## SPEC® CFP2006 Result

**Lenovo Group Limited**

Lenovo ThinkServer RD450 (Intel Xeon E5-2620 v3, 2.40 GHz)

**SPECfp®2006 = 97.4**

**SPECfp_base2006 = 93.0**

<table>
<thead>
<tr>
<th>Test sponsor: Lenovo Group Limited</th>
<th>Tested by: Lenovo Group Limited</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2006 license: 9017</td>
<td>Test date: Nov-2014</td>
</tr>
<tr>
<td>Hardware Availability: Dec-2014</td>
<td>Software Availability: Sep-2014</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>410.bwaves</th>
<th>38.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>416.gamess</td>
<td>32.6</td>
</tr>
<tr>
<td>433.milc</td>
<td>68.5</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>67.9</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>39.9</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td></td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>233</td>
</tr>
<tr>
<td>444.namd</td>
<td>27.8</td>
</tr>
<tr>
<td>447.dealII</td>
<td>52.5</td>
</tr>
<tr>
<td>450.soplex</td>
<td>39.2</td>
</tr>
<tr>
<td>453.povray</td>
<td>57.0</td>
</tr>
<tr>
<td>454.calculix</td>
<td>51.1</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>47.9</td>
</tr>
<tr>
<td>470.lbm</td>
<td>37.0</td>
</tr>
<tr>
<td>481.wrf</td>
<td>89.5</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>68.6</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name: Intel Xeon E5-2620 v3</th>
<th>Operating System: Red Hat Enterprise Linux Server release 7.0 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz</td>
<td>3.10.0-123.el7.x86_64</td>
</tr>
<tr>
<td>CPU MHz: 2400</td>
<td>Compiler: C++: 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>FPU: Integrated</td>
<td>Auto Parallel: Yes</td>
</tr>
<tr>
<td>CPU(s) enabled: 12 cores, 2 chips, 6 cores/chip, 2 threads/core</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>CPU(s) orderable: 1.2 chip</td>
<td></td>
</tr>
<tr>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
<td></td>
</tr>
<tr>
<td>Secondary Cache: 256 KB I+D on chip per core</td>
<td></td>
</tr>
</tbody>
</table>

Continued on next page
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L3 Cache: 15 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None

System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>33.4</td>
<td>4.07</td>
<td>33.2</td>
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<td>416.gamess</td>
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<td>434.zesmp</td>
<td>53.7</td>
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<td>53.4</td>
<td>171</td>
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<td>435.gromacs</td>
<td>179</td>
<td>39.9</td>
<td>179</td>
<td>39.9</td>
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<tr>
<td>436.cactusADM</td>
<td>20.6</td>
<td>580</td>
<td>20.6</td>
<td>579</td>
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<tr>
<td>437.leslie3d</td>
<td>40.1</td>
<td>234</td>
<td>40.4</td>
<td>233</td>
</tr>
<tr>
<td>444.namd</td>
<td>297</td>
<td>27.0</td>
<td>297</td>
<td>27.0</td>
</tr>
<tr>
<td>447.dealII</td>
<td>218</td>
<td>52.5</td>
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<td>450.soplex</td>
<td>213</td>
<td>39.2</td>
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<tr>
<td>453.povray</td>
<td>105</td>
<td>50.8</td>
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<td>51.1</td>
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<tr>
<td>454.calculix</td>
<td>165</td>
<td>50.0</td>
<td>165</td>
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<td>459.GemsFDTD</td>
<td>53.6</td>
<td>198</td>
<td>53.7</td>
<td>197</td>
</tr>
<tr>
<td>465.tonto</td>
<td>266</td>
<td>37.0</td>
<td>266</td>
<td>37.0</td>
</tr>
<tr>
<td>470.lbm</td>
<td>24.6</td>
<td>560</td>
<td>24.6</td>
<td>560</td>
</tr>
<tr>
<td>481.wrf</td>
<td>124</td>
<td>89.8</td>
<td>125</td>
<td>89.5</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>286</td>
<td>68.2</td>
<td>286</td>
<td>68.2</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
**Lenovo Group Limited**

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**SPECf2006 =** 97.4

**SPECfp_base2006 =** 93.0

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**CPU2006 license:** 9017

**Test sponsor:** Lenovo Group Limited

**Tested by:** Lenovo Group Limited

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**Platform Notes (Continued)**

Sysinfo program /usr/cpu2006/config/sysinfo.rev6914

$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on RD450 Fri Nov 14 18:34:45 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 E5-2620 v3 @ 2.40GHz
- 2 "physical id"s (chips)
- 24 "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: 6
  - siblings: 12
  - physical 0: cores 0 1 2 3 4 5
  - physical 1: cores 0 1 2 3 4 5
- cache size: 15360 KB

From /proc/meminfo

- MemTotal: 263859204 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"

runlevel 3 Nov 14 18:33

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

Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program
Continued on next page
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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 = "12"

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

Continued on next page
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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:
licpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64
Lenovo Group Limited
Lenovo ThinkServer RD450 (Intel Xeon E5-2620 v3, 2.40 GHz)

SPECfp2006 = 97.4
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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)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-auto-ilp32 -ansi-alias

470.lbm: basepeak = yes

482.sphinx3: -xCORE-AVX2 -ipo -03 -no-prec-div -unroll12 -ansi-alias
-parallel

C++ benchmarks:
444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(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)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll14
-ansi-alias

Fortran benchmarks:
410.bwaves: basepeak = yes

416.gamess: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll12
-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)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll12
-inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-inline-calloc -opt-malloc-options=3 -auto -unroll14

Continued on next page
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**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/Lenovo-Platform-Settings-V1.2-HSW-revA.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-Settings-V1.2-HSW-revA.xml

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

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