SPEC® CFP2006 Result

Dell Inc.

PowerEdge R740 (Intel Xeon Platinum 8170, 2.10 GHz)

$SPECfp®_rate2006 = $ 1640

$SPECfp_rate_base2006 = $ 1590
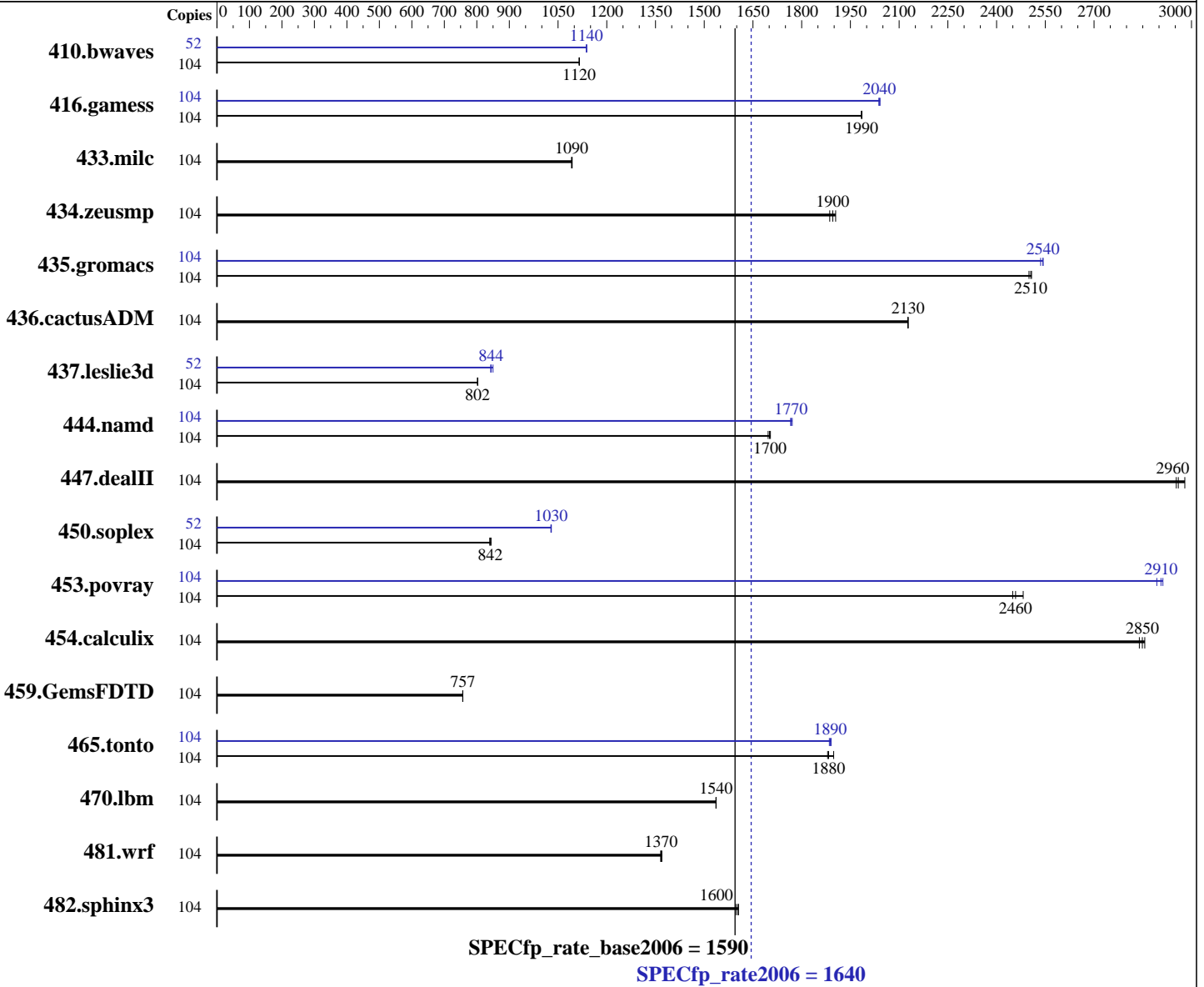
CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

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

SPECfp_rate_base2006 = 1590

SPECfp_rate2006 = 1640

Hardware

CPU Name:	Intel Xeon Platinum 8170
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2100
FPU:	Integrated
CPU(s) enabled:	52 cores, 2 chips, 26 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:	xfs
System State:	Run level 3 (multi-user)

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L3 Cache:	35.75 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	384 GB (24 x 16 GB 2Rx8 PC4-2666V-R)	Other Software:	None
Disk Subsystem:	1 x 960 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	104	1267	1120	**1267**	**1120**	1268	1110	52	621	1140	621	1140	**621**	**1140**
416.gamess	104	1026	1990	**1026**	**1990**	1027	1980	104	998	2040	**999**	**2040**	999	2040
433.milc	104	**874**	**1090**	875	1090	873	1090	104	**874**	**1090**	875	1090	873	1090
434.zeusmp	104	502	1890	497	1900	**499**	**1900**	104	502	1890	497	1900	**499**	**1900**
435.gromacs	104	296	2510	297	2500	**296**	**2510**	104	293	2540	292	2540	**292**	**2540**
436.cactusADM	104	584	2130	**584**	**2130**	584	2130	104	584	2130	**584**	**2130**	584	2130
437.leslie3d	104	**1218**	**802**	1218	803	1219	802	52	**579**	**844**	575	850	580	843
444.namd	104	492	1700	**490**	**1700**	490	1700	104	**472**	**1770**	471	1770	472	1770
447.dealII	104	**402**	**2960**	399	2980	403	2950	104	**402**	**2960**	399	2980	403	2950
450.soplex	104	1033	840	1028	844	**1030**	**842**	52	421	1030	**421**	**1030**	422	1030
453.povray	104	**225**	**2460**	226	2450	223	2480	104	190	2910	**190**	**2910**	191	2890
454.calculix	104	302	2840	**301**	**2850**	300	2860	104	302	2840	**301**	**2850**	300	2860
459.GemsFDTD	104	1458	757	1458	757	**1458**	**757**	104	1458	757	1458	757	**1458**	**757**
465.tonto	104	544	1880	539	1900	**543**	**1880**	104	**542**	**1890**	541	1890	543	1890
470.lbm	104	930	1540	**930**	**1540**	930	1540	104	930	1540	**930**	**1540**	930	1540
481.wrf	104	848	1370	**850**	**1370**	850	1370	104	848	1370	**850**	**1370**	850	1370
482.sphinx3	104	1263	1610	**1263**	**1600**	1268	1600	104	1263	1610	**1263**	**1600**	1268	1600

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
    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-wwko Wed May 17 01:34:24 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 8170 CPU @ 2.10GHz
          2 "physical id"s (chips)
          104 "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 : 26
          siblings  : 52
          physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
          26 27 28 29
          physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25
          26 27 28 29
       cache size : 36608 KB

    From /proc/meminfo
       MemTotal:       394867840 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"
```

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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-wwko 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 16 14:04

    SPEC is set to: /root/cpu2006-1.2_ic17u3
        Filesystem      Type  Size  Used Avail Use% Mounted on
        /dev/sda2       xfs   892G  9.1G  883G   2% /
    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. 0.5.8 05/12/2017
      Memory:
      18x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666 MHz
      6x 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 = "/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-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

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

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