SPEC® CFP2006 Result

Dell Inc.

PowerEdge R940
(Intel Xeon Gold 6140, 2.30 GHz)

$SPECfp®\_rate2006 = 2760$

$SPECfp\_rate\_base2006 = 2710$

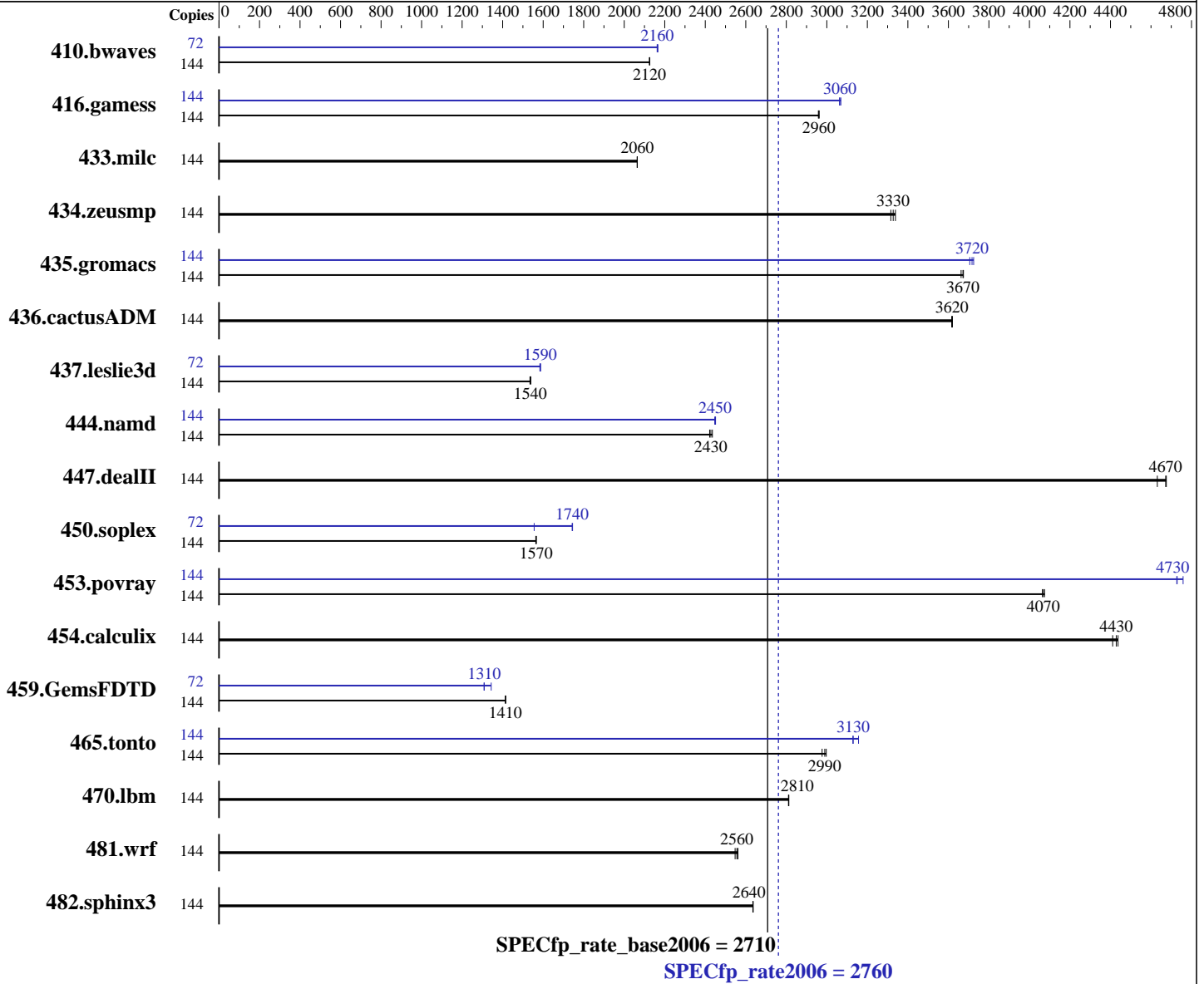|		
CPU2006 license: 55		**Test date:** Oct-2017
Test sponsor: Dell Inc.		**Hardware Availability:** Sep-2017
Tested by: Dell Inc.		**Software Availability:** Apr-2017

