SPEC® CFP2006 Result

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Dell Inc.

PowerEdge R940
(Intel Xeon Gold 6126, 2.60 GHz)

$SPECfp^{®}\_rate2006 = 2230$
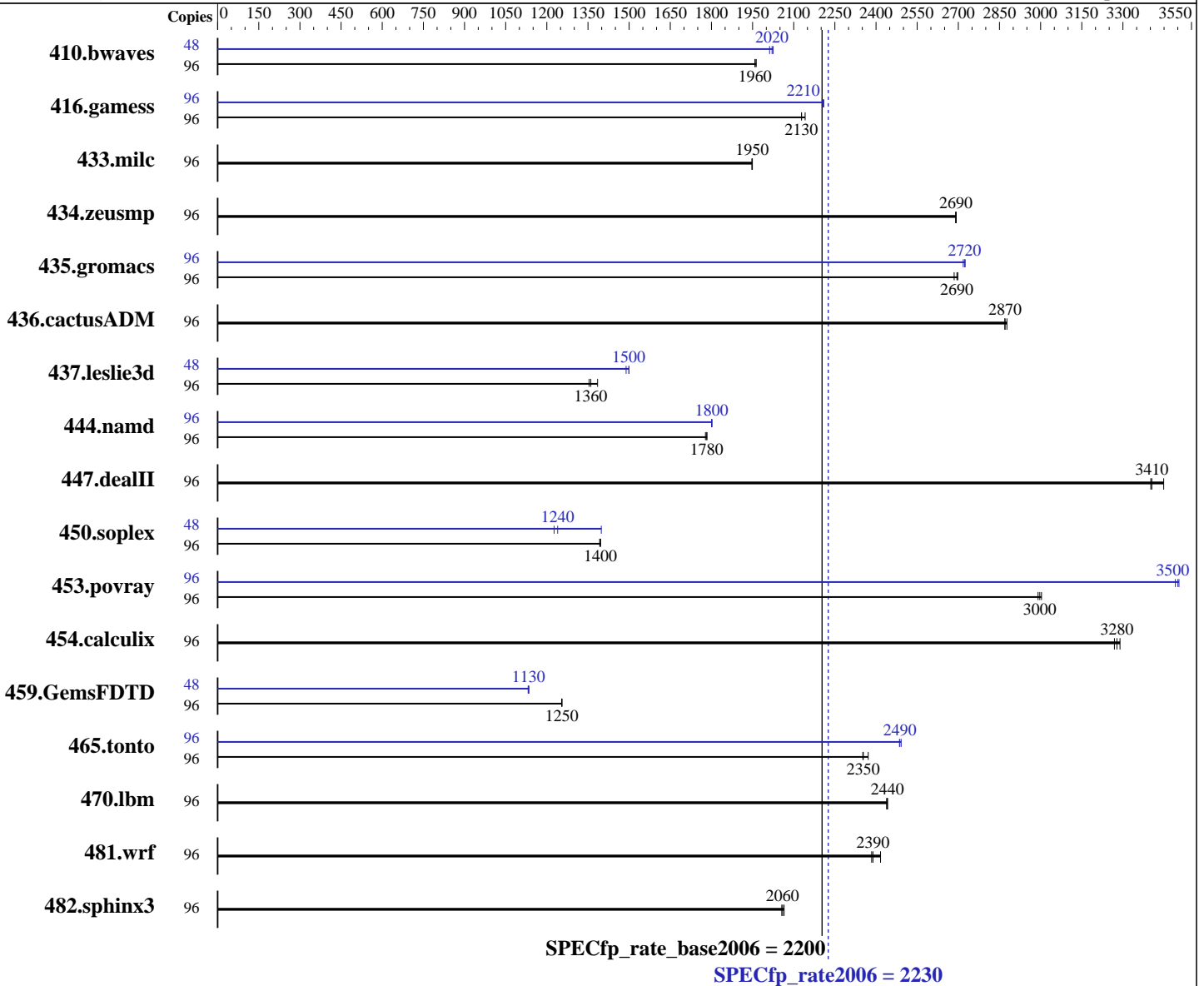
$SPECfp\_rate\_base2006 = 2200$

CPU2006 license: 55

Test sponsor: Dell Inc.

Tested by: Dell Inc.

