SPEC® CFP2006 Result

Lenovo Group Limited

$SPECfp®\_rate2006 = 675$

Lenovo Flex System x240 M5
(Intel Xeon E5-2650 v3, 3.00 GHz)

$SPECfp\_rate\_base2006 = 656$

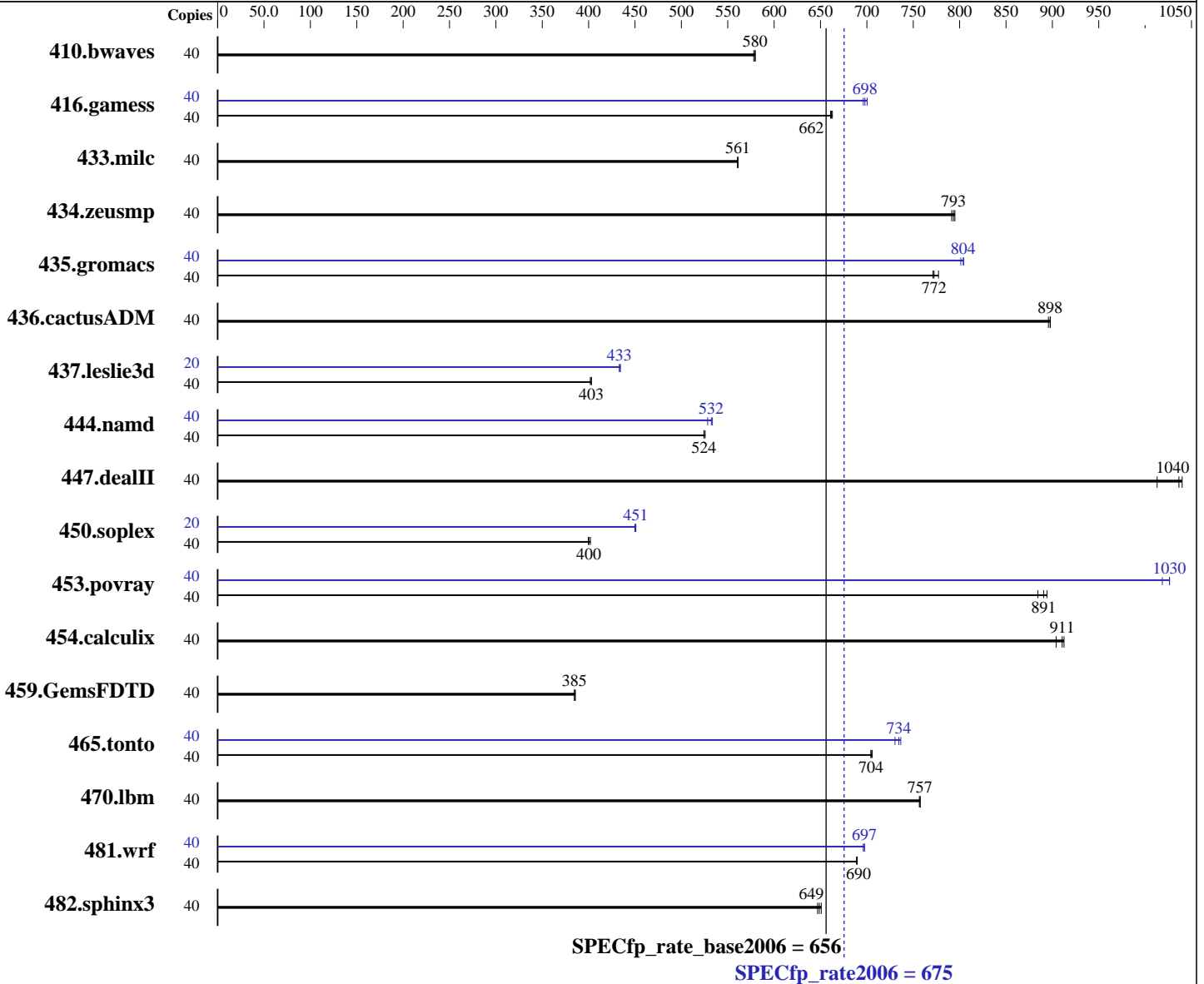Benchmark results (Copies = 40 unless noted):

Benchmark	Copies	Base	Peak
410.bwaves	40	580	
416.gamess	40 / 40	662	698
433.milc	40	561	
434.zeusmp	40	793	
435.gromacs	40 / 40	772	804
436.cactusADM	40	898	
437.leslie3d	20 / 40	403	433
444.namd	40 / 40	524	532
447.dealII	40	1040	
450.soplex	20 / 40	400	451
453.povray	40 / 40	891	1030
454.calculix	40	911	
459.GemsFDTD	40	385	
465.tonto	40 / 40	704	734
470.lbm	40	757	
481.wrf	40 / 40	690	697
482.sphinx3	40	649	

