



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Group Limited

### SPECfp<sup>®</sup>\_rate2006 = 810

Lenovo System x3550 M5  
(Intel Xeon E5-2690 v3, 2.60 GHz)

### SPECfp\_rate\_base2006 = 787

CPU2006 license: 9017

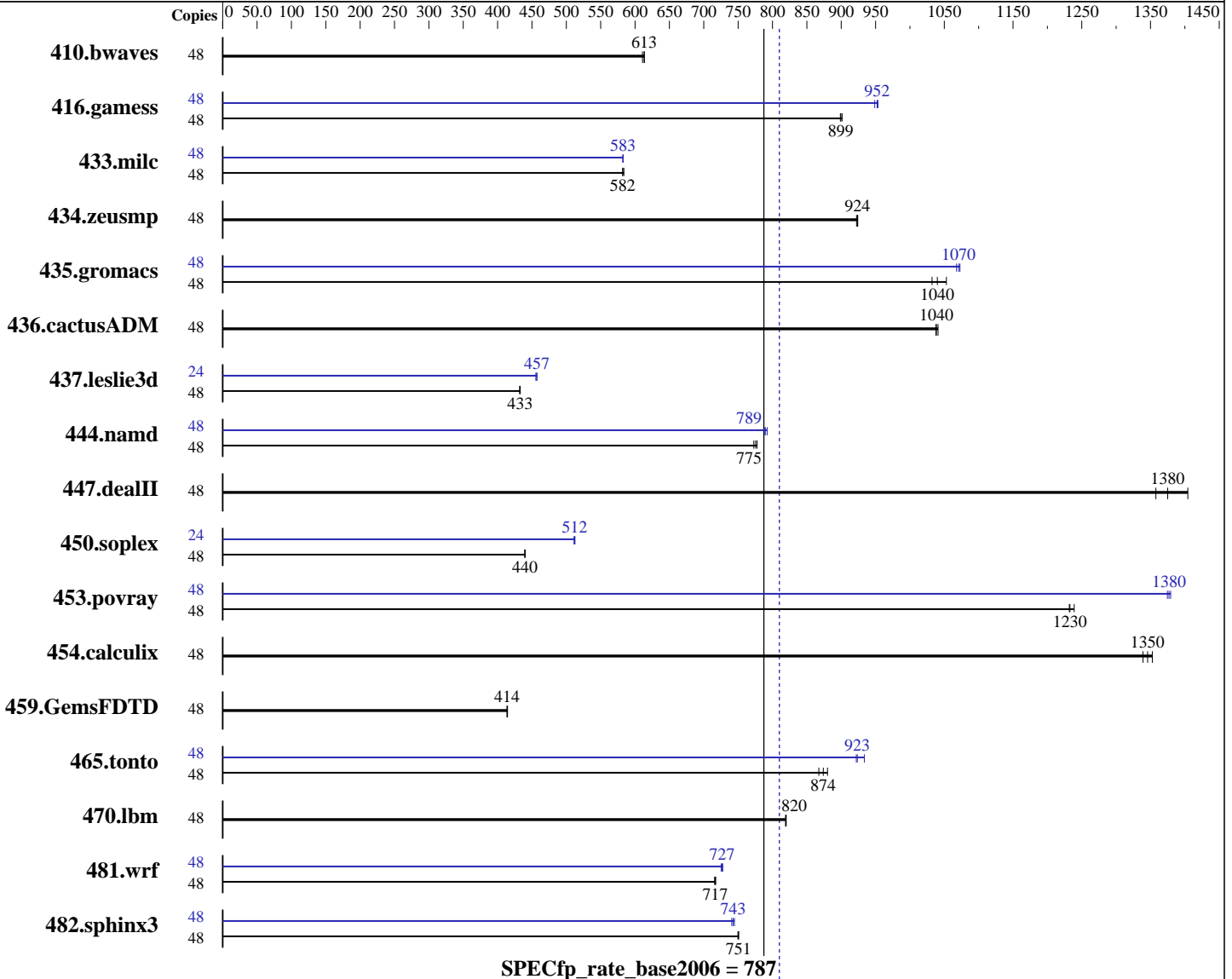
Test date: Mar-2015

Test sponsor: Lenovo Group Limited

Hardware Availability: Oct-2014

Tested by: Lenovo Group Limited

Software Availability: Sep-2014



### Hardware

CPU Name: Intel Xeon E5-2690 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.50 GHz  
 CPU MHz: 2600  
 FPU: Integrated  
 CPU(s) enabled: 24 cores, 2 chips, 12 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

