# SPEC® CFP2006 Result

## Dell Inc.

PowerEdge R620 (Intel Xeon E5-2660 v2, 2.20 GHz)

$SPECfp®\_rate2006 = 581$

$SPECfp\_rate\_base2006 = 568$

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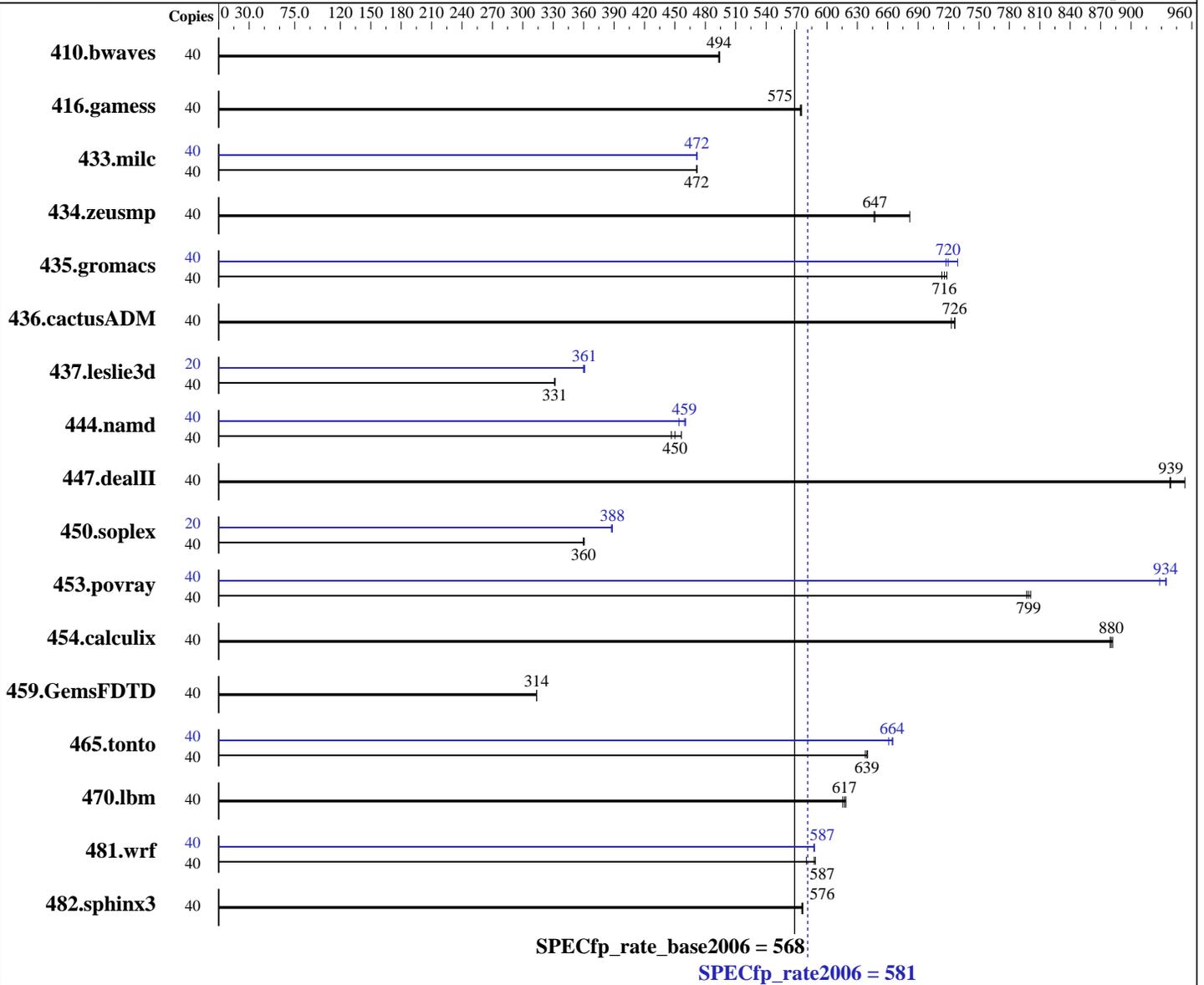**Test sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  

