# SPEC® CFP2006 Result

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## Dell Inc.

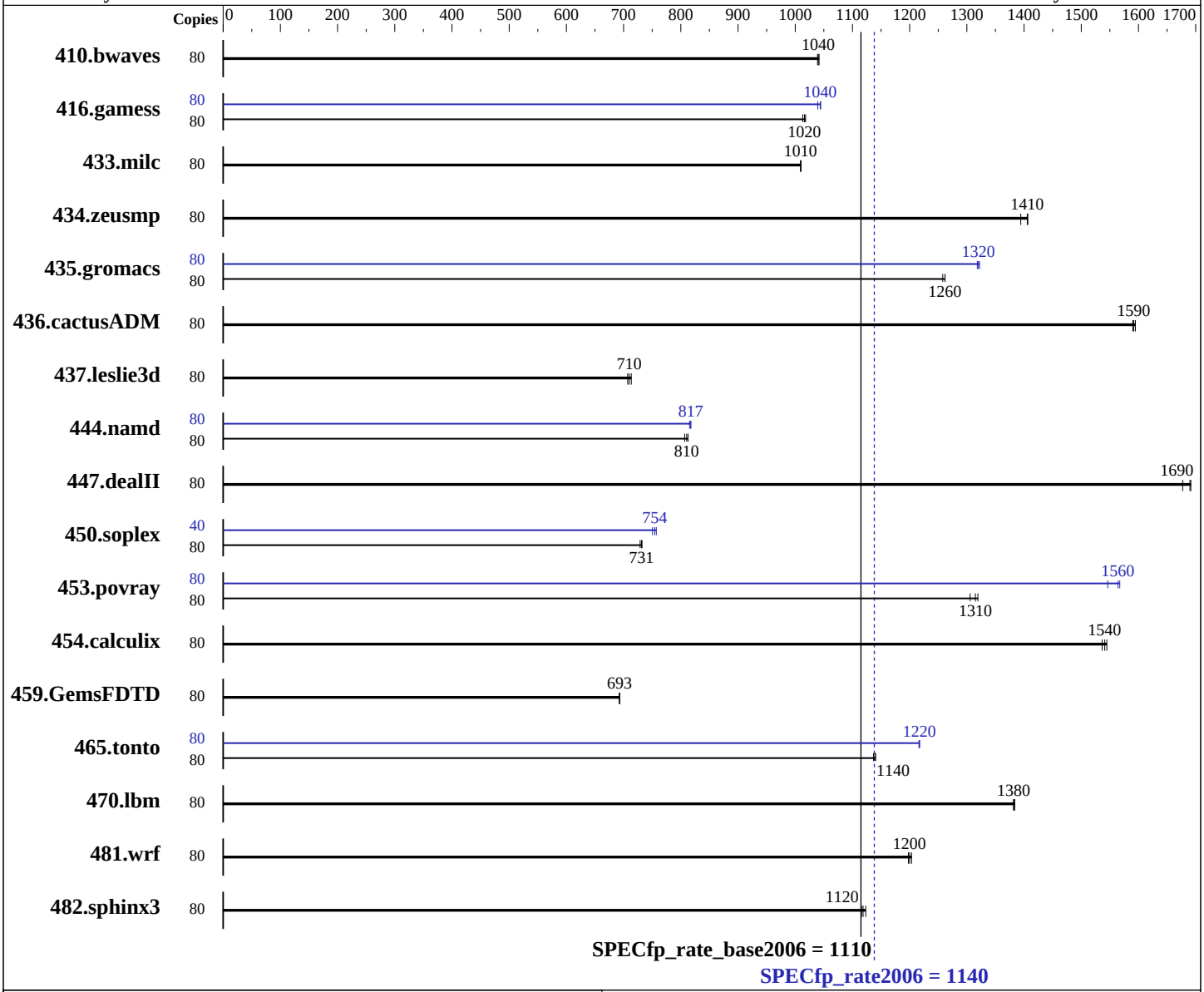
PowerEdge R830 (Intel Xeon E5-4610 v4, 1.80 GHz)

SPECfp®_rate2006 = 1140

SPECfp_rate_base2006 = 1110

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

**Test date:** May-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Mar-2016




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-4610 v4 |
| CPU Characteristics: | |
| CPU MHz: | 1800 |
| FPU: | integrated |
| CPU(s) enabled: | 40 cores, 4 chips, 10 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: | 256 KB I+D on chip per core |

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## Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 12 SP1 3.12.49-11-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) |

