SPEC® CFP2006 Result

Dell Inc.

PowerEdge C6420 (Intel Xeon Platinum 8168, 2.70 GHz)

$SPECfp^{®}\_rate2006 = 1650$

$SPECfp\_rate\_base2006 = 1600$
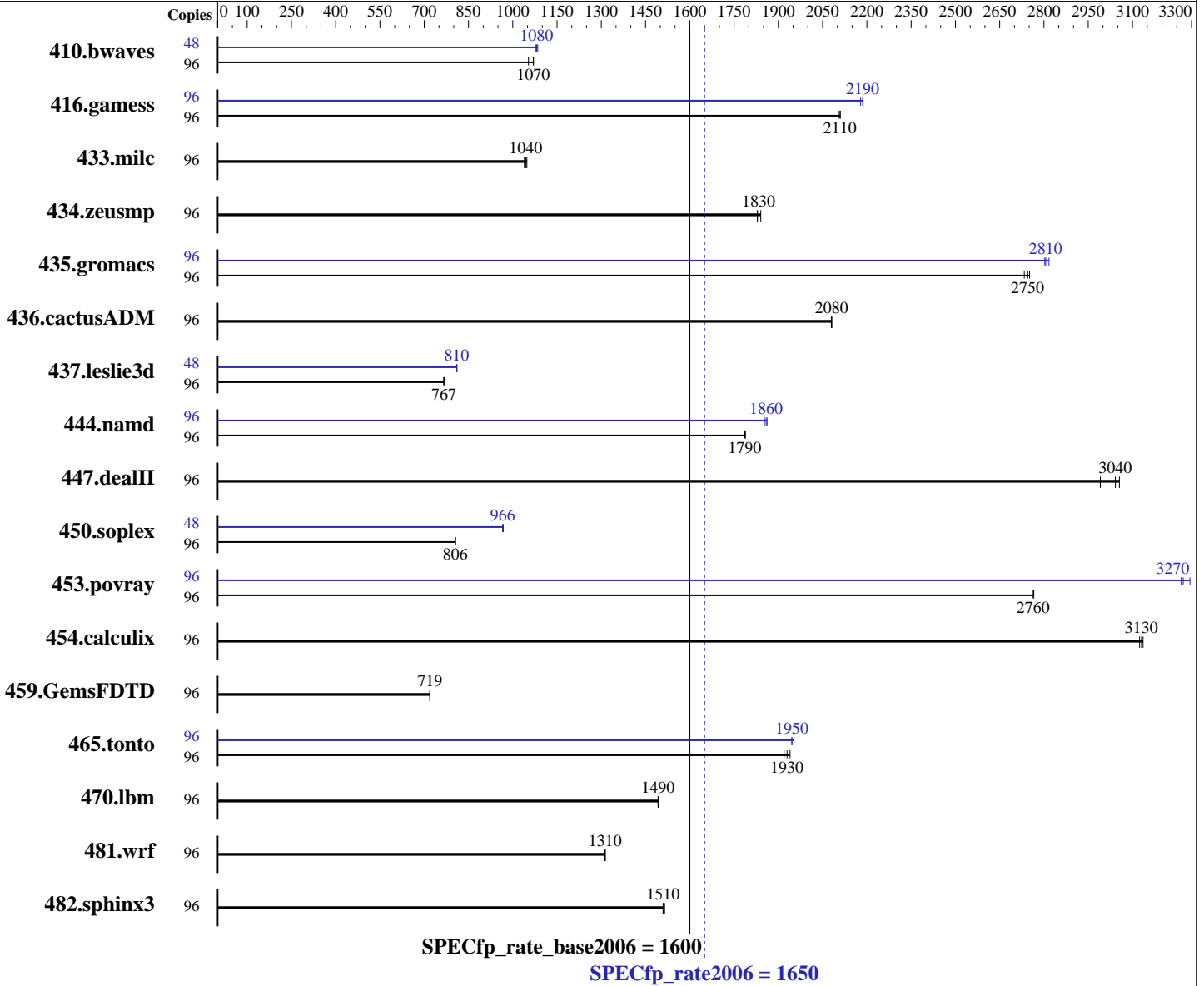
CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

Test date: May-2017
Hardware Availability: Jul-2017
Software Availability: Jul-2017

Benchmark	Copies	Result
410.bwaves	48	1080
	96	1070
416.gamess	96	2190
	96	2110
433.milc	96	1040
434.zeusmp	96	1830
435.gromacs	96	2810
	96	2750
436.cactusADM	96	2080
437.leslie3d	48	810
	96	767
444.namd	96	1860
	96	1790
447.dealII	96	3040
450.soplex	48	966
	96	806
453.povray	96	3270
	96	2760
454.calculix	96	3130
459.GemsFDTD	96	719
465.tonto	96	1950
	96	1930
470.lbm	96	1490
481.wrf	96	1310
482.sphinx3	96	1510

SPECfp_rate_base2006 = 1600

SPECfp_rate2006 = 1650

Hardware

CPU Name: Intel Xeon Platinum 8168
CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz: 2700
FPU: Integrated
CPU(s) enabled: 48 cores, 2 chips, 24 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: 1 MB I+D on chip per core

