SPEC® CFP2006 Result

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Lenovo Group Limited

Lenovo ThinkServer RD650 (Intel Xeon E5-2623 v3, 3.00 GHz)

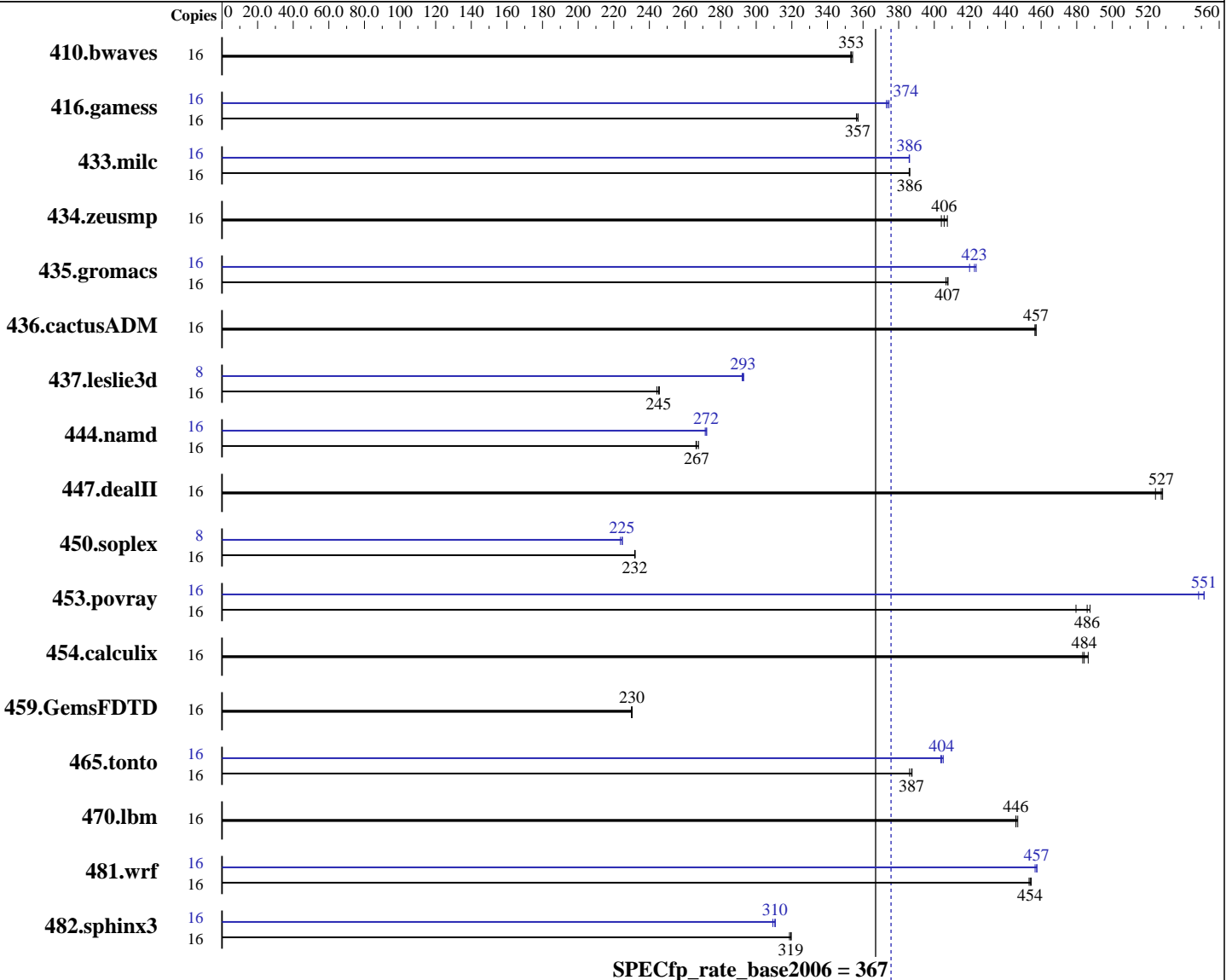$SPECfp®_rate2006 = $ 376

$SPECfp_rate_base2006 = $ 367

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

Copies

410.bwaves — 16 — 353

416.gamess — 16 — 374 / 16 — 357

433.milc — 16 — 386 / 16 — 386

434.zeusmp — 16 — 406

435.gromacs — 16 — 423 / 16 — 407

436.cactusADM — 16 — 457

437.leslie3d — 8 — 293 / 16 — 245

444.namd — 16 — 272 / 16 — 267

447.dealII — 16 — 527

450.soplex — 8 — 225 / 16 — 232

453.povray — 16 — 551 / 16 — 486

454.calculix — 16 — 484

459.GemsFDTD — 16 — 230

465.tonto — 16 — 404 / 16 — 387

470.lbm — 16 — 446

481.wrf — 16 — 457 / 16 — 454

482.sphinx3 — 16 — 310 / 16 — 319

SPECfp_rate_base2006 = 367

SPECfp_rate2006 = 376

Hardware

CPU Name:	Intel Xeon E5-2623 v3
CPU Characteristics:	Intel Turbo Boost Technology up to 3.50 GHz
CPU MHz:	3000
FPU:	Integrated
CPU(s) enabled:	8 cores, 2 chips, 4 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:	No
File System:	ext4