Continued on next page

### Software

Operating System: Red Hat Enterprise Linux Server release 7.0 (Maipo)  
 3.10.0-123.el7.x86\_64  
 Compiler: C/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  
 Auto Parallel: No  
 File System: xfs

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L3 Cache: 30 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 300 GB SAS, 10000 RPM  
Other Hardware: None

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

## Results Table

| Benchmark     | Base   |                    |                   |                    |                    |                    |                    | Peak   |                   |                    |                    |                    |                    |                    |
|---------------|--------|--------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
|               | Copies | Seconds            | Ratio             | Seconds            | Ratio              | Seconds            | Ratio              | Copies | Seconds           | Ratio              | Seconds            | Ratio              | Seconds            | Ratio              |
| 410.bwaves    | 48     | 1068               | 611               | <b><u>1064</u></b> | <b><u>613</u></b>  | 1063               | 614                | 48     | 1068              | 611                | <b><u>1064</u></b> | <b><u>613</u></b>  | 1063               | 614                |
| 416.gamess    | 48     | 1043               | 901               | 1046               | 899                | <b><u>1045</u></b> | <b><u>899</u></b>  | 48     | 991               | 949                | <b><u>987</u></b>  | <b><u>952</u></b>  | 986                | 953                |
| 433.milc      | 48     | 757                | 582               | 755                | 584                | <b><u>757</u></b>  | <b><u>582</u></b>  | 48     | <b><u>756</u></b> | <b><u>583</u></b>  | 757                | 582                | 756                | 583                |
| 434.zeusmp    | 48     | <b><u>473</u></b>  | <b><u>924</u></b> | 474                | 922                | 473                | 924                | 48     | <b><u>473</u></b> | <b><u>924</u></b>  | 474                | 922                | 473                | 924                |
| 435.gromacs   | 48     | 325                | 1050              | 332                | 1030               | <b><u>330</u></b>  | <b><u>1040</u></b> | 48     | <b><u>320</u></b> | <b><u>1070</u></b> | 321                | 1070               | 319                | 1070               |
| 436.cactusADM | 48     | 553                | 1040              | 551                | 1040               | <b><u>552</u></b>  | <b><u>1040</u></b> | 48     | 553               | 1040               | 551                | 1040               | <b><u>552</u></b>  | <b><u>1040</u></b> |
| 437.leslie3d  | 48     | <b><u>1043</u></b> | <b><u>433</u></b> | 1042               | 433                | 1044               | 432                | 24     | 495               | 456                | <b><u>494</u></b>  | <b><u>457</u></b>  | 493                | 457                |
| 444.namd      | 48     | 498                | 773               | <b><u>496</u></b>  | <b><u>775</u></b>  | 495                | 778                | 48     | 486               | 792                | <b><u>488</u></b>  | <b><u>789</u></b>  | 488                | 789                |
| 447.dealII    | 48     | 404                | 1360              | <b><u>399</u></b>  | <b><u>1380</u></b> | 391                | 1400               | 48     | 404               | 1360               | <b><u>399</u></b>  | <b><u>1380</u></b> | 391                | 1400               |
| 450.soplex    | 48     | <b><u>910</u></b>  | <b><u>440</u></b> | 910                | 440                | 911                | 439                | 24     | 390               | 513                | <b><u>391</u></b>  | <b><u>512</u></b>  | 392                | 511                |
| 453.povray    | 48     | 206                | 1240              | <b><u>207</u></b>  | <b><u>1230</u></b> | 207                | 1230               | 48     | 186               | 1370               | 185                | 1380               | <b><u>185</u></b>  | <b><u>1380</u></b> |
| 454.calculix  | 48     | 296                | 1340              | 293                | 1350               | <b><u>294</u></b>  | <b><u>1350</u></b> | 48     | 296               | 1340               | 293                | 1350               | <b><u>294</u></b>  | <b><u>1350</u></b> |
| 459.GemsFDTD  | 48     | 1231               | 414               | 1229               | 414                | <b><u>1231</u></b> | <b><u>414</u></b>  | 48     | 1231              | 414                | 1229               | 414                | <b><u>1231</u></b> | <b><u>414</u></b>  |
| 465.tonto     | 48     | <b><u>540</u></b>  | <b><u>874</u></b> | 537                | 880                | 544                | 867                | 48     | 512               | 922                | 506                | 934                | <b><u>512</u></b>  | <b><u>923</u></b>  |
| 470.lbm       | 48     | 805                | 819               | 804                | 820                | <b><u>805</u></b>  | <b><u>820</u></b>  | 48     | 805               | 819                | 804                | 820                | <b><u>805</u></b>  | <b><u>820</u></b>  |
| 481.wrf       | 48     | 747                | 717               | <b><u>748</u></b>  | <b><u>717</u></b>  | 749                | 716                | 48     | <b><u>738</u></b> | <b><u>727</u></b>  | 737                | 728                | 739                | 725                |
| 482.sphinx3   | 48     | 1248               | 750               | <b><u>1246</u></b> | <b><u>751</u></b>  | 1246               | 751                | 48     | 1256              | 745                | <b><u>1260</u></b> | <b><u>743</u></b>  | 1263               | 741                |

