SPEC® CFP2006 Result

Dell Inc.

PowerEdge R830 (Intel Xeon E5-2698 v4, 2.20 GHz)

$SPECfp^®\_rate2006 = 989$

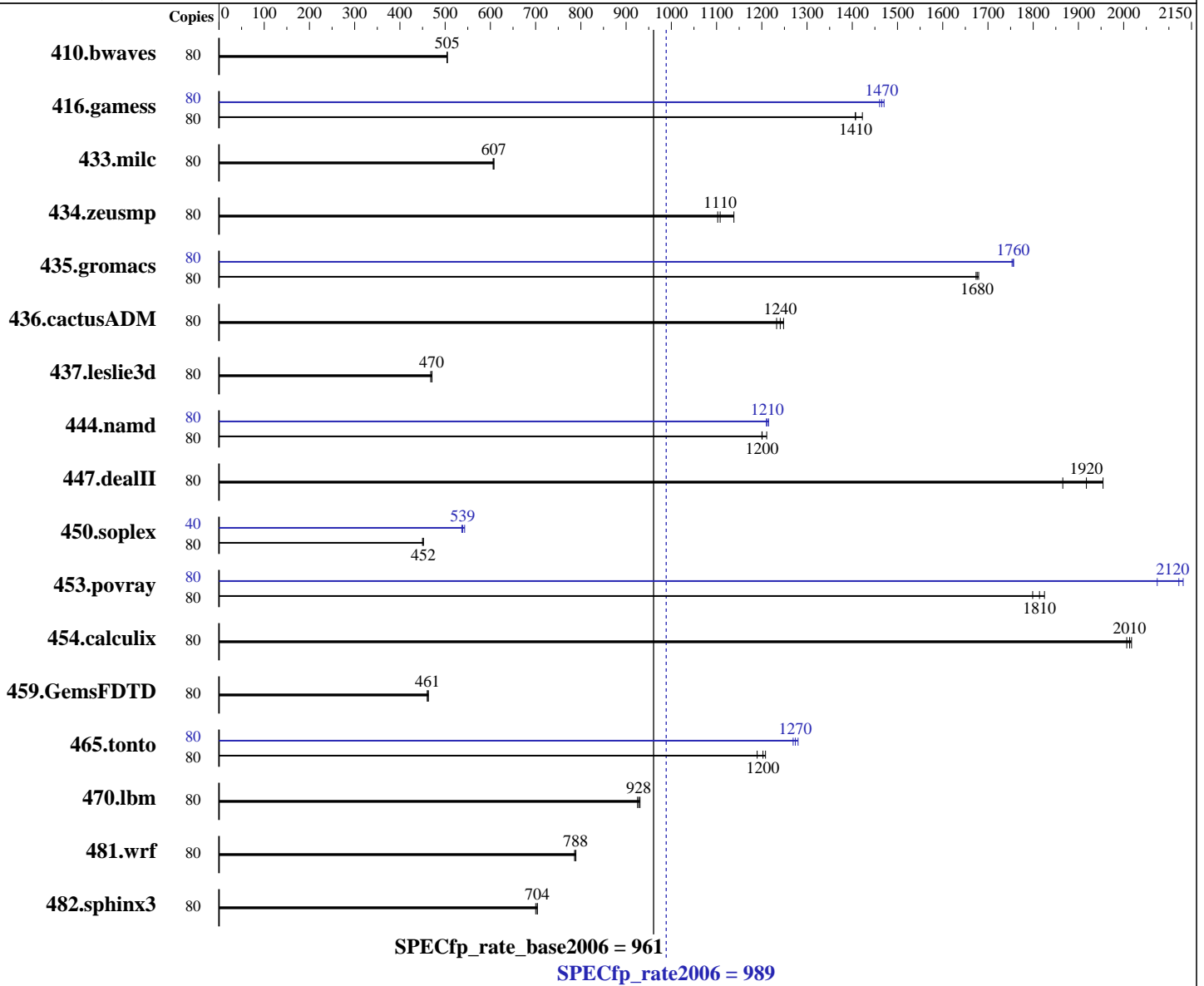$SPECfp\_rate\_base2006 = 961$

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

Test date: Jul-2017
Hardware Availability: Jun-2016
Software Availability: Mar-2016

Benchmark	Copies	Result
410.bwaves	80	505
416.gamess	80	1470
416.gamess	80	1410
433.milc	80	607
434.zeusmp	80	1110
435.gromacs	80	1760
435.gromacs	80	1680
436.cactusADM	80	1240
437.leslie3d	80	470
444.namd	80	1210
444.namd	80	1200
447.dealII	80	1920
450.soplex	40	539
450.soplex	80	452
453.povray	80	2120
453.povray	80	1810
454.calculix	80	2010
459.GemsFDTD	80	461
465.tonto	80	1270
465.tonto	80	1200
470.lbm	80	928
481.wrf	80	788
482.sphinx3	80	704

SPECfp_rate_base2006 = 961

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Hardware

CPU Name: Intel Xeon E5-2698 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 40 cores, 2 chips, 20 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: 256 KB I+D on chip per core
Continued on next page

Software

Operating System: SUSE Linux Enterprise Server 12 SP3 (x86_64) 4.4.70-2-default
Compiler: C/C++: Version 16.0.2.181 of Intel C++ Studio XE for Linux;
Fortran: Version 16.0.2.181 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: btrfs
System State: Run level 3 (multi-user)
Continued on next page