Test date: Oct-2017

Hardware Availability: Sep-2017

Software Availability: Apr-2017

Copies		
410.bwaves	48	2020
	96	1960
416.gamess	96	2210
	96	2130
433.milc	96	1950
434.zeusmp	96	2690
435.gromacs	96	2720
	96	2690
436.cactusADM	96	2870
437.leslie3d	48	1500
	96	1360
444.namd	96	1800
	96	1780
447.dealII	96	3410
450.soplex	48	1240
	96	1400
453.povray	96	3500
	96	3000
454.calculix	96	3280
459.GemsFDTD	48	1130
	96	1250
465.tonto	96	2490
	96	2350
470.lbm	96	2440
481.wrf	96	2390
482.sphinx3	96	2060

SPECfp_rate_base2006 = 2200

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Hardware

CPU Name: Intel Xeon Gold 6126

CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz

CPU MHz: 2600

FPU: Integrated

CPU(s) enabled: 48 cores, 4 chips, 12 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

Continued on next page

Software

Operating System: SUSE Linux Enterprise Server 12 (x86_64) 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	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)	Other Software:	None
Disk Subsystem:	1 x 900 GB 15K RPM SAS12		
Other Hardware:	None		

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	96	664	1960	**666**	**1960**	666	1960	48	322	2020	324	2010	**323**	**2020**
416.gamess	96	883	2130	**883**	**2130**	878	2140	96	853	2200	**852**	**2210**	851	2210
433.milc	96	452	1950	**452**	**1950**	453	1950	96	452	1950	**452**	**1950**	453	1950
434.zeusmp	96	325	2690	**325**	**2690**	324	2690	96	325	2690	**325**	**2690**	324	2690
435.gromacs	96	254	2700	255	2680	**254**	**2690**	96	252	2720	252	2730	**252**	**2720**
436.cactusADM	96	399	2880	400	2870	**400**	**2870**	96	399	2880	400	2870	**400**	**2870**
437.leslie3d	96	666	1350	652	1390	**663**	**1360**	48	**301**	**1500**	301	1500	303	1490
444.namd	96	432	1780	**432**	**1780**	433	1780	96	427	1800	**428**	**1800**	428	1800
447.dealII	96	318	3450	**322**	**3410**	323	3400	96	318	3450	**322**	**3410**	323	3400
450.soplex	96	575	1390	574	1400	**574**	**1400**	48	326	1230	286	1400	**323**	**1240**
453.povray	96	170	3000	171	2990	**170**	**3000**	96	**146**	**3500**	146	3490	146	3500
454.calculix	96	241	3290	242	3270	**242**	**3280**	96	241	3290	242	3270	**242**	**3280**
459.GemsFDTD	96	812	1250	**812**	**1250**	812	1250	48	449	1130	**449**	**1130**	450	1130
465.tonto	96	**401**	**2350**	398	2370	402	2350	96	**380**	**2490**	379	2490	380	2490
470.lbm	96	**540**	**2440**	540	2440	541	2440	96	**540**	**2440**	540	2440	541	2440
481.wrf	96	444	2420	450	2380	**449**	**2390**	96	444	2420	450	2380	**449**	**2390**
482.sphinx3	96	**908**	**2060**	906	2060	910	2060	96	**908**	**2060**	906	2060	910	2060

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

Kernel boot parameter: nohz_full=1-95
Stack size set to unlimited using "ulimit -s unlimited"

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Platform Notes

```
        BIOS settings:
        Logical Processor Enabled
        Virtualization Technology Disabled
        Sub NUMA Cluster Enabled
        System Profile set to Custom
        CPU Performance set to Maximum Performance
        C1E Disabled
        C States set to Autonomous
        Uncore Frequency set to Dynamic
        Memory Patrol Scrub Disabled
        Energy Efficiency Policy set to Performance
        CPU Interconnect Bus Link Power Management Disabled
        PCI ASPM L1 Link Power Management Disabled
        Sysinfo program /home/cpu2006/config/sysinfo.rev6993
        Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
        running on linux-92x1 Wed Oct 25 01:48:18 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 6126 CPU @ 2.60GHz
              4 "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 : 12
              siblings  : 24
              physical 0: cores 0 1 3 4 5 6 8 9 10 11 12 13
              physical 1: cores 0 1 3 4 5 6 8 9 10 11 12 13
              physical 2: cores 0 1 3 4 5 6 8 9 10 11 12 13
              physical 3: cores 0 1 3 4 5 6 8 9 10 11 12 13
           cache size : 19712 KB

        From /proc/meminfo
           MemTotal:       791223344 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.
```

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Platform Notes (Continued)

```
    os-release:
       NAME="SLES"
       VERSION="12-SP2"
       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-92x1 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 Oct 24 16:20

  SPEC is set to: /home/cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda4       xfs   796G   17G  779G   3% /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. 1.1.7 08/10/2017
     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/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/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
```

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Base Compiler Invocation (Continued)

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

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

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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-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

  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
```

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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-revD.20171221.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-revD.20171221.xml

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

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