SPEC® CFP2006 Result

Copyright 2006-2017 Standard Performance Evaluation Corporation

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

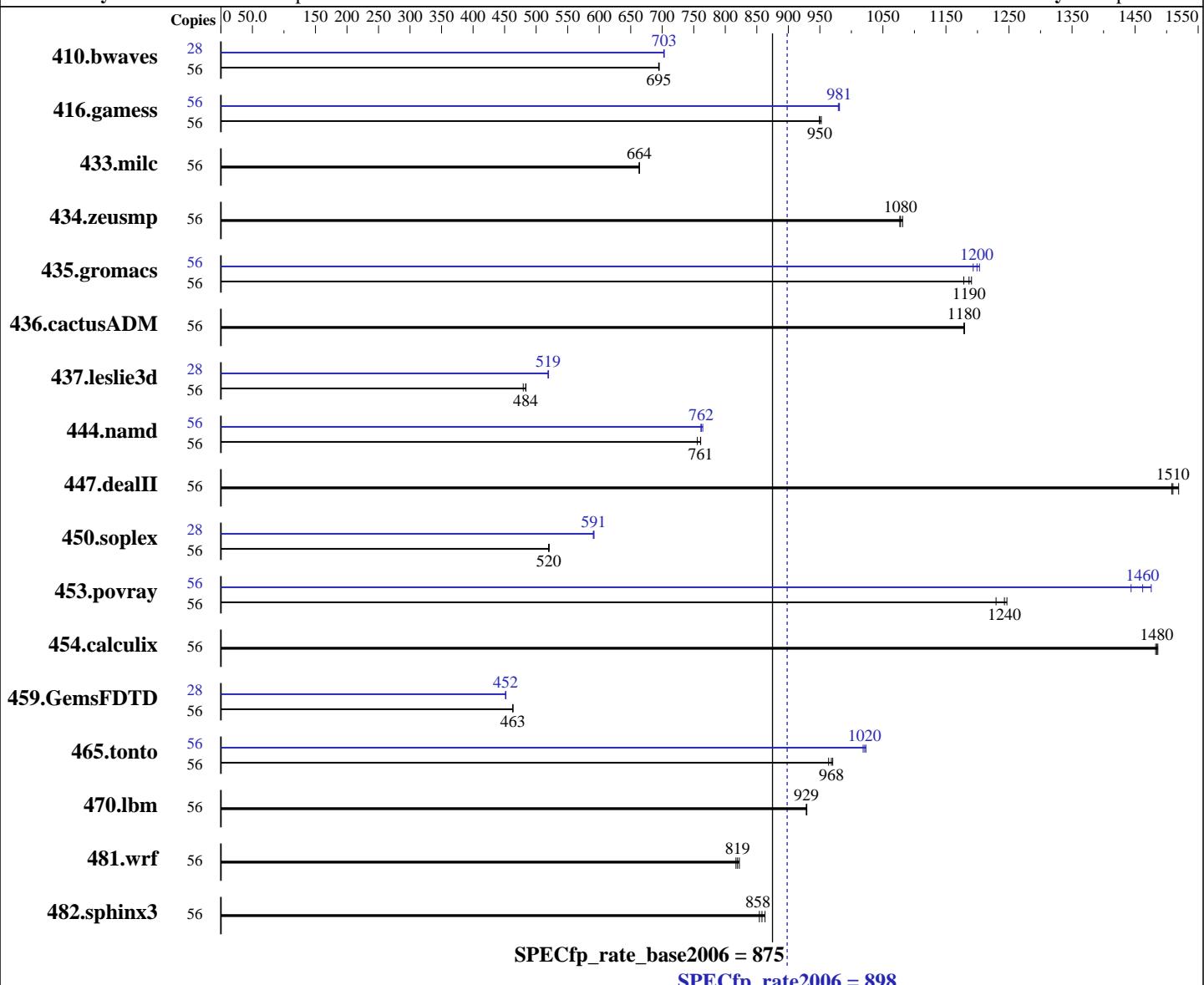$SPECfp^®_rate2006 = $ **898**

SPECfp_rate_base2006 = **875**

CPU2006 license: 9017	**Test date:** Jan-2017
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Mar-2016
Tested by: Lenovo Group Limited	**Software Availability:** Sep-2016

