SPEC® CFP2006 Result

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Dell Inc.

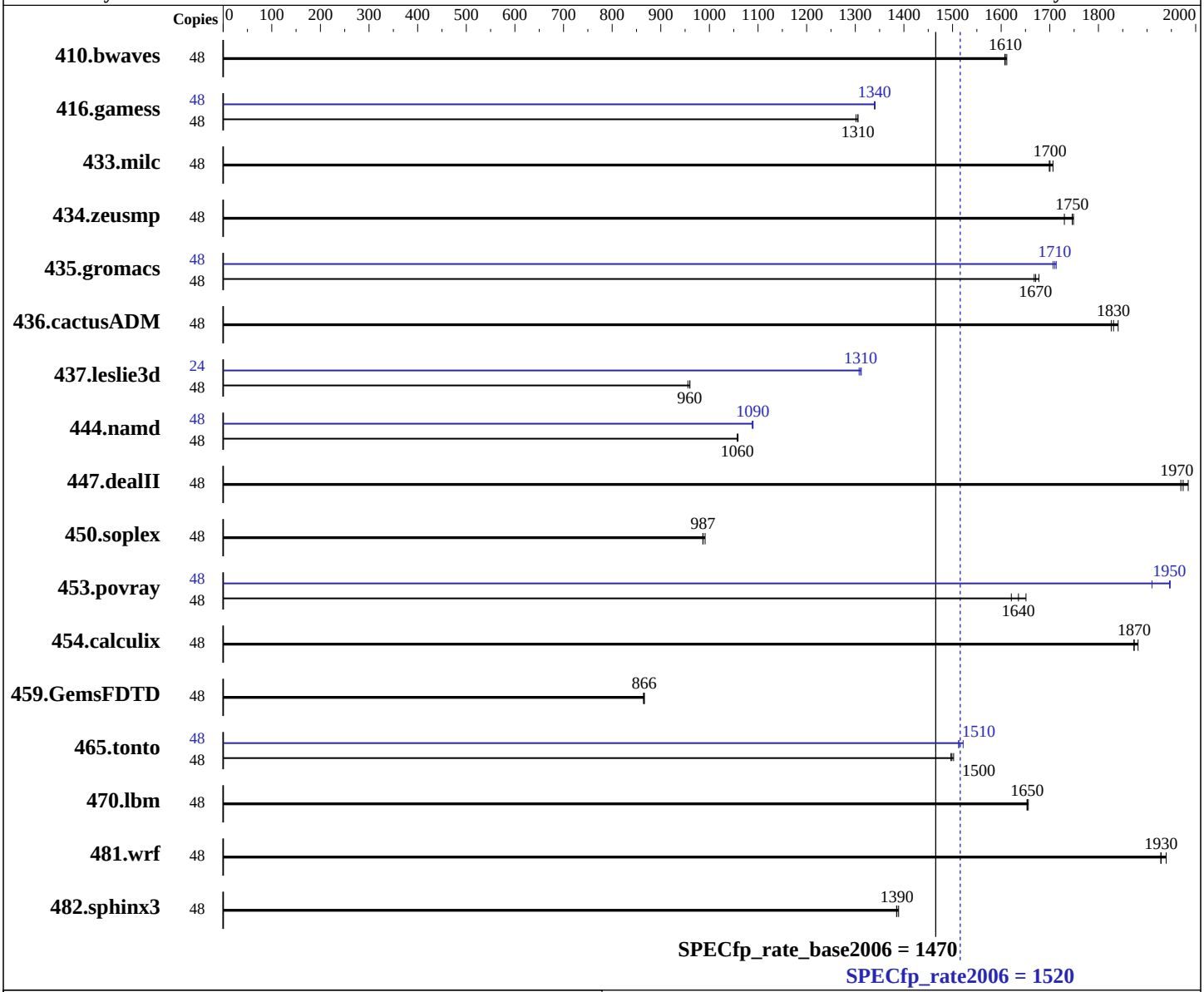
PowerEdge R940 (Intel Xeon Gold 6128, 3.40 GHz)

