## Lenovo Group Limited

**Lenovo ThinkServer RD450 (Intel Xeon E5-2623 v3, 3.00 GHz)**

<table>
<thead>
<tr>
<th>Specfp2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>96.3</td>
<td>93.5</td>
</tr>
</tbody>
</table>

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### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2623 v3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU MHZ:</td>
<td>3000</td>
</tr>
<tr>
<td>CPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>8 cores, 2 chips, 4 cores/chip, 2 threads/core</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>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>Red Hat Enterprise Linux Server release 7.0 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>CIC++: Version 15.0.0.090 of Intel C++ Studio XE for Linux; Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
</tbody>
</table>
### Lenovo Group Limited

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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>41.8</td>
<td>325</td>
<td>41.5</td>
<td>327</td>
</tr>
<tr>
<td>416.gamess</td>
<td>493</td>
<td>39.7</td>
<td>493</td>
<td>39.7</td>
</tr>
<tr>
<td>433.milc</td>
<td>132</td>
<td>69.8</td>
<td>131</td>
<td>70.2</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>55.5</td>
<td>164</td>
<td>55.6</td>
<td>164</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>147</td>
<td>48.7</td>
<td>147</td>
<td>48.7</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>25.4</td>
<td>471</td>
<td>25.6</td>
<td>466</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>42.9</td>
<td>219</td>
<td>43.1</td>
<td>218</td>
</tr>
<tr>
<td>444.namd</td>
<td>271</td>
<td>29.6</td>
<td>271</td>
<td>29.6</td>
</tr>
<tr>
<td>447.dealII</td>
<td>202</td>
<td>56.6</td>
<td>203</td>
<td>56.4</td>
</tr>
<tr>
<td>450.soplex</td>
<td>228</td>
<td>36.6</td>
<td>228</td>
<td>36.5</td>
</tr>
<tr>
<td>453.povray</td>
<td>95.5</td>
<td>55.7</td>
<td>95.6</td>
<td>55.7</td>
</tr>
<tr>
<td>454.calculix</td>
<td>149</td>
<td>55.2</td>
<td>150</td>
<td>55.0</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>65.8</td>
<td>161</td>
<td>65.7</td>
<td>161</td>
</tr>
<tr>
<td>465.tonto</td>
<td>218</td>
<td>45.1</td>
<td>219</td>
<td>44.9</td>
</tr>
<tr>
<td>470.lbm</td>
<td>34.2</td>
<td>402</td>
<td>32.1</td>
<td>428</td>
</tr>
<tr>
<td>481.wrf</td>
<td>122</td>
<td>91.5</td>
<td>122</td>
<td>91.6</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>243</td>
<td>80.2</td>
<td>243</td>
<td>80.2</td>
</tr>
</tbody>
</table>

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

#### Operating System Notes

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

#### Platform Notes

BIOS configuration:
- Cluster On Die set to Disabled
- Early Snoop 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

Continued on next page
Platform Notes (Continued)

Sysinfo program /usr/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on RD450 Tue Nov 18 18:54:41 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 E5-2623 v3 @ 3.00GHz
  2 "physical id"s (chips)
  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 : 4
  siblings  : 8
  physical 0: cores 0 1 2 3
  physical 1: cores 0 1 2 3
  cache size : 10240 KB

From /proc/meminfo

MemTotal:       263860132 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 RD450 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 Nov 18 18:52

SPEC is set to: /usr/cpu2006
  Filesystem   Type  Size  Used Avail Use% Mounted on
  /dev/sda2    xfs 741G  84G 658G  12% /
Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program
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SPECfp2006 = 96.3
SPECfp_base2006 = 93.5

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

Platform Notes (Continued)

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 VB3TS110 10/05/2014
Memory:
16x Samsung M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz, configured at 1866 MHz

(End of data from sysinfo program)
RD450 support 4 channels and 8 DIMMs per processor, total 8 channels and
16 DIMMs. All 16 DIMM slots installed with 16 GB DIMM for this run.

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"
OMP_NUM_THREADS = "8"

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

Base Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main

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SPECfp_base2006 = 93.5

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited
Test date: Nov-2014
Hardware Availability: Dec-2014
Software Availability: Sep-2014

Base Portability Flags (Continued)

437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

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

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

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

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64
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**Test sponsor:** Lenovo Group Limited  
**Tested by:** Lenovo Group Limited  
**Test date:** Nov-2014  
**Hardware Availability:** Dec-2014  
**Software Availability:** Sep-2014

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

### C benchmarks:

- `433.milc`: `-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 -ansi-alias`
- `470.lbm`: `basepeak = yes`
- `482.sphinx3`: `-xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -ansi-alias -parallel`

### C++ benchmarks:

- `444.namd`: `-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -fno-alias -auto-ilp32`
- `447.dealII`: `basepeak = yes`
- `450.soplex`: `basepeak = yes`
- `453.povray`: `-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias`

### Fortran benchmarks:

- `410.bwaves`: `basepeak = yes`
- `416.gamess`: `-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2 -inline-level=0 -scalar-rep-`
- `434.zeusmp`: `basepeak = yes`
- `437.leslie3d`: `basepeak = yes`
- `459.GemsFDTD`: `-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2 -inline-level=0 -opt-prefetch -parallel`
- `465.tonto`: `-xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -inline-calloc -opt-malloc-options=3 -auto -unroll4`

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| Test sponsor: | Lenovo Group Limited |
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| Hardware Availability: | Dec-2014 |
| Software Availability: | Sep-2014 |

#### Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

- `435.gromacs`: `basepeak = yes`
- `436.cactusADM`: `basepeak = yes`
- `454.calculix`: `-xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias`
- `481.wrf`: `basepeak = yes`

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/Intel-ic15.0-official-linux64.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/Intel-ic15.0-official-linux64.xml)
- [http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revA.xml](http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revA.xml)

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