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L3 Cache: 25 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx8 PC4-2400T-R, running at 1866 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
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 | **1045** | **1040** | 1046 | 1040 | 1044 | 1040 | 80 | **1045** | **1040** | 1046 | 1040 | 1044 | 1040 |
| 416.gamess | 80 | 1539 | 1020 | 1546 | 1010 | **1541** | **1020** | 80 | 1507 | 1040 | 1500 | 1040 | **1500** | **1040** |
| 433.milc | 80 | 728 | 1010 | 727 | 1010 | **727** | **1010** | 80 | 728 | 1010 | 727 | 1010 | **727** | **1010** |
| 434.zeusmp | 80 | 518 | 1410 | 522 | 1390 | **518** | **1410** | 80 | 518 | 1410 | 522 | 1390 | **518** | **1410** |
| 435.gromacs | 80 | 454 | 1260 | **453** | **1260** | 453 | 1260 | 80 | 433 | 1320 | 432 | 1320 | **433** | **1320** |
| 436.cactusADM | 80 | **601** | **1590** | 601 | 1590 | 600 | 1590 | 80 | **601** | **1590** | 601 | 1590 | 600 | 1590 |
| 437.leslie3d | 80 | **1059** | **710** | 1054 | 713 | 1064 | 707 | 80 | **1059** | **710** | 1054 | 713 | 1064 | 707 |
| 444.namd | 80 | 789 | 813 | **792** | **810** | 795 | 807 | 80 | **785** | **817** | 785 | 817 | 787 | 815 |
| 447.dealII | 80 | 546 | 1680 | **542** | **1690** | 541 | 1690 | 80 | 546 | 1680 | **542** | **1690** | 541 | 1690 |
| 450.soplex | 80 | 915 | 729 | **912** | **731** | 911 | 732 | 40 | 441 | 757 | **442** | **754** | 445 | 750 |
| 453.povray | 80 | **324** | **1310** | 323 | 1320 | 326 | 1310 | 80 | **272** | **1560** | 275 | 1550 | 272 | 1570 |
| 454.calculix | 80 | **428** | **1540** | 427 | 1540 | 430 | 1540 | 80 | **428** | **1540** | 427 | 1540 | 430 | 1540 |
| 459.GemsFDTD | 80 | 1224 | 693 | **1225** | **693** | 1226 | 692 | 80 | 1224 | 693 | **1225** | **693** | 1226 | 692 |
| 465.tonto | 80 | 692 | 1140 | 690 | 1140 | **691** | **1140** | 80 | 647 | 1220 | 647 | 1220 | **647** | **1220** |
| 470.lbm | 80 | 796 | 1380 | **795** | **1380** | 794 | 1380 | 80 | 796 | 1380 | **795** | **1380** | 794 | 1380 |
| 481.wrf | 80 | 746 | 1200 | **745** | **1200** | 743 | 1200 | 80 | 746 | 1200 | **745** | **1200** | 743 | 1200 |
| 482.sphinx3 | 80 | **1394** | **1120** | 1388 | 1120 | 1397 | 1120 | 80 | **1394** | **1120** | 1388 | 1120 | 1397 | 1120 |

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 Home Snoop
Virtualization Technology disabled
```

Continued on next page

## Platform Notes (Continued)

```
System Profile set to custom
CPU Performance set to Hardware P States
C States set to Autonomous
C1E 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-t2sb Sat May 28 00:27:55 2016

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 E5-4610 v4 @ 1.80GHz
      4 "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 : 10
      siblings  : 20
      physical 0: cores 0 1 2 3 4 8 9 10 11 12
      physical 1: cores 0 1 2 3 4 8 9 10 11 12
      physical 2: cores 0 1 2 3 4 8 9 10 11 12
      physical 3: cores 0 1 2 3 4 8 9 10 11 12
   cache size : 25600 KB

From /proc/meminfo
   MemTotal:       529326748 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 1
      # 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-SP1"
      VERSION_ID="12.1"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
      ID="sles"
```

Continued on next page

## Platform Notes (Continued)

```
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp1"

  uname -a:
     Linux linux-t2sb 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
     (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 May 27 09:07

  SPEC is set to: /root/cpu2006-1.2
     Filesystem     Type   Size  Used Avail Use% Mounted on
     /dev/sda3      btrfs  461G  9.5G  449G   3% /
  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. 1.0.2 05/13/2016
    Memory:
     31x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz, configured at 1866
     MHz
     1x 00CE00B300CE M393A2K43BB1-CRC 16 GB 2 rank 2400 MHz, configured at 1866
     MHz
     16x 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
```

Continued on next page

## 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 -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

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:

Continued on next page

## Peak Optimization Flags (Continued)

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

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.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.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.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.xml


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