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 setting:  
Operating Mode set to "Efficiency-Favor Performance"  
Sysinfo program /SPECcpu/config/sysinfo.rev6914

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Hardware Availability: Oct-2014

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Software Availability: Sep-2014

### Platform Notes (Continued)

\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
running on x3550M5 Wed Mar 18 09:55:49 2015

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 E5-2690 v3 @ 2.60GHz
 2 "physical id"s (chips)
 48 "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 8 9 10 11 12 13
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
cache size : 15360 KB
```

```
From /proc/meminfo
MemTotal:      263761924 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 x3550M5 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
```

```
SPEC is set to: /SPECcpu
Filesystem      Type      Size      Used Avail Use% Mounted on
/dev/sda2        xfs       239G      57G  182G  24% /
```

Additional information from dmidecode:

Warning: Use caution when you interpret this section. The 'dmidecode' program 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

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**Software Availability:** Sep-2014

## Platform Notes (Continued)

hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS IBM -[TBE103AUS-1.01]- 10/23/2014

Memory:

12x Hynix 484D4134324752374D4652344E2D54462020 16 GB 2 rank 2133 MHz

4x Hynix 484D4134324752374D4652344E2D54465431 16 GB 2 rank 2133 MHz

8x NO DIMM Unknown

(End of data from sysinfo program)

## General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/SPECcpu/libs/32:/SPECcpu/libs/64:/SPECcpu/sh"

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

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

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## Base Portability Flags (Continued)

```

437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.deall: -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

```

C++ benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias

```

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

```

## Peak Compiler Invocation

C benchmarks:

```

icc -m64

```

C++ benchmarks (except as noted below):

```

icpc -m64

```

```

450.soplex: icpc -m32 -L/opt/intel/composer_xe_2015/lib/ia32

```

Fortran benchmarks:

```

ifort -m64

```

Benchmarks using both Fortran and C:

```

icc -m64 ifort -m64

```



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## 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
482.sphinx3: -DSPEC_CPU_LP64

```

## 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

470.lbm: basepeak = yes

482.sphinx3: -xCORE-AVX2 -prof-gen(pass 1) -ipo -O3 -no-prec-div
            -prof-use(pass 2) -unroll2

```

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: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
         -O3(pass 2) -no-prec-div(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) -prof-use(pass 2) -unroll4
         -ansi-alias

```

Fortran benchmarks:

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## Peak Optimization Flags (Continued)

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-alloc -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) -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-ic15.0-official-linux64.html>

<http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-HSW-B.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-Flags-V1.2-HSW-B.xml>

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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

Tested with SPEC CPU2006 v1.2.

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