SPEC® CFP2006 Result
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Dell Inc.

PowerEdge C6420 (Intel Xeon Platinum 8156, 3.60 GHz)

$SPECfp^{®}2006 =$ 94.6

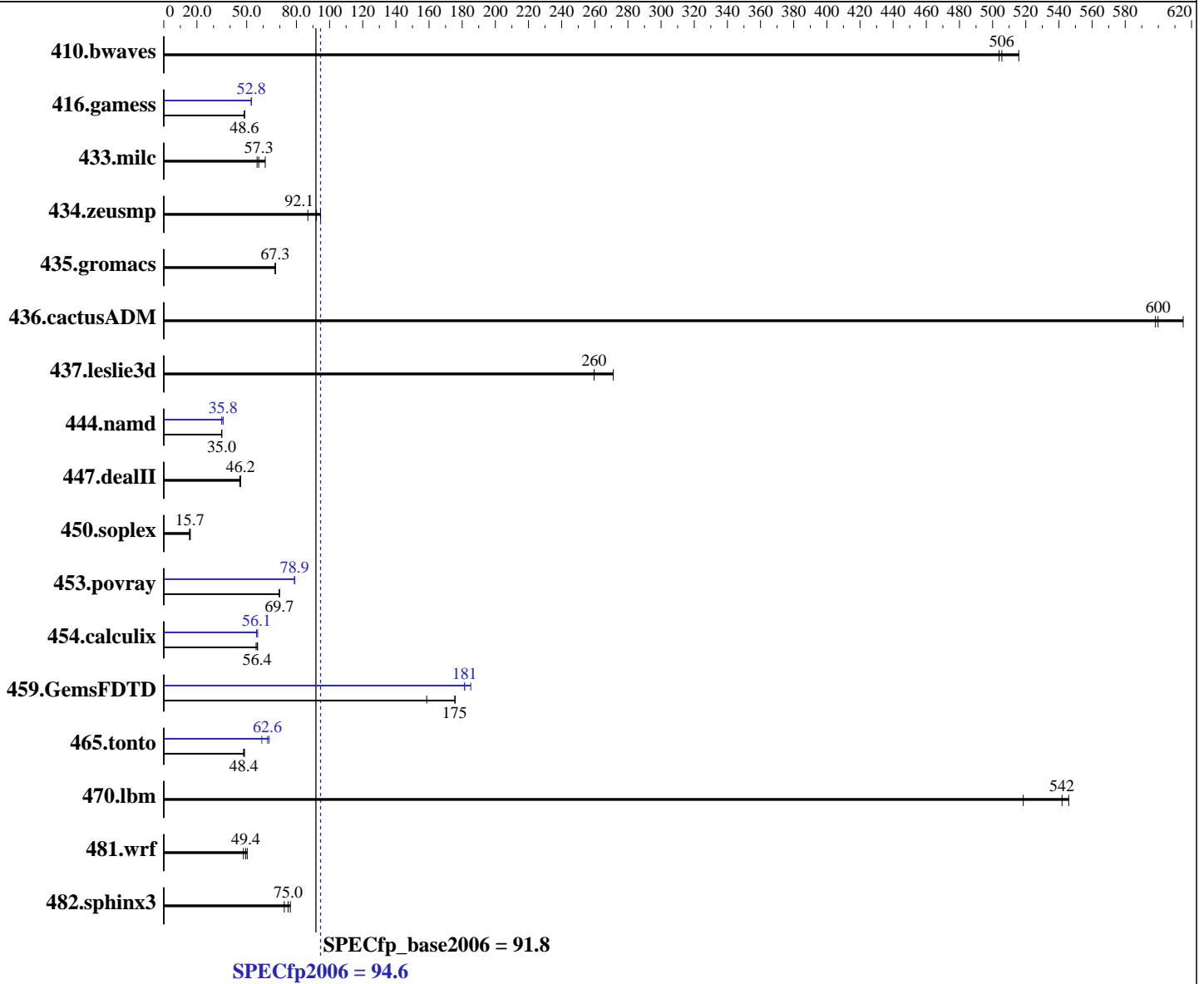$SPECfp\_base2006 =$ 91.8

CPU2006 license: 55	**Test date:** Jul-2017
Test sponsor: Dell Inc.	**Hardware Availability:** Jul-2017
Tested by: Dell Inc.	**Software Availability:** Nov-2016

