



# SPEC<sup>®</sup> CFP2006 Result

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## Lenovo Group Limited

### SPECfp<sup>®</sup>\_rate2006 = 1830

Lenovo Flex System x880 X6  
(Intel Xeon E7-8890 v3, 2.50 GHz)

### SPECfp\_rate\_base2006 = 1780

CPU2006 license: 9017

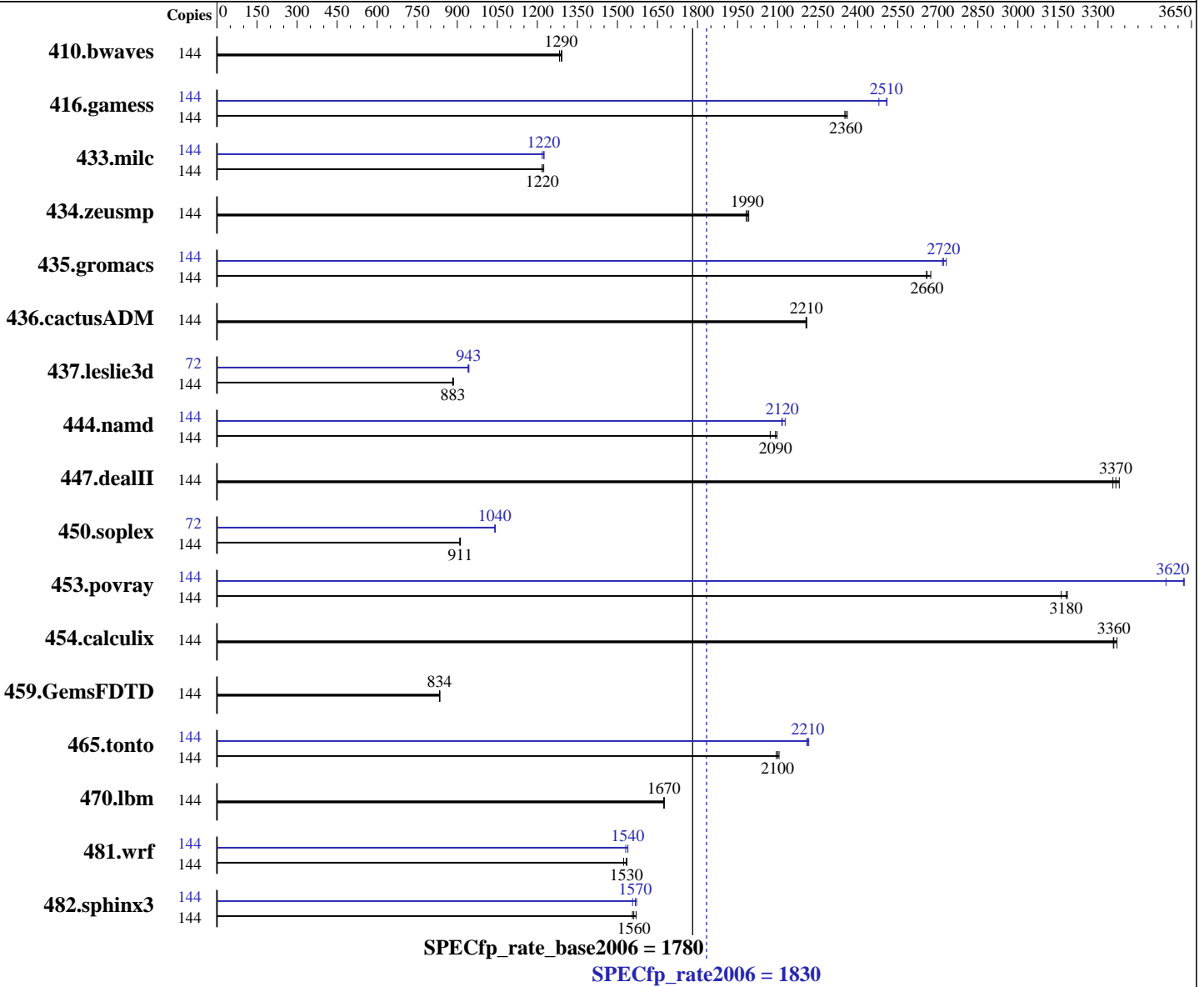
Test date: May-2015

Test sponsor: Lenovo Group Limited

Hardware Availability: May-2015

Tested by: Lenovo Group Limited

Software Availability: Mar-2015



### Hardware

CPU Name: Intel Xeon E7-8890 v3  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.30 GHz  
 CPU MHz: 2500  
 FPU: Integrated  
 CPU(s) enabled: 72 cores, 4 chips, 18 cores/chip, 2 threads/core  
 CPU(s) orderable: 2,4,8 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 7.1 (Maipo)  
 3.10.0-229.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: 45 MB I+D on chip per chip  
Other Cache: None  
Memory: 1 TB (64 x 16 GB 2Rx4 PC3L-12800R-11, ECC, running at 1333 MHz)  
Disk Subsystem: 1 x 200 GB SSD  
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	144	1515	1290	<b>1518</b>	<b>1290</b>	1525	1280	144	1515	1290	<b>1518</b>	<b>1290</b>	1525	1280
416.gamess	144	1199	2350	<b>1197</b>	<b>2360</b>	1194	2360	144	1137	2480	<b>1124</b>	<b>2510</b>	1123	2510
433.milc	144	1080	1220	1086	1220	<b>1085</b>	<b>1220</b>	144	<b>1080</b>	<b>1220</b>	1079	1230	1085	1220
434.zeusmp	144	661	1980	<b>660</b>	<b>1990</b>	658	1990	144	661	1980	<b>660</b>	<b>1990</b>	658	1990
435.gromacs	144	385	2670	387	2660	<b>387</b>	<b>2660</b>	144	376	2730	378	2720	<b>378</b>	<b>2720</b>
436.cactusADM	144	780	2210	779	2210	<b>779</b>	<b>2210</b>	144	780	2210	779	2210	<b>779</b>	<b>2210</b>
437.leslie3d	144	1533	883	1528	886	<b>1532</b>	<b>883</b>	72	717	944	<b>718</b>	<b>943</b>	720	940
444.namd	144	<b>552</b>	<b>2090</b>	551	2100	557	2070	144	<b>545</b>	<b>2120</b>	546	2120	543	2130
447.dealII	144	491	3360	<b>489</b>	<b>3370</b>	487	3380	144	491	3360	<b>489</b>	<b>3370</b>	487	3380
450.soplex	144	1317	912	1321	909	<b>1318</b>	<b>911</b>	72	577	1040	<b>577</b>	<b>1040</b>	576	1040
453.povray	144	241	3190	<b>241</b>	<b>3180</b>	242	3160	144	<b>212</b>	<b>3620</b>	216	3550	211	3620
454.calculix	144	<b>354</b>	<b>3360</b>	352	3370	354	3360	144	<b>354</b>	<b>3360</b>	352	3370	354	3360
459.GemsFDTD	144	1832	834	1830	835	<b>1832</b>	<b>834</b>	144	1832	834	1830	835	<b>1832</b>	<b>834</b>
465.tonto	144	<b>675</b>	<b>2100</b>	673	2110	676	2100	144	641	2210	<b>640</b>	<b>2210</b>	639	2220
470.lbm	144	1181	1680	1182	1670	<b>1182</b>	<b>1670</b>	144	1181	1680	1182	1670	<b>1182</b>	<b>1670</b>
481.wrf	144	1048	1540	<b>1049</b>	<b>1530</b>	1056	1520	144	<b>1045</b>	<b>1540</b>	1051	1530	1045	1540
482.sphinx3	144	<b>1797</b>	<b>1560</b>	1803	1560	1788	1570	144	1786	1570	<b>1791</b>	<b>1570</b>	1803	1560

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"



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CPU2006 license: 9017

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### Platform Notes

Operating Mode set to Custom in BIOS  
 Cstates disabled in BIOS  
 Maximum OS Cstate set to zero  
