



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Group Limited

Lenovo ThinkServer RD650 (Intel Xeon E5-2699 v3, 2.30 GHz)

**SPECfp<sup>®</sup>2006 = 111**

**SPECfp\_base2006 = 105**

CPU2006 license: 9017

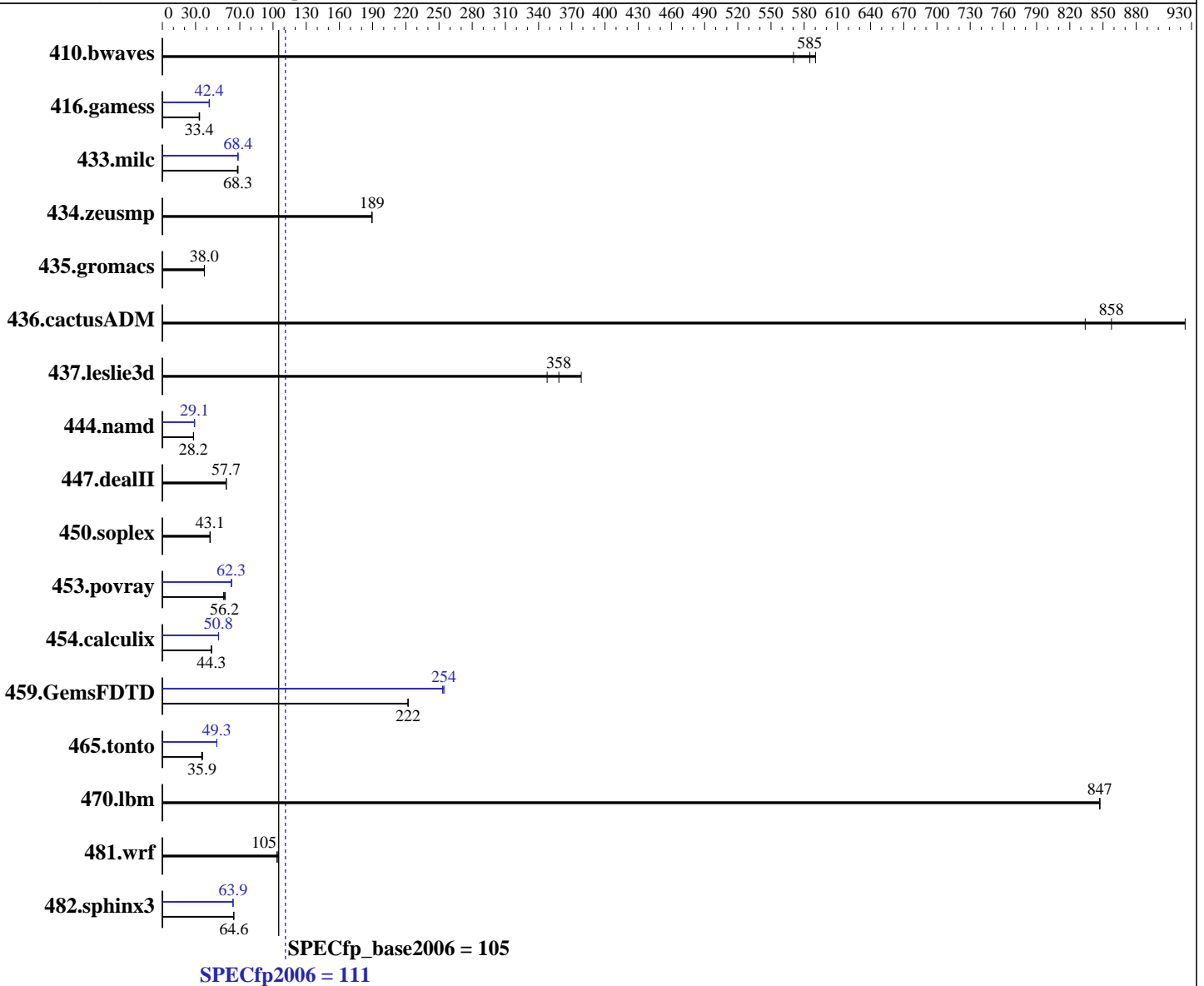
Test sponsor: Lenovo Group Limited

Tested by: Lenovo Group Limited

Test date: Oct-2014

Hardware Availability: Sep-2014

Software Availability: Nov-2014



### Hardware

CPU Name: Intel Xeon E5-2699 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz  
 CPU MHz: 2300  
 FPU: Integrated  
 CPU(s) enabled: 36 cores, 2 chips, 18 cores/chip, 2 threads/core  
 CPU(s) orderable: 1,2 chips  
 Primary Cache: 32 KB I + 32 KB D on chip per core  
 Secondary Cache: 256 KB I+D on chip per core