SPECfp_base2006 = 91.8

SPECfp2006 = 94.6

Benchmark	Result
410.bwaves	506
416.gamess	52.8 / 48.6
433.milc	57.3
434.zeusmp	92.1
435.gromacs	67.3
436.cactusADM	600
437.leslie3d	260
444.namd	35.8 / 35.0
447.dealII	46.2
450.soplex	15.7
453.povray	78.9 / 69.7
454.calculix	56.1 / 56.4
459.GemsFDTD	181 / 175
465.tonto	62.6 / 48.4
470.lbm	542
481.wrf	49.4
482.sphinx3	75.0

Hardware

CPU Name:	Intel Xeon Platinum 8156
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	3600
FPU:	Integrated
CPU(s) enabled:	8 cores, 2 chips, 4 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 (x86_64) 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:	btrfs
System State:	Run level 3 (multi-user)

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L3 Cache:	16.5 MB I+D on chip per chip	Base Pointers:	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

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**26.9**	**506**	27.0	504	26.3	516	**26.9**	**506**	27.0	504	26.3	516
416.gamess	402	48.7	403	48.6	**403**	**48.6**	**371**	**52.8**	371	52.8	371	52.8
433.milc	150	61.2	163	56.3	**160**	**57.3**	150	61.2	163	56.3	**160**	**57.3**
434.zeusmp	96.3	94.5	105	86.9	**98.8**	**92.1**	96.3	94.5	105	86.9	**98.8**	**92.1**
435.gromacs	**106**	**67.3**	106	67.3	106	67.2	**106**	**67.3**	106	67.3	106	67.2
436.cactusADM	**19.9**	**600**	20.0	598	19.4	615	**19.9**	**600**	20.0	598	19.4	615
437.leslie3d	**36.2**	**260**	34.7	271	36.2	260	**36.2**	**260**	34.7	271	36.2	260
444.namd	229	35.0	**229**	**35.0**	230	34.9	230	34.8	**224**	**35.8**	224	35.8
447.dealII	**247**	**46.2**	250	45.8	247	46.4	**247**	**46.2**	250	45.8	247	46.4
450.soplex	538	15.5	**530**	**15.7**	521	16.0	538	15.5	**530**	**15.7**	521	16.0
453.povray	**76.3**	**69.7**	76.3	69.8	76.3	69.7	67.3	79.0	67.5	78.8	**67.4**	**78.9**
454.calculix	146	56.6	**146**	**56.4**	148	55.7	146	56.6	147	56.0	**147**	**56.1**
459.GemsFDTD	60.3	176	66.9	159	**60.5**	**175**	57.3	185	58.5	181	**58.5**	**181**
465.tonto	202	48.7	**203**	**48.4**	204	48.1	155	63.5	166	59.1	**157**	**62.6**
470.lbm	**25.4**	**542**	25.2	546	26.5	519	**25.4**	**542**	25.2	546	26.5	519
481.wrf	**226**	**49.4**	222	50.3	233	48.0	**226**	**49.4**	222	50.3	233	48.0
482.sphinx3	255	76.3	268	72.7	**260**	**75.0**	255	76.3	268	72.7	**260**	**75.0**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Operating System Notes

    Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

    BIOS settings:
    Sub NUMA Cluster disabled
    Virtualization Technology disabled
    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

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Platform Notes (Continued)

```
    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-7lna Mon Jul 17 23:37:25 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 8156 CPU @ 3.60GHz
          2 "physical id"s (chips)
          16 "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 : 4
          siblings  : 8
          physical 0: cores 0 5 9 13
          physical 1: cores 1 5 9 13
       cache size : 16896 KB

    From /proc/meminfo
       MemTotal:       394868380 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"
          ID="sles"
          ANSI_COLOR="0;32"
          CPE_NAME="cpe:/o:suse:sles:12:sp2"

    uname -a:
       Linux linux-7lna 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 Jul 17 15:45
```

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Platform Notes (Continued)

```
  SPEC is set to: /root/cpu2006-1.2_ic17u3
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda6       btrfs  272G  9.8G  262G   4% /
  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. 1.0.8 07/12/2017
  Memory:
    4x 002C00B3002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz
    4x 002C0632002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz
    4x 00AD063200AD HMA84GR7AFR4N-VK 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:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"
OMP_NUM_THREADS = "8"

  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
```

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

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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 -parallel -qopt-prefetch
```

C++ benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

Fortran benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
```

Benchmarks using both Fortran and C:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
```

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
```

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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-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

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: basepeak = yes

459.GemsFDTD: -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
-qopt-prefetch -parallel

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) -inline-calloc -qopt-malloc-options=3
-auto -unroll4

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32

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-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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