Continued on next page

Software

Operating System: SUSE Linux Enterprise Server 12 SP2 4.4.21-69-default
Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux
Auto Parallel: Yes
File System: ext4
System State: Run level 3 (multi-user)

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L3 Cache:	33 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	384 GB (12 x 32 GB 2Rx8 PC4-2666V-R)	Other Software:	None
Disk Subsystem:	1 x 960 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	96	**_1220_**	**_1070_**	1219	1070	1239	1050	48	605	1080	601	1080	**_603_**	**_1080_**
416.gamess	96	891	2110	**_891_**	**_2110_**	893	2100	96	859	2190	863	2180	**_860_**	**_2190_**
433.milc	96	848	1040	**_844_**	**_1040_**	841	1050	96	848	1040	**_844_**	**_1040_**	841	1050
434.zeusmp	96	478	1830	475	1840	**_476_**	**_1830_**	96	478	1830	475	1840	**_476_**	**_1830_**
435.gromacs	96	249	2750	**_250_**	**_2750_**	251	2730	96	245	2800	**_244_**	**_2810_**	243	2820
436.cactusADM	96	552	2080	**_551_**	**_2080_**	551	2080	96	552	2080	**_551_**	**_2080_**	551	2080
437.leslie3d	96	**_1177_**	**_767_**	1177	767	1177	767	48	557	810	**_557_**	**_810_**	556	811
444.namd	96	430	1790	**_431_**	**_1790_**	431	1780	96	**_414_**	**_1860_**	416	1850	414	1860
447.dealII	96	359	3060	367	2990	**_361_**	**_3040_**	96	359	3060	367	2990	**_361_**	**_3040_**
450.soplex	96	**_994_**	**_806_**	995	805	994	806	48	414	968	415	966	**_414_**	**_966_**
453.povray	96	185	2770	185	2760	**_185_**	**_2760_**	96	156	3270	155	3290	**_156_**	**_3270_**
454.calculix	96	254	3120	**_253_**	**_3130_**	253	3140	96	254	3120	**_253_**	**_3130_**	253	3140
459.GemsFDTD	96	1417	719	**_1416_**	**_719_**	1415	720	96	1417	719	**_1416_**	**_719_**	1415	720
465.tonto	96	**_490_**	**_1930_**	492	1920	487	1940	96	484	1950	485	1950	**_485_**	**_1950_**
470.lbm	96	**_884_**	**_1490_**	884	1490	884	1490	96	**_884_**	**_1490_**	884	1490	884	1490
481.wrf	96	**_817_**	**_1310_**	817	1310	816	1310	96	**_817_**	**_1310_**	817	1310	816	1310
482.sphinx3	96	**_1239_**	**_1510_**	1240	1510	1235	1510	96	**_1239_**	**_1510_**	1240	1510	1235	1510

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 settings:
    Sub NUMA Cluster enabled
    Virtualization Technology disabled
```

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Platform Notes (Continued)

```
    System Profile set to Custom
    CPU Performance set to Maximum Performance
    C States set to autonomous
    C1E disabled
    Energy Efficient Turbo disabled
    Uncore Frequency set to Dynamic
    Energy Efficiency Policy set to Performance
    Memory Patrol Scrub disabled
    Logical Processor enabled
    CPU Interconnect Bus Link Power Management disabled
    PCI ASPM L1 Link Power Management disabled
    Sysinfo program /root/cpu2006-1.2_ic17u3/config/sysinfo.rev6993
    Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
    running on linux-fx60 Thu May 25 02:05:24 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) Platinum 8168 CPU @ 2.70GHz
          2 "physical id"s (chips)
          96 "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 : 24
          siblings  : 48
          physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
          27 28 29
          physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
          27 28 29
       cache size : 33792 KB

    From /proc/meminfo
       MemTotal:       394867844 kB
       HugePages_Total:        0
       Hugepagesize:        2048 kB

    From /etc/*release* /etc/*version*
       SuSE-release:
          SUSE Linux Enterprise Server 12 (x86_64)
          VERSION = 12
          PATCHLEVEL = 2
          # 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-SP2"
          VERSION_ID="12.2"
          PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
```

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Platform Notes (Continued)

```
     ID="sles"
     ANSI_COLOR="0;32"
     CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
   Linux linux-fx60 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
   (9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 23 11:39

SPEC is set to: /root/cpu2006-1.2_ic17u3
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       ext4  909G  8.5G  900G   1% /
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 Dell Inc. 1.0.0 05/17/2017
 Memory:
 2x 002C00B3002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz
 10x 002C0632002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz
 4x Not Specified Not Specified

(End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"


 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 Transparent Huge Pages enabled by default
 Filesystem page cache cleared with:
 shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

Base Compiler Invocation

C benchmarks:
```
icc -m64
```

C++ benchmarks:
```
icpc -m64
```

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Base Compiler Invocation (Continued)

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
```

Base Optimization Flags

C benchmarks:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

Fortran benchmarks:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

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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
```

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:

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Peak Optimization Flags (Continued)

444.namd: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(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-AVX512(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

453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(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: basepeak = yes

465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(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-AVX512(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

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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-revF.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge14G-revC.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-revF.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge14G-revC.xml

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