**Test date:** Aug-2013  
**Hardware Availability:** Sep-2013  
**Software Availability:** Sep-2013  

| Benchmark | Copies | Result |
|---|---|---|
| 410.bwaves | 40 | 494 |
| 416.gamess | 40 | 575 |
| 433.milc | 40 / 40 | 472 / 472 |
| 434.zeusmp | 40 | 647 |
| 435.gromacs | 40 / 40 | 720 / 716 |
| 436.cactusADM | 40 | 726 |
| 437.leslie3d | 20 / 40 | 361 / 331 |
| 444.namd | 40 / 40 | 459 / 450 |
| 447.dealII | 40 | 939 |
| 450.soplex | 20 / 40 | 388 / 360 |
| 453.povray | 40 / 40 | 934 / 799 |
| 454.calculix | 40 | 880 |
| 459.GemsFDTD | 40 | 314 |
| 465.tonto | 40 / 40 | 664 / 639 |
| 470.lbm | 40 | 617 |
| 481.wrf | 40 / 40 | 587 / 587 |
| 482.sphinx3 | 40 | 576 |

**SPECfp_rate_base2006 = 568**

**SPECfp_rate2006 = 581**

## Hardware

CPU Name: Intel Xeon E5-2660 v2  
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz  
CPU MHz: 2200  
FPU: Integrated  
CPU(s) enabled: 20 cores, 2 chips, 10 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 11 SP3 (x86_64) 3.0.76-0.11-default  
Compiler: C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux; Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux  
Auto Parallel: No  
File System: ext2  
System State: Run level 3 (multi-user)  
**Continued on next page**

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| | |
|---|---|
| L3 Cache: | 25 MB I+D on chip per chip |
| Other Cache: | None |
| Memory: | 256 GB (16 x 16 GB 2Rx4 PC3-14900R-13, ECC) |
| Disk Subsystem: | 1 x 300 GB 15000 RPM SAS |
| 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 | 40 | **1101** | **494** | 1100 | 494 | 1102 | 493 | 40 | **1101** | **494** | 1100 | 494 | 1102 | 493 |
| 416.gamess | 40 | 1362 | 575 | 1365 | 574 | **1363** | **575** | 40 | 1362 | 575 | 1365 | 574 | **1363** | **575** |
| 433.milc | 40 | **779** | **472** | 778 | 472 | 779 | 472 | 40 | **779** | **472** | 778 | 472 | 779 | 472 |
| 434.zeusmp | 40 | 534 | 682 | **562** | **647** | 563 | 647 | 40 | 534 | 682 | **562** | **647** | 563 | 647 |
| 435.gromacs | 40 | 398 | 718 | **399** | **716** | 400 | 713 | 40 | 398 | 717 | 392 | 729 | **397** | **720** |
| 436.cactusADM | 40 | 658 | 726 | **658** | **726** | 661 | 723 | 40 | 658 | 726 | **658** | **726** | 661 | 723 |
| 437.leslie3d | 40 | 1135 | 331 | **1134** | **331** | 1133 | 332 | 20 | 521 | 361 | **521** | **361** | 523 | 360 |
| 444.namd | 40 | **713** | **450** | 719 | 446 | 703 | 456 | 40 | 696 | 461 | 706 | 454 | **698** | **459** |
| 447.dealII | 40 | 480 | 953 | **487** | **939** | 488 | 938 | 40 | 480 | 953 | **487** | **939** | 488 | 938 |
| 450.soplex | 40 | 925 | 361 | 927 | 360 | **927** | **360** | 20 | 431 | 387 | 430 | 388 | **430** | **388** |
| 453.povray | 40 | 266 | 801 | **266** | **799** | 267 | 797 | 40 | 229 | 928 | 228 | 935 | **228** | **934** |
| 454.calculix | 40 | 374 | 882 | **375** | **880** | 375 | 879 | 40 | 374 | 882 | **375** | **880** | 375 | 879 |
| 459.GemsFDTD | 40 | 1353 | 314 | 1353 | 314 | **1353** | **314** | 40 | 1353 | 314 | 1353 | 314 | **1353** | **314** |
| 465.tonto | 40 | 617 | 638 | 615 | 640 | **616** | **639** | 40 | **592** | **664** | 592 | 665 | 595 | 661 |
| 470.lbm | 40 | 888 | 619 | **890** | **617** | 893 | 616 | 40 | 888 | 619 | **890** | **617** | 893 | 616 |
| 481.wrf | 40 | **761** | **587** | 771 | 580 | 759 | 588 | 40 | 761 | 587 | **761** | **587** | 760 | 588 |
| 482.sphinx3 | 40 | 1355 | 575 | 1353 | 576 | **1354** | **576** | 40 | 1355 | 575 | 1353 | 576 | **1354** | **576** |