Copies

Benchmark	Copies	Value
410.bwaves	72	2160
	144	2120
416.gamess	144	3060
	144	2960
433.milc	144	2060
434.zeusmp	144	3330
435.gromacs	144	3720
	144	3670
436.cactusADM	144	3620
437.leslie3d	72	1590
	144	1540
444.namd	144	2450
	144	2430
447.dealII	144	4670
450.soplex	72	1740
	144	1570
453.povray	144	4730
	144	4070
454.calculix	144	4430
459.GemsFDTD	72	1310
	144	1410
465.tonto	144	3130
	144	2990
470.lbm	144	2810
481.wrf	144	2560
482.sphinx3	144	2640

SPECfp_rate_base2006 = 2710

SPECfp_rate2006 = 2760

Hardware

CPU Name:	Intel Xeon Gold 6140
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2300
FPU:	Integrated
CPU(s) enabled:	72 cores, 4 chips, 18 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)

Continued on next page

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L3 Cache:	24.75 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	144	920	2130	**921**	**2120**	921	2120	72	**452**	**2160**	452	2170	452	2160
416.gamess	144	952	2960	**952**	**2960**	953	2960	144	919	3070	921	3060	**920**	**3060**
433.milc	144	**640**	**2060**	640	2060	640	2060	144	**640**	**2060**	640	2060	640	2060
434.zeusmp	144	**394**	**3330**	395	3320	393	3340	144	**394**	**3330**	395	3320	393	3340
435.gromacs	144	**280**	**3670**	281	3660	280	3670	144	276	3720	277	3710	**277**	**3720**
436.cactusADM	144	475	3620	476	3620	**476**	**3620**	144	475	3620	476	3620	**476**	**3620**
437.leslie3d	144	880	1540	**880**	**1540**	882	1530	72	426	1590	427	1580	**427**	**1590**
444.namd	144	474	2440	477	2420	**476**	**2430**	144	**471**	**2450**	472	2450	471	2450
447.dealII	144	356	4630	352	4680	**353**	**4670**	144	356	4630	352	4680	**353**	**4670**
450.soplex	144	**767**	**1570**	767	1570	768	1560	72	**345**	**1740**	344	1750	386	1560
453.povray	144	188	4070	**188**	**4070**	188	4060	144	161	4760	162	4730	**162**	**4730**
454.calculix	144	269	4410	268	4440	**268**	**4430**	144	269	4410	268	4440	**268**	**4430**
459.GemsFDTD	144	**1080**	**1410**	1081	1410	1080	1410	72	**584**	**1310**	569	1340	584	1310
465.tonto	144	476	2980	473	3000	**474**	**2990**	144	453	3130	**453**	**3130**	449	3160
470.lbm	144	704	2810	704	2810	**704**	**2810**	144	704	2810	704	2810	**704**	**2810**
481.wrf	144	628	2560	**629**	**2560**	631	2550	144	628	2560	**629**	**2560**	631	2550
482.sphinx3	144	1065	2630	**1065**	**2640**	1065	2640	144	1065	2630	**1065**	**2640**	1065	2640

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=1-143
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-4qdv Sun Oct 22 04:45:26 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 6140 CPU @ 2.30GHz
           4 "physical id"s (chips)
           144 "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 : 18
           siblings  : 36
           physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
           physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
           physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
           physical 3: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
        cache size : 25344 KB

     From /proc/meminfo
        MemTotal:       791224272 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-4qdv 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 21 18:14

   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:
      3x 002C00B3002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666 MHz
      21x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666 MHz
      24x 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>
```

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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
```

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
```

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3
```

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:

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Peak Optimization Flags (Continued)

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-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

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Peak Optimization Flags (Continued)

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-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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