SPECint2006 = 52.9**
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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</tr>
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<tbody>
<tr>
<td>400.perlbench</td>
<td>298</td>
<td>32.8</td>
<td>298</td>
<td>32.8</td>
<td>299</td>
<td>32.7</td>
<td>250</td>
<td>39.1</td>
<td>250</td>
<td>39.1</td>
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<tr>
<td>401.bzip2</td>
<td>452</td>
<td>21.3</td>
<td>453</td>
<td>21.3</td>
<td>452</td>
<td>21.3</td>
<td>449</td>
<td>21.5</td>
<td>448</td>
<td>21.5</td>
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<tr>
<td>403.gcc</td>
<td>458</td>
<td>31.2</td>
<td>258</td>
<td>31.2</td>
<td>258</td>
<td>31.2</td>
<td>253</td>
<td>31.9</td>
<td>253</td>
<td>31.8</td>
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<tr>
<td>429.mcf</td>
<td>555</td>
<td>18.9</td>
<td>556</td>
<td>18.9</td>
<td>554</td>
<td>18.9</td>
<td>436</td>
<td>24.0</td>
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<tr>
<td>445.gobmk</td>
<td>161</td>
<td>58.1</td>
<td>159</td>
<td>57.4</td>
<td>157</td>
<td>58.2</td>
<td>156</td>
<td>58.3</td>
<td>158</td>
<td>57.6</td>
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<tr>
<td>456.hmmer</td>
<td>430</td>
<td>28.1</td>
<td>430</td>
<td>28.2</td>
<td>429</td>
<td>28.2</td>
<td>423</td>
<td>28.6</td>
<td>423</td>
<td>28.6</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>5.25</td>
<td>3950</td>
<td>5.24</td>
<td>3950</td>
<td>5.25</td>
<td>3950</td>
<td>5.25</td>
<td>3950</td>
<td>5.24</td>
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<tr>
<td>464.h264ref</td>
<td>644</td>
<td>34.4</td>
<td>644</td>
<td>34.4</td>
<td>643</td>
<td>34.4</td>
<td>644</td>
<td>34.4</td>
<td>644</td>
<td>34.4</td>
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<tr>
<td>471.omnetpp</td>
<td>232</td>
<td>26.9</td>
<td>231</td>
<td>27.0</td>
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<td>37.8</td>
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<td>38.3</td>
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<tr>
<td>473.astar</td>
<td>426</td>
<td>28.6</td>
<td>247</td>
<td>28.4</td>
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<td>28.6</td>
<td>246</td>
<td>28.5</td>
<td>246</td>
<td>28.5</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>122</td>
<td>56.8</td>
<td>121</td>
<td>56.8</td>
<td>122</td>
<td>56.4</td>
<td>122</td>
<td>56.7</td>
<td>121</td>
<td>57.1</td>
</tr>
</tbody>
</table>

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

Submit Notes

The config file option 'submit' was used.

Operating System Notes

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

Platform Notes

BIOS configuration:
Hyper-Threading set to Disabled
Performance Profile set to Custom
C1E Support set to Disabled
Core C3 set to Disabled
Core C6 set to Disabled
Thermal Profile set to High Fan Speed
Memory Power Savings set to Disabled
Sysinfo program /usr/cpu2006/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #s e86d102572650a6e4d596a3c3e98f191
running on RD550 Thu Nov 20 21:40:07 2014

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 E5-2630L v3 @ 1.80GHz
2 "physical id"s (chips)
**SPEC CINT2006 Result**

**Lenovo Group Limited**

Lenovo ThinkServer RD550 (Intel Xeon E5-2630L v3, 1.80 GHz)

| SPECint2006 = | 52.9 |
| SPECint_base2006 = | 49.8 |

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### Platform Notes (Continued)

16 "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 : 8
- siblings : 8
- physical 0: cores 0 1 2 3 4 5 6 7
- physical 1: cores 0 1 2 3 4 5 6 7
- cache size : 20480 KB

From /proc/meminfo

- MemTotal: 264415772 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

```
/usr/bin/lsb_release -d
Red Hat Enterprise Linux Server release 6.5 (Santiago)
```

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

```
redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
```

```
uname -a:
Linux RD550 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54 EST 2013 x86_64
x86_64 x86_64 GNU/Linux
```

```
run-level 3 Nov 20 21:39
```

`SPEC is set to: /usr/cpu2006`

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 730G 65G 628G 10% /
```

Additional information from dmidecode:

- BIOS LENOVO PBITS110 10/06/2014
- Memory:
  - 16x 16 GB
  - 8x NO DIMM NO DIMM
  - 16x Samsung M393A2G40DB0-CPB 16 GB 1866 MHz 2 rank

(End of data from sysinfo program)

RD550 support 4 channels and 12 DIMMs per processor, total 8 channels and 24 DIMMs. 16 DIMM slots installed with 16 GB DIMM for this run.

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### General Notes

Environment variables set by runspec before the start of the run:

- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"
- OMP_NUM_THREADS = "16"

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General Notes (Continued)
Binaries compiled on a system with 1x Core i7-860 CPU + 8GB memory using RedHat EL 6.4
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/redhat_transparent_hugepage/enabled
runcspec command invoked through numactl i.e.:
numactl --interleave=all runcspec <etc>

Base Compiler Invocation
C benchmarks:
icc -m64
C++ benchmarks:
icpc -m64

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

Base Optimization Flags
C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32
C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh -lsmartheap64

Base Other Flags
Continued on next page
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Base Other Flags (Continued)

403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m64

400.perlbench: icc -m32
445.gobmk: icc -m32

C++ benchmarks (except as noted below):
icpc -m32
473.astar: icpc -m64

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
473.astar: -DSPEC_CPU_LP64
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)
-opt-prefetch -ansi-alias

401.bzip2: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div -prof-use(pass 2) -auto-ilp32
-opt-prefetch -ansi-alias

403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
-opt-malloc-options=3 -auto-ilp32

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Peak Optimization Flags (Continued)

429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
-opt-prefetch -auto-p32

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
-ansi-alias

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

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

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)
-opt-ra-region-strategy=block -ansi-alias
-Wl,-z,muldefs -L/sh -lsmartheap

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-auto-p32 -Wl,-z,muldefs -L/sh -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap

Peak Other Flags

C benchmarks:

403.gcc: -Dalloca=_alloca

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revA.xml
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