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### 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;  
 Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux  
 Auto Parallel: Yes  
 File System: ext4

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L3 Cache: 45 MB I+D on chip per chip  
Other Cache: None  
Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2133P-R)  
Disk Subsystem: 1 x 240 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

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	23.0	590	23.8	570	<u>23.2</u>	<u>585</u>	23.0	590	23.8	570	<u>23.2</u>	<u>585</u>
416.gamess	<u>587</u>	<u>33.4</u>	587	33.3	581	33.7	<u>462</u>	<u>42.4</u>	462	42.4	462	42.4
433.milc	135	67.8	134	68.3	<u>134</u>	<u>68.3</u>	134	68.5	<u>134</u>	<u>68.4</u>	135	68.1
434.zeusmp	<u>48.0</u>	<u>189</u>	48.0	189	48.0	189	<u>48.0</u>	<u>189</u>	48.0	189	48.0	189
435.gromacs	188	38.0	188	38.0	<u>188</u>	<u>38.0</u>	188	38.0	188	38.0	<u>188</u>	<u>38.0</u>
436.cactusADM	12.9	924	14.3	834	<u>13.9</u>	<u>858</u>	12.9	924	14.3	834	<u>13.9</u>	<u>858</u>
437.leslie3d	24.8	379	<u>26.2</u>	<u>358</u>	27.0	348	24.8	379	<u>26.2</u>	<u>358</u>	27.0	348
444.namd	<u>285</u>	<u>28.2</u>	285	28.2	285	28.1	<u>276</u>	<u>29.1</u>	276	29.1	276	29.1
447.dealII	198	57.7	<u>198</u>	<u>57.7</u>	198	57.7	198	57.7	<u>198</u>	<u>57.7</u>	198	57.7
450.soplex	<u>194</u>	<u>43.1</u>	193	43.3	194	43.1	<u>194</u>	<u>43.1</u>	193	43.3	194	43.1
453.povray	<u>94.7</u>	<u>56.2</u>	93.4	56.9	96.1	55.3	85.0	62.6	85.6	62.2	<u>85.4</u>	<u>62.3</u>
454.calculix	186	44.4	186	44.3	<u>186</u>	<u>44.3</u>	162	50.9	<u>163</u>	<u>50.8</u>	163	50.7
459.GemsFDTD	47.8	222	47.8	222	<u>47.8</u>	<u>222</u>	<u>41.7</u>	<u>254</u>	41.7	254	41.9	253
465.tonto	271	36.4	<u>274</u>	<u>35.9</u>	277	35.5	<u>200</u>	<u>49.3</u>	200	49.3	200	49.2
470.lbm	<u>16.2</u>	<u>847</u>	16.2	847	16.2	847	<u>16.2</u>	<u>847</u>	16.2	847	16.2	847
481.wrf	107	105	<u>107</u>	<u>105</u>	108	103	107	105	<u>107</u>	<u>105</u>	108	103
482.sphinx3	<u>302</u>	<u>64.6</u>	302	64.6	303	64.3	<u>305</u>	<u>63.9</u>	305	63.9	305	63.8

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  
ClE 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

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### Platform Notes (Continued)

\$Rev: 6818 \$ \$Date:: 2012-07-17 #\$ e86d102572650a6e4d596a3cee98f191  
running on RD650 Mon Oct 27 23:59:02 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 E5-2699 v3 @ 2.30GHz
 2 "physical id"s (chips)
 72 "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 : 18
siblings  : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
cache size : 46080 KB
```

```
From /proc/meminfo
MemTotal:      264408640 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)
system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server
```

```
uname -a:
Linux RD650 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 Oct 27 23:57
```

```
SPEC is set to: /usr/cpu2006
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2       ext4  217G   13G  193G   7% /
```

Additional information from dmidecode:

BIOS LENOVO PB2TS110 10/06/2014

Memory:

16x 16 GB

8x NO DIMM NO DIMM

16x Samsung M393A2G40DB0-CPB 16 GB 2133 MHz 2 rank

(End of data from sysinfo program)

RD650 support 4 channels and 12 DIMMs per processor, total 8 channels and  
Continued on next page



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## Platform Notes (Continued)

24 DIMMs. 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 = "36"

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

runspec command invoked through numactl i.e.:

numactl --interleave=all runspec <etc>

## 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

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

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## Base Portability Flags (Continued)

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

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

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## Peak Optimization Flags (Continued)

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.dealIII: 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

### Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

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## Peak Optimization Flags (Continued)

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-ic14.0-official-linux64.20140128.html>

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-revA.html>

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-revA.xml>

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