SPEC® CFP2006 Result
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Lenovo Group Limited

Lenovo ThinkServer RD650 (Intel Xeon E5-2697 v3, 2.60 GHz)
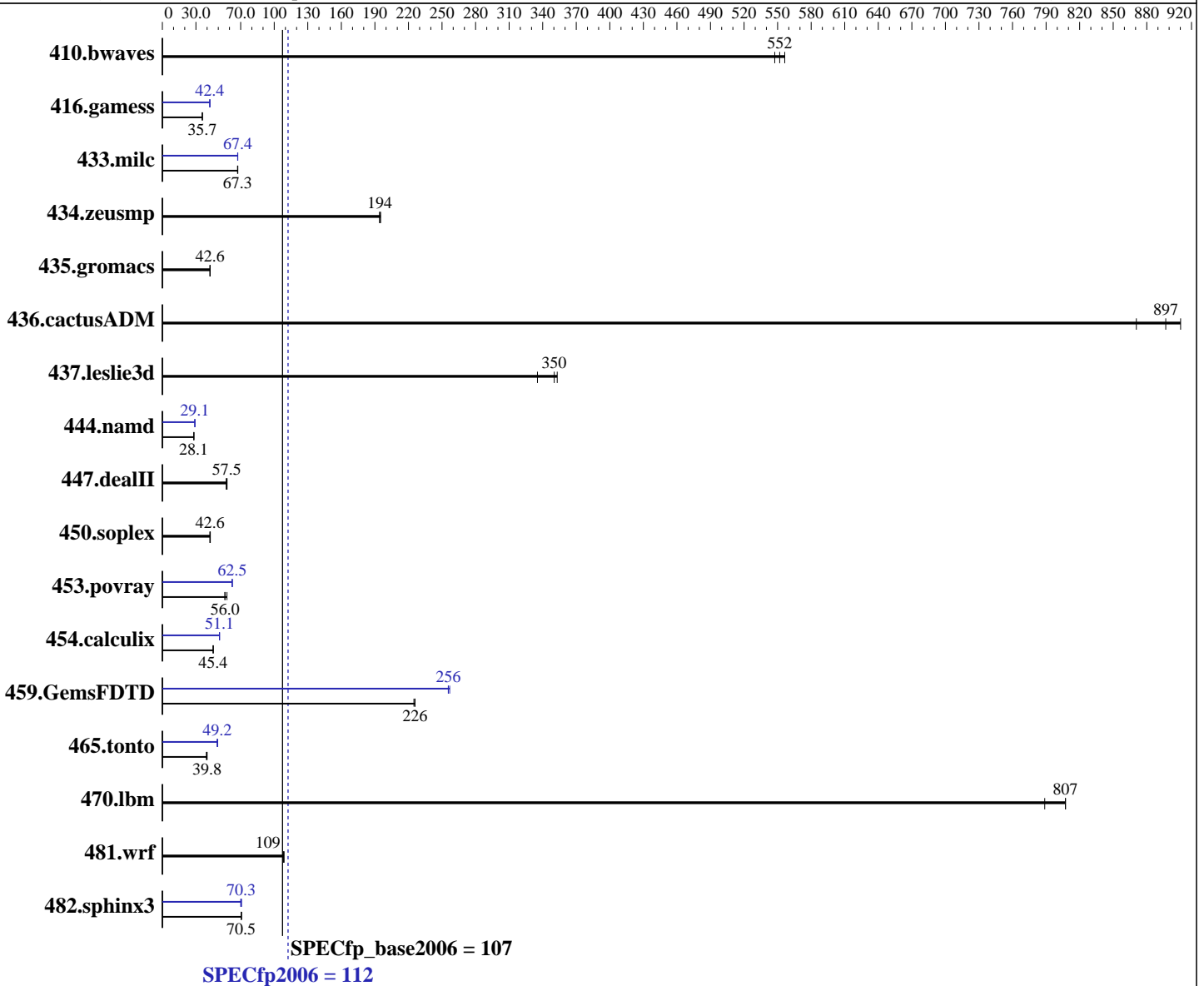
$SPECfp^{®}2006 =$ 112

$SPECfp\_base2006 =$ 107

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

410.bwaves 552
416.gamess 42.4 / 35.7
433.milc 67.4 / 67.3
434.zeusmp 194
435.gromacs 42.6
436.cactusADM 897
437.leslie3d 350
444.namd 29.1 / 28.1
447.dealII 57.5
450.soplex 42.6
453.povray 62.5 / 56.0
454.calculix 51.1 / 45.4
459.GemsFDTD 256 / 226
465.tonto 49.2 / 39.8
470.lbm 807
481.wrf 109
482.sphinx3 70.3 / 70.5

SPECfp_base2006 = 107

SPECfp2006 = 112

Hardware

CPU Name:	Intel Xeon E5-2697 v3
CPU Characteristics:	Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz:	2600
FPU:	Integrated
CPU(s) enabled:	28 cores, 2 chips, 14 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core

Continued on next page

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:	35 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2133P-R)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 240 GB SATA SSD	Other Software:	None
Other Hardware:	None		

Results Table

Benchmark	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
410.bwaves	24.4	556	24.8	547	**24.6**	**552**	24.4	556	24.8	547	**24.6**	**552**
416.gamess	549	35.7	547	35.8	**548**	**35.7**	461	42.4	462	42.4	**461**	**42.4**
433.milc	136	67.5	**136**	**67.3**	136	67.3	**136**	**67.4**	136	67.3	136	67.4
434.zeusmp	46.6	195	46.8	194	**46.8**	**194**	46.6	195	46.8	194	**46.8**	**194**
435.gromacs	**168**	**42.6**	167	42.7	168	42.6	**168**	**42.6**	167	42.7	168	42.6
436.cactusADM	13.7	871	**13.3**	**897**	13.1	910	13.7	871	**13.3**	**897**	13.1	910
437.leslie3d	**26.8**	**350**	26.6	353	28.0	335	**26.8**	**350**	26.6	353	28.0	335
444.namd	285	28.2	285	28.1	**285**	**28.1**	**276**	**29.1**	276	29.0	276	29.1
447.dealII	200	57.1	198	57.9	**199**	**57.5**	200	57.1	198	57.9	**199**	**57.5**
450.soplex	196	42.5	**196**	**42.6**	194	42.9	196	42.5	**196**	**42.6**	194	42.9
453.povray	92.1	57.8	95.2	55.9	**95.0**	**56.0**	**85.2**	**62.5**	85.0	62.6	85.5	62.3
454.calculix	182	45.4	181	45.5	**182**	**45.4**	162	51.1	**161**	**51.1**	161	51.1
459.GemsFDTD	**47.0**	**226**	47.2	225	47.0	226	41.5	256	41.3	257	**41.5**	**256**
465.tonto	246	40.0	**247**	**39.8**	250	39.3	**200**	**49.2**	201	48.9	199	49.4
470.lbm	17.4	789	17.0	807	**17.0**	**807**	17.4	789	17.0	807	**17.0**	**807**
481.wrf	**103**	**109**	103	109	103	108	**103**	**109**	103	109	103	108
482.sphinx3	275	70.8	**276**	**70.5**	277	70.4	**277**	**70.3**	275	70.8	278	70.0

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
 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 Nov  3 18:02:21 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 E5-2697 v3 @ 2.60GHz
      2 "physical id"s (chips)
      56 "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 : 14
      siblings  : 28
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
   cache size : 35840 KB

From /proc/meminfo
   MemTotal:       264410624 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 Nov 3 18:00

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
```

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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 = "28"

 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:

Continued on next page

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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.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`

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-RD650-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-RD650-revA.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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