



# SPEC<sup>®</sup> CFP2006 Result

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Dell Inc.

SPECfp<sup>®</sup>2006 = 127

PowerEdge R930 (Intel Xeon E7-8867 v4, 2.40 GHz)

SPECfp\_base2006 = 119

CPU2006 license: 55

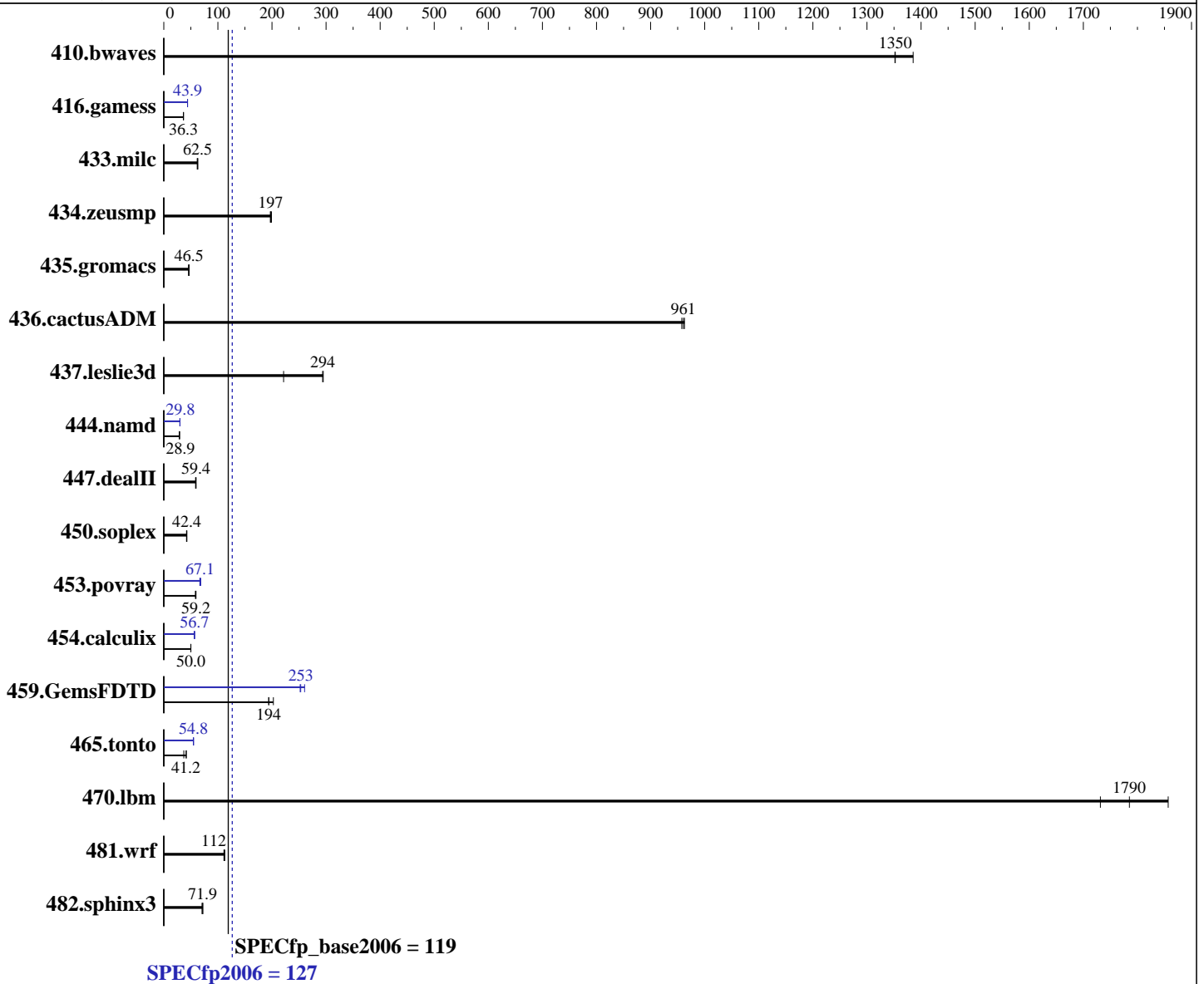
Test date: May-2016

Test sponsor: Dell Inc.

Hardware Availability: Jun-2016

Tested by: Dell Inc.

Software Availability: Dec-2015



## Hardware

CPU Name: Intel Xeon E7-8867 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.30 GHz  
 CPU MHz: 2400  
 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: 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 16.0.0.101 of Intel C++ Studio XE  
 for Linux;  
 Fortran: Version 16.0.0.101 of Intel Fortran  
 Studio XE for Linux  
 Auto Parallel: Yes  
 File System: xfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 45 MB I+D on chip per chip  
Other Cache: None  
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)  
Disk Subsystem: 1 x 480 GB SAS SSD  
Other Hardware: None

Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other Software: None

## Results Table

| Benchmark     | Base        |             |             |             |             |             | Peak        |             |             |             |             |             |
|---------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
|               | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       | Seconds     | Ratio       |
| 410.bwaves    | 9.81        | 1390        | <b>10.0</b> | <b>1350</b> | 10.1        | 1350        | 9.81        | 1390        | <b>10.0</b> | <b>1350</b> | 10.1        | 1350        |
| 416.gamess    | 540         | 36.3        | 539         | 36.3        | <b>539</b>  | <b>36.3</b> | 446         | 43.9        | 446         | 43.9        | <b>446</b>  | <b>43.9</b> |
| 433.milc      | 149         | 61.8        | <b>147</b>  | <b>62.5</b> | 146         | 62.9        | 149         | 61.8        | <b>147</b>  | <b>62.5</b> | 146         | 62.9        |
| 434.zeusmp    | 45.7        | 199         | 46.2        | 197         | <b>46.1</b> | <b>197</b>  | 45.7        | 199         | 46.2        | 197         | <b>46.1</b> | <b>197</b>  |
| 435.gromacs   | <b>153</b>  | <b>46.5</b> | 153         | 46.7        | 156         | 45.7        | <b>153</b>  | <b>46.5</b> | 153         | 46.7        | 156         | 45.7        |
| 436.cactusADM | <b>12.4</b> | <b>961</b>  | 12.5        | 958         | 12.4        | 963         | <b>12.4</b> | <b>961</b>  | 12.5        | 958         | 12.4        | 963         |
| 437.leslie3d  | 31.9        | 295         | 42.4        | 221         | <b>32.0</b> | <b>294</b>  | 31.9        | 295         | 42.4        | 221         | <b>32.0</b> | <b>294</b>  |
| 444.namd      | <b>277</b>  | <b>28.9</b> | 276         | 29.0        | 278         | 28.9        | 269         | 29.8        | <b>269</b>  | <b>29.8</b> | 268         | 29.9        |
| 447.dealII    | 195         | 58.7        | <b>193</b>  | <b>59.4</b> | 192         | 59.6        | 195         | 58.7        | <b>193</b>  | <b>59.4</b> | 192         | 59.6        |
| 450.soplex    | <b>197</b>  | <b>42.4</b> | 199         | 42.0        | 196         | 42.6        | <b>197</b>  | <b>42.4</b> | 199         | 42.0        | 196         | 42.6        |
| 453.povray    | 91.2        | 58.4        | <b>89.8</b> | <b>59.2</b> | 89.4        | 59.5        | <b>79.3</b> | <b>67.1</b> | 77.8        | 68.4        | 79.9        | 66.6        |
| 454.calculix  | 165         | 50.1        | <b>165</b>  | <b>50.0</b> | 165         | 50.0        | 144         | 57.1        | <b>145</b>  | <b>56.7</b> | 147         | 56.1        |
| 459.GemsFDTD  | 52.4        | 203         | <b>54.6</b> | <b>194</b>  | 54.7        | 194         | <b>41.9</b> | <b>253</b>  | 42.1        | 252         | 40.8        | 260         |
| 465.tonto     | 266         | 37.0        | <b>239</b>  | <b>41.2</b> | 236         | 41.6        | 179         | 55.0        | <b>180</b>  | <b>54.8</b> | 180         | 54.6        |
| 470.lbm       | 7.94        | 1730        | <b>7.70</b> | <b>1790</b> | 7.40        | 1860        | 7.94        | 1730        | <b>7.70</b> | <b>1790</b> | 7.40        | 1860        |
| 481.wrf       | <b>100</b>  | <b>112</b>  | 99.0        | 113         | 100         | 111         | <b>100</b>  | <b>112</b>  | 99.0        | 113         | 100         | 111         |
| 482.sphinx3   | 270         | 72.1        | 276         | 70.6        | <b>271</b>  | <b>71.9</b> | 270         | 72.1        | 276         | 70.6        | <b>271</b>  | <b>71.9</b> |

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:  
Virtualization Technology Disabled  
System Profile set to Custom  
CPU Power Management set to Hardware P States  
Memory Frequency set to Maximum Performance  
Turbo Boost Enabled  
Energy Efficient Turbo Enabled  
C1E Disabled  
C States set to Autonomous

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## Platform Notes (Continued)

Collaborative CPU Performance Control Disabled  
 Memory Patrol Scrub Disabled  
 Memory Refresh Rate set to 1x  
 Uncore Frequency set to Dynamic  
 Energy Efficient Policy set to Performance  
 Monitor/MWait Enabled  
 Snoop Mode set to Home Snoop  
 Sysinfo program /root/icl6.0\_Sept12\_2015/config/sysinfo.rev6914  
 \$Rev: 6914 \$ \$Date:: 2014-06-25 # \$ e3fbb8667b5a285932ceab81e28219e1  
 running on bdx-perf04 Fri May 6 14:26:33 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 E7-8867 v4 @ 2.40GHz
 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 : 46080 KB
```

```
From /proc/meminfo
MemTotal:      529322532 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"
```

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## Platform Notes (Continued)

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

```
uname -a:
Linux bdx-perf04 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 6 09:13
```

```
SPEC is set to: /root/ic16.0_Sept12_2015
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda2        xfs   369G  9.8G 359G   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. 2.0.1 04/20/2016

Memory:

```
32x 00AD00B300AD HMA42GR7MFR4N-TF 16 GB 2 rank 2133 MHz, configured at 1600
MHz
64x 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/ic16.0_Sept12_2015/libs/32:/root/ic16.0_Sept12_2015/libs/64:/root/ic16.0_Sept12_2015/sh"
OMP_NUM_THREADS = "72"
```

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1

Transparent Huge Pages enabled with:

```
echo always > /sys/kernel/mm/transparent_hugepage/enabled
```

## Base Compiler Invocation

C benchmarks:

```
icc -m64
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

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## Base Compiler Invocation (Continued)

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 -parallel -opt-prefetch  
-ansi-alias

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch  
-ansi-alias

## Peak Compiler Invocation

C benchmarks:

icc -m64

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## Peak Compiler Invocation (Continued)

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

icc -m64 ifort -m64

## 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: -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) -fno-alias  
-auto-ilp32

447.dealIII: basepeak = yes

450.soplex: basepeak = yes

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) -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-

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## Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -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 -opt-prefetch -parallel

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

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 -ansi-alias

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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For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

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