Copies — bar chart

- 410.bwaves: 28 → 703; 56 → 695
- 416.gamess: 56 → 981; 56 → 950
- 433.milc: 56 → 664
- 434.zeusmp: 56 → 1080
- 435.gromacs: 56 → 1200; 56 → 1190
- 436.cactusADM: 56 → 1180
- 437.leslie3d: 28 → 519; 56 → 484
- 444.namd: 56 → 762; 56 → 761
- 447.dealII: 56 → 1510
- 450.soplex: 28 → 591; 56 → 520
- 453.povray: 56 → 1460; 56 → 1240
- 454.calculix: 56 → 1480
- 459.GemsFDTD: 28 → 452; 56 → 463
- 465.tonto: 56 → 1020; 56 → 968
- 470.lbm: 56 → 929
- 481.wrf: 56 → 819
- 482.sphinx3: 56 → 858

SPECfp_rate_base2006 = 875
SPECfp_rate2006 = 898

Hardware

CPU Name:	Intel Xeon E5-2660 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.20 GHz
CPU MHz:	2000
FPU:	Integrated
CPU(s) enabled:	28 cores, 2 chips, 14 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:	SUSE Linux Enterprise Server 12 SP1 (x86_64) Kernel 3.12.49-11-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
Auto Parallel:	No
File System:	xfs
System State:	Run level 3 (multi-user)

Continued on next page

SPEC CFP2006 Result

Copyright 2006-2017 Standard Performance Evaluation Corporation

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 = 898

SPECfp_rate_base2006 = 875

CPU2006 license: 9017	**Test date:** Jan-2017
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Mar-2016
Tested by: Lenovo Group Limited	**Software Availability:** Sep-2016

L3 Cache:	35 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)	Other Software:	None
Disk Subsystem:	1 x 800 GB SATA SSD		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	56	**1096**	**695**	1096	694	1095	695	28	**541**	**703**	541	703	542	702
416.gamess	56	1155	949	**1154**	**950**	1151	952	56	**1118**	**981**	1120	979	1118	981
433.milc	56	775	663	774	664	**774**	**664**	56	775	663	774	664	**774**	**664**
434.zeusmp	56	**473**	**1080**	471	1080	473	1080	56	**473**	**1080**	471	1080	473	1080
435.gromacs	56	**337**	**1190**	339	1180	336	1190	56	335	1190	**333**	**1200**	332	1200
436.cactusADM	56	568	1180	**568**	**1180**	567	1180	56	568	1180	**568**	**1180**	567	1180
437.leslie3d	56	1098	480	1089	484	**1089**	**484**	28	**507**	**519**	507	519	506	520
444.namd	56	**590**	**761**	590	761	594	756	56	588	764	590	761	**589**	**762**
447.dealII	56	425	1510	422	1520	**424**	**1510**	56	425	1510	422	1520	**424**	**1510**
450.soplex	56	897	521	**898**	**520**	899	520	28	**395**	**591**	395	591	395	592
453.povray	56	**240**	**1240**	242	1230	239	1250	56	202	1480	206	1440	**204**	**1460**
454.calculix	56	311	1490	312	1480	**311**	**1480**	56	311	1490	312	1480	**311**	**1480**
459.GemsFDTD	56	1283	463	1283	463	**1283**	**463**	28	657	452	658	451	**658**	**452**
465.tonto	56	572	964	**569**	**968**	568	970	56	539	1020	**540**	**1020**	541	1020
470.lbm	56	828	929	**829**	**929**	829	929	56	828	929	**829**	**929**	829	929
481.wrf	56	761	822	766	817	**763**	**819**	56	761	822	766	817	**763**	**819**
482.sphinx3	56	1278	854	1265	863	**1272**	**858**	56	1278	854	1265	863	**1272**	**858**

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"
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
```

SPEC CFP2006 Result
Copyright 2006-2017 Standard Performance Evaluation Corporation

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 =   898

SPECfp_rate_base2006 =   875

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jan-2017
Hardware Availability: Mar-2016
Software Availability: Sep-2016

Platform Notes