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L3 Cache:	50 MB I+D on chip per chip
Other Cache:	None
Memory:	256 GB (8 x 32 GB 2Rx8 PC4-2400T-R)
Disk Subsystem:	1 TB SATA 7.2K
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	80	**2155**	**505**	2154	505	2157	504	80	**2155**	**505**	2154	505	2157	504
416.gamess	80	**1113**	**1410**	1101	1420	1114	1410	80	1073	1460	**1069**	**1470**	1065	1470
433.milc	80	**1209**	**607**	1212	606	1208	608	80	**1209**	**607**	1212	606	1208	608
434.zeusmp	80	**657**	**1110**	660	1100	640	1140	80	**657**	**1110**	660	1100	640	1140
435.gromacs	80	340	1680	**341**	**1680**	341	1670	80	325	1760	326	1750	**325**	**1760**
436.cactusADM	80	766	1250	**770**	**1240**	775	1230	80	766	1250	**770**	**1240**	775	1230
437.leslie3d	80	1597	471	**1598**	**470**	1607	468	80	1597	471	**1598**	**470**	1607	468
444.namd	80	530	1210	**534**	**1200**	535	1200	80	530	1210	**529**	**1210**	528	1220
447.dealII	80	468	1950	491	1870	**477**	**1920**	80	468	1950	491	1870	**477**	**1920**
450.soplex	80	1477	452	**1477**	**452**	1483	450	40	621	537	614	543	**619**	**539**
453.povray	80	233	1820	**235**	**1810**	237	1800	80	200	2130	205	2070	**201**	**2120**
454.calculix	80	**328**	**2010**	329	2010	327	2020	80	**328**	**2010**	329	2010	327	2020
459.GemsFDTD	80	1833	463	1843	461	**1842**	**461**	80	1833	463	1843	461	**1842**	**461**
465.tonto	80	652	1210	662	1190	**655**	**1200**	80	**618**	**1270**	615	1280	620	1270
470.lbm	80	1181	931	1188	925	**1185**	**928**	80	1181	931	1188	925	**1185**	**928**
481.wrf	80	**1134**	**788**	1137	786	1133	789	80	**1134**	**788**	1137	786	1133	789
482.sphinx3	80	2216	704	2227	700	**2216**	**704**	80	2216	704	2227	700	**2216**	**704**

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:
Snoop Mode set to Cluster on Die
Virtualization Technology disabled

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Platform Notes (Continued)

```
     System Profile set to custom
     CPU Performance set to Hardware P States
     C States set to Autonomous
     C1E disabled
     Energy Efficient Turbo disabled
     Uncore Frequency set to Dynamic
     Energy Efficiency Policy set to Balanced Performance
     Memory Patrol Scrub disabled
     Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
     $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
     running on linux-1ajq Sat Jul  8 11:33:40 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) CPU E5-2698 v4 @ 2.20GHz
           2 "physical id"s (chips)
           80 "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 : 20
           siblings  : 40
           physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
           physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
        cache size : 51200 KB

     From /proc/meminfo
        MemTotal:      264037444 kB
        HugePages_Total:        0
        Hugepagesize:        2048 kB

     From /etc/*release* /etc/*version*
        SuSE-release:
           SUSE Linux Enterprise Server 12 (x86_64)
           VERSION = 12
           PATCHLEVEL = 3
           # 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-SP3"
           VERSION_ID="12.3"
           PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
           ID="sles"
           ANSI_COLOR="0;32"
           CPE_NAME="cpe:/o:suse:sles:12:sp3"

     uname -a:
```

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Platform Notes (Continued)

```
    Linux linux-1ajq 4.4.70-2-default #1 SMP Wed Jun 7 15:12:06 UTC 2017
    (4502c76) x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 Jul 7 22:38

  SPEC is set to: /root/cpu2006-1.2
    Filesystem      Type    Size   Used Avail Use% Mounted on
    /dev/sda1       btrfs  864G    12G  851G   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. 2.4.2 01/09/2017
    Memory:
    8x 002C00B3002C 36ASF4G72PZ-2G3B1 32 GB 2 rank 2400 MHz
    8x Not Specified Not Specified

  (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/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB
 memory using RedHat EL 7.2 glibc 2.17
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
 Filesystem page cache cleared with:
 echo 1>       /proc/sys/vm/drop_caches
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-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_2016/linux/compiler/lib/ia32_lin
```

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Peak Compiler Invocation (Continued)

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:

```
  444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
            -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
            -par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2)
            -prof-use(pass 2) -fno-alias -auto-ilp32

  447.dealII: basepeak = yes
```

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Peak Optimization Flags (Continued)

450.soplex: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-opt-mem-layout-trans=3`(pass 2)
`-prof-use`(pass 2) `-opt-malloc-options=3`

453.povray: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-opt-mem-layout-trans=3`(pass 2)
`-prof-use`(pass 2) `-unroll4 -ansi-alias`

Fortran benchmarks:

410.bwaves: `basepeak = yes`

416.gamess: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-prof-use`(pass 2) `-unroll2`
`-inline-level=0 -scalar-rep-`

434.zeusmp: `basepeak = yes`

437.leslie3d: `basepeak = yes`

459.GemsFDTD: `basepeak = yes`

465.tonto: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-prof-use`(pass 2) `-unroll4 -auto`
`-inline-calloc -opt-malloc-options=3`

Benchmarks using both Fortran and C:

435.gromacs: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-opt-mem-layout-trans=3`(pass 2)
`-prof-use`(pass 2) `-opt-prefetch -auto-ilp32`

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-ic16.0-official-linux64-revB.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge13G-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64-revB.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge13G-revE.xml

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

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