SPECfp_rate_base2006 = 656

SPECfp_rate2006 = 675

Hardware

CPU Name:	Intel Xeon E5-2650 v3
CPU Characteristics:	Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz:	2300
FPU:	Integrated
CPU(s) enabled:	20 cores, 2 chips, 10 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 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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CPU2006 license: 9017	**Test date:** May-2015
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Dec-2014
Tested by: Lenovo Group Limited	**Software Availability:** Nov-2013

L3 Cache:	25 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)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 300 GB SAS, 10000 RPM	Other Software:	None
Other Hardware:	None		

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	40	938	580	940	578	**938**	**580**	40	938	580	940	578	**938**	**580**
416.gamess	40	1185	661	**1183**	**662**	1182	663	40	**1122**	**698**	1118	700	1125	696
433.milc	40	655	561	**655**	**561**	655	561	40	655	561	**655**	**561**	655	561
434.zeusmp	40	460	791	458	795	**459**	**793**	40	460	791	458	795	**459**	**793**
435.gromacs	40	367	777	370	771	**370**	**772**	40	356	801	**355**	**804**	355	804
436.cactusADM	40	532	898	**532**	**898**	534	896	40	532	898	**532**	**898**	534	896
437.leslie3d	40	933	403	**934**	**403**	936	402	20	**434**	**433**	434	433	433	434
444.namd	40	**612**	**524**	610	526	612	524	40	**603**	**532**	601	533	607	528
447.dealII	40	440	1040	452	1010	**442**	**1040**	40	440	1040	452	1010	**442**	**1040**
450.soplex	40	**833**	**400**	830	402	835	400	20	370	451	371	450	**370**	**451**
453.povray	40	238	894	241	884	**239**	**891**	40	**207**	**1030**	209	1020	207	1030
454.calculix	40	**362**	**911**	362	913	365	904	40	**362**	**911**	362	913	365	904
459.GemsFDTD	40	1103	385	**1103**	**385**	1100	386	40	1103	385	**1103**	**385**	1100	386
465.tonto	40	559	704	558	706	**559**	**704**	40	539	730	**536**	**734**	534	737
470.lbm	40	726	757	726	757	**726**	**757**	40	726	757	726	757	**726**	**757**
481.wrf	40	**648**	**690**	648	690	649	689	40	642	696	**641**	**697**	641	697
482.sphinx3	40	1205	647	**1202**	**649**	1198	651	40	1205	647	**1202**	**649**	1198	651

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

    Operating Mode set to Maximum Performance in BIOS
    Enabled COD Preference in BIOS
    Disabled Early Snoop Preference in BIOS

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Software Availability: Nov-2013

Platform Notes (Continued)

```
Disabled Patrol Scrub in BIOS
 Sysinfo program /cpu2006.1.2_14.0_jan2014/config/sysinfo.rev6818
 $Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
 running on newport-rhel6.5 Wed May 20 10:45:28 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 E5-2650 v3 @ 2.30GHz
       2 "physical id"s (chips)
       40 "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 : 10
       siblings  : 20
       physical 0: cores 0 1 2 3 4 8 9 10 11 12
       physical 1: cores 0 1 2 3 4 8 9 10 11 12
    cache size : 12800 KB

 From /proc/meminfo
    MemTotal:       264120276 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 newport-rhel6.5 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 May 20 07:41 last=5

 SPEC is set to: /cpu2006.1.2_14.0_jan2014
    Filesystem                       Type  Size  Used Avail Use% Mounted on
    /dev/mapper/vg_newportrhel6-lv_root ext4  265G   86G  166G  35% /

 Additional information from dmidecode:
   BIOS IBM -[C4E105JUS-1.10]- 04/11/2015
   Memory:
    8x NO DIMM Unknown
    16x Samsung M393A2G40DB0-CPB 16 GB 2133 MHz 2 rank

 (End of data from sysinfo program)
```

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General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/cpu2006.1.2_14.0_jan2014/libs/32:/cpu2006.1.2_14.0_jan2014/libs/64:/cpu2006.1.2_14.0_jan2014/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
          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

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Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: May-2015
Hardware Availability: Dec-2014
Software Availability: Nov-2013

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
```

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
```

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CPU2006 license: 9017
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Test date: May-2015
Hardware Availability: Dec-2014
Software Availability: Nov-2013

Peak Portability Flags (Continued)

```
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: -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
```

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
```

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Test date: May-2015

Hardware Availability: Dec-2014

Software Availability: Nov-2013

Peak Optimization Flags (Continued)

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-Flags-V1.2-HSW-BB.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-Flags-V1.2-HSW-BB.xml

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