SPECfp®_rate2006 = 1520

SPECfp_rate_base2006 = 1470

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

Test date: May-2017
Hardware Availability: Jul-2017
Software Availability: Nov-2016



Hardware

CPU Name:	Intel Xeon Gold 6128
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	3400
FPU:	Integrated
CPU(s) enabled:	24 cores, 4 chips, 6 cores/chip, 2 threads/core
CPU(s) orderable:	2,4 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	1 MB I+D on chip per core

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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:	xfs
System State:	Run level 3 (multi-user)

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L3 Cache: 19.25 MB I+D on chip per chip
Other Cache: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem: 1 x 960 GB SATA SSD
Other Hardware: None

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	405	1610	**406**	**1610**	406	1610	48	405	1610	**406**	**1610**	406	1610
416.gamess	48	**720**	**1310**	720	1310	722	1300	48	701	1340	**702**	**1340**	702	1340
433.milc	48	258	1710	259	1700	**259**	**1700**	48	258	1710	259	1700	**259**	**1700**
434.zeusmp	48	250	1750	**250**	**1750**	252	1730	48	250	1750	**250**	**1750**	252	1730
435.gromacs	48	**205**	**1670**	205	1670	204	1680	48	201	1710	**200**	**1710**	200	1710
436.cactusADM	48	**313**	**1830**	312	1840	314	1830	48	**313**	**1830**	312	1840	314	1830
437.leslie3d	48	470	960	472	956	**470**	**960**	24	**172**	**1310**	172	1310	173	1310
444.namd	48	364	1060	**364**	**1060**	364	1060	48	353	1090	354	1090	**353**	**1090**
447.dealII	48	279	1970	277	1980	**278**	**1970**	48	279	1970	277	1980	**278**	**1970**
450.soplex	48	404	991	406	987	**406**	**987**	48	404	991	406	987	**406**	**987**
453.povray	48	**156**	**1640**	155	1650	158	1620	48	**131**	**1950**	134	1910	131	1950
454.calculix	48	210	1880	211	1870	**211**	**1870**	48	210	1880	211	1870	**211**	**1870**
459.GemsFDTD	48	**588**	**866**	589	864	588	866	48	**588**	**866**	589	864	588	866
465.tonto	48	316	1500	**315**	**1500**	314	1500	48	312	1510	**312**	**1510**	310	1520
470.lbm	48	399	1650	**399**	**1650**	398	1660	48	399	1650	**399**	**1650**	398	1660
481.wrf	48	278	1930	**278**	**1930**	276	1940	48	278	1930	**278**	**1930**	276	1940
482.sphinx3	48	676	1380	**675**	**1390**	673	1390	48	676	1380	**675**	**1390**	673	1390

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
```

Continued on next page

Platform Notes (Continued)

```
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to autonomous
C1E 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 /home/cpu2006-1.2_ic17u3/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-b14r Tue May 30 03:01:41 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) Gold 6128 CPU @ 3.40GHz
      4 "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 6 9 10 11 13
      physical 1: cores 0 6 9 10 11 13
      physical 2: cores 0 6 9 10 11 13
      physical 3: cores 0 6 9 10 11 13
  cache size : 19712 KB

From /proc/meminfo
   MemTotal:       791001296 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP2

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"
```

Continued on next page

Platform Notes (Continued)

```
        VERSION_ID="12.2"
        PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp2"

 uname -a:
    Linux linux-b14r 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 29 19:24

 SPEC is set to: /home/cpu2006-1.2_ic17u3
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   852G  8.5G  843G   1% /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 Dell Inc. 1.0.0 05/16/2017
   Memory:
    48x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666 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_ic17u3/lib/ia32:/home/cpu2006-1.2_ic17u3/lib/intel64:/home/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
```

Continued on next page

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

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc -m64 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

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-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: basepeak = yes

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: basepeak = yes

Continued on next page

Peak Optimization Flags (Continued)

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

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`

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-revB.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-revB.xml`

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