```
  BIOS configuration:
  Operating Mode set to Maximum Performance
  COD Preference set to Enable
  DCU Streamer Prefetcher set to Disable
   Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993
   Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
   running on XinYi-MLK-06 Thu Jan 12 01:32:17 2017

   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 E5-2660 v4@ 2.00GHz
        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 : 17920 KB

  From /proc/meminfo
     MemTotal:       263956436 kB
     HugePages_Total:        0
     Hugepagesize:        2048 kB

  From /etc/*release* /etc/*version*
     SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 1
        # This file is deprecated and will be removed in a future service pack or
        release.
        # Please check /etc/os-release for details about this release.
     os-release:
        NAME="SLES"
        VERSION="12-SP1"
        VERSION_ID="12.1"
        PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp1"

  uname -a:
     Linux XinYi-MLK-06 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
     (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 Jan 12 01:30
```

Continued on next page

SPEC CFP2006 Result
Copyright 2006-2017 Standard Performance Evaluation Corporation

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 =   898

SPECfp_rate_base2006 = 875

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jan-2017
Hardware Availability: Mar-2016
Software Availability: Sep-2016

Platform Notes (Continued)

```
  SPEC is set to: /home/cpu2006-1.2-ic17.0
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   690G  101G  590G  15% /home
  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 LENOVO -[TCE125O-2.20]- 09/07/2016
  Memory:
  8x NO DIMM Unknown
  16x Samsung M393A2G40DB1-CRC 16 GB 2 rank 2400 MHz

(End of data from sysinfo program)
```

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006-1.2-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"

```
 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 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

Continued on next page

SPEC CFP2006 Result
Copyright 2006-2017 Standard Performance Evaluation Corporation

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp_rate2006 = 898

SPECfp_rate_base2006 = 875

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jan-2017
Hardware Availability: Mar-2016
Software Availability: Sep-2016

Base Portability Flags (Continued)

```
        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 -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

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

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-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/compilers_and_libraries_2017/linux/lib/ia32
```

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

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp\_rate2006 =$ 898

$SPECfp\_rate\_base2006 =$ 875

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jan-2017
Hardware Availability: Mar-2016
Software Availability: Sep-2016

Peak Compiler Invocation (Continued)

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
        450.soplex: -D_FILE_OFFSET_BITS=64
       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: basepeak = yes

        470.lbm: basepeak = yes

      482.sphinx3: basepeak = yes
```

C++ benchmarks:

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

        447.dealII: basepeak = yes

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

Continued on next page

SPEC CFP2006 Result
Copyright 2006-2017 Standard Performance Evaluation Corporation

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp\_rate2006 =$ 898

$SPECfp\_rate\_base2006 =$ 875

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jan-2017
Hardware Availability: Mar-2016
Software Availability: Sep-2016

Peak Optimization Flags (Continued)

453.povray: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2) -unroll4 -qopt-mem-layout-trans=3`

Fortran benchmarks:

410.bwaves: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`

416.gamess: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-`

434.zeusmp: `basepeak = yes`

437.leslie3d: `Same as 410.bwaves`

459.GemsFDTD: `Same as 410.bwaves`

465.tonto: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2) -unroll4 -auto -inline-calloc`
`-qopt-malloc-options=3`

Benchmarks using both Fortran and C:

435.gromacs: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32`
`-qopt-mem-layout-trans=3`

436.cactusADM: `basepeak = yes`

454.calculix: `basepeak = yes`

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-ic17.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-BDW-C.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-BDW-C.xml

Lenovo Group Limited

Lenovo System x3650 M5
(2.00 GHz, Intel Xeon E5-2660 v4)

$SPECfp\_rate2006 = 898$

$SPECfp\_rate\_base2006 = 875$

CPU2006 license: 9017	**Test date:** Jan-2017
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Mar-2016
Tested by: Lenovo Group Limited	**Software Availability:** Sep-2016

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

Tested with SPEC CPU2006 v1.2.
Report generated on Tue Feb 7 17:00:28 2017 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 7 February 2017.