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:
   Virtualization Technology disabled
   Execute Disable disabled

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## Platform Notes (Continued)

```
Logical Processor enabled
System Profile set to Performance
Sysinfo program /root/cpu2006.1.2.ic13/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on linux Thu Aug 29 10:46:02 2013

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 E5-2660 v2 @ 2.20GHz
      2 "physical id"s (chips)
      40 "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
   cache size : 25600 KB

From /proc/meminfo
   MemTotal:       264634596 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 11 (x86_64)

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 11 (x86_64)
      VERSION = 11
      PATCHLEVEL = 3

uname -a:
   Linux linux 3.0.76-0.11-default #1 SMP Fri Jun 14 08:21:43 UTC 2013 (ccab990)
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 28 21:25 last=S

SPEC is set to: /root/cpu2006.1.2.ic13
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       ext2  267G   45G  221G  17% /

Additional information from dmidecode:
  BIOS Dell Inc. 2.0.18 08/10/2013
  Memory:
   6x 00AD00B300AD HMT42GR7MFR4C-RD 16 GB 1866 MHz
   10x 00AD04B300AD HMT42GR7AFR4C-RD 16 GB 1866 MHz
```
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## Platform Notes (Continued)

```
(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.ic13/libs/32:/root/cpu2006.1.2.ic13/libs/64:/root/cpu2006.1.2.ic13/sh"

 Binaries compiled on a system with 1x Core i7-860 CPU + 8GB
 memory using RHEL5.5
 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
```

## 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
```

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# Base Portability Flags (Continued)

```
    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:
```
    -xAVX -ipo -O3 -no-prec-div -static -opt-prefetch -auto-p32
    -ansi-alias -opt-mem-layout-trans=3
```

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

Fortran benchmarks:
```
    -xAVX -ipo -O3 -no-prec-div -static -opt-prefetch
```

Benchmarks using both Fortran and C:
```
    -xAVX -ipo -O3 -no-prec-div -static -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
```

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
```

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# Peak Portability Flags (Continued)

```
      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
       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: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                 -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
                 -prof-use(pass 2) -static -auto-ilp32
```

```
        470.lbm: basepeak = yes
```

```
      482.sphinx3: basepeak = yes
```

C++ benchmarks:

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

```
        447.dealII: basepeak = yes
```

```
      450.soplex: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                 -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
                 -prof-use(pass 2) -opt-malloc-options=3
```

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

Fortran benchmarks:

```
      410.bwaves: basepeak = yes
```

```
      416.gamess: basepeak = yes
```

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| | | | | |
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# Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes

437.leslie3d: -xAVX -ipo -O3 -no-prec-div -static -opt-prefetch

459.GemsFDTD: basepeak = yes

465.tonto: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
    -no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -auto
    -inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
    -no-prec-div(pass 2) -opt-mem-layout-trans=3(pass 2)
    -prof-use(pass 2) -opt-prefetch -static -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: -xAVX -ipo -O3 -no-prec-div -static -auto-ilp32

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revB.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revB.xml

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

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