 Sysinfo program /cpu2006.1.2/config/sysinfo.rev6914  
 \$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
 running on SPECcpu-Newport Sat May 2 01:50:51 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 E7-8890 v3 @ 2.50GHz
 4 "physical id"s (chips)
 144 "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
 physical 2:   cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
 physical 3:   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:      1056424224 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

From /etc/\*release\* /etc/\*version\*

```

os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.1 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.1"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.1 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.1:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.1 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.1 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.1:ga:server

```

uname -a:

```

Linux SPECcpu-Newport 3.10.0-229.el7.x86_64 #1 SMP Thu Jan 29 18:37:38 EST 2015 x86_64 x86_64 x86_64 GNU/Linux

```

run-level 3 May 1 11:17

SPEC is set to: /cpu2006.1.2

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## Platform Notes (Continued)

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-root	xfs	182G	5.6G	176G	4%	/

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

BIOS IBM -[N3E121SUS-1.00]- 03/13/2015

Memory:

30x 0x0000 HMT42GR7AFR4A-PB 16 GB 2 rank 1600 MHz

2x 0x0000 MT42GR7AFR4A-PB 16 GB 2 rank 1600 MHz

32x NO DIMM Unknown

32x Samsung M393B2G70QH0-YK0 16 GB 2 rank 1600 MHz, configured at 1333 MHz

(End of data from sysinfo program)

Due to a dmidecode issue, some memory speeds are listed at the highest speed the DIMMs are capable of rather than the actual lower run speed.

## General Notes

Environment variables set by runspec before the start of the run:

LD\_LIBRARY\_PATH = "/cpu2006.1.2/libs/32:/cpu2006.1.2/libs/64:/cpu2006.1.2/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



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## 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
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:

```

icc -m64

```

C++ benchmarks (except as noted below):

```

icpc -m64

```

```

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

```

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## Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

icc -m64 ifort -m64

## 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)  
 -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

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## Peak Optimization Flags (Continued)

447.dealIII: 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) -unroll14  
-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) -unroll12  
-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) -unroll14  
-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-ic15.0-official-linux64.html>

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

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

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