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L3 Cache:	10 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	32/64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)	Peak Pointers:	32/64-bit
		Other Software:	None
Disk Subsystem:	1 x 240 GB SATA SSD		
Other Hardware:	None		

Results Table

	Base						Peak					
Benchmark	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	16	616	353	**615**	**353**	614	354	16	616	353	**615**	**353**	614	354
416.gamess	16	879	356	**877**	**357**	877	357	16	836	375	840	373	**838**	**374**
433.milc	16	**380**	**386**	381	386	380	386	16	380	386	381	386	**381**	**386**
434.zeusmp	16	**359**	**406**	360	404	357	407	16	**359**	**406**	360	404	357	407
435.gromacs	16	280	408	**280**	**407**	281	407	16	270	424	**270**	**423**	272	420
436.cactusADM	16	418	457	**418**	**457**	419	456	16	418	457	**418**	**457**	419	456
437.leslie3d	16	616	244	**613**	**245**	612	246	8	**257**	**293**	257	292	257	293
444.namd	16	479	268	482	266	**481**	**267**	16	**472**	**272**	471	272	473	271
447.dealII	16	**347**	**527**	347	528	349	524	16	**347**	**527**	347	528	349	524
450.soplex	16	**576**	**232**	576	232	575	232	8	297	225	298	224	**297**	**225**
453.povray	16	177	480	**175**	**486**	175	487	16	155	548	**154**	**551**	154	552
454.calculix	16	271	486	273	483	**273**	**484**	16	271	486	273	483	**273**	**484**
459.GemsFDTD	16	737	230	738	230	**737**	**230**	16	737	230	738	230	**737**	**230**
465.tonto	16	408	386	**407**	**387**	406	388	16	389	405	390	404	**389**	**404**
470.lbm	16	**493**	**446**	492	447	493	446	16	**493**	**446**	492	447	493	446
481.wrf	16	**394**	**454**	394	453	393	454	16	391	457	391	458	**391**	**457**
482.sphinx3	16	979	319	975	320	**976**	**319**	16	1003	311	**1005**	**310**	1008	309

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

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

Platform Notes

BIOS configuration:
Cluster On Die set to Auto
Early Snoop set to Auto

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Platform Notes (Continued)

```
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 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
 running on RD550 Sat Dec 20 04:45:53 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:       264415612 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 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 Dec 19 18:53

 SPEC is set to: /usr/cpu2006
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda2       ext4  217G   38G  168G  19% /

 Additional information from dmidecode:
    BIOS LENOVO PB2TS110 10/06/2014
```

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Platform Notes (Continued)

```
    Memory:
     16x   16 GB
     16x Hynix Semiconductor HMA42GR7MFR4N-TFTD 16 GB 1866 MHz 2 rank
     8x NO DIMM NO DIMM

  (End of data from sysinfo program)
 RD650 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.
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"

 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
 Filesystem page cache cleared with:
 echo 1>        /proc/sys/vm/drop_caches
 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
```

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Base Portability Flags (Continued)

```
 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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

Peak Compiler Invocation

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

```
482.sphinx3: icc -m32
```

C++ benchmarks (except as noted below):
```
icpc   -m64
```

```
450.soplex: icpc -m32
```

Fortran benchmarks:
```
ifort -m64
```

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

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Software Availability: Jan-2014

Peak 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
 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
```

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)
          -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
          -auto-ilp32

 470.lbm: basepeak = yes

482.sphinx3: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-mem-layout-trans=3
          -unroll2
```

C++ benchmarks:

```
444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2)
          -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -fno-alias
          -auto-ilp32

447.dealII: basepeak = yes

450.soplex: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2)
          -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
          -opt-malloc-options=3

453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2)
          -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -unroll4
          -ansi-alias
```

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Peak Optimization Flags (Continued)

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: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

> 459.GemsFDTD: basepeak = yes

> 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) -unroll4
>   -auto -inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

> 435.gromacs: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
>   -O3(pass 2) -no-prec-div(pass 2)
>   -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
>   -opt-prefetch -auto-ilp32

> 436.cactusADM: basepeak = yes

> 454.calculix: basepeak = yes

> 481.wrf: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32

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-HSW-revA.html

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

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