



# SPEC® CFP2006 Result

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## Dell Inc.

SPECfp®2006 = 109

PowerEdge FC830 (Intel Xeon E5-4650 v4, 2.20 GHz)

SPECfp\_base2006 = 102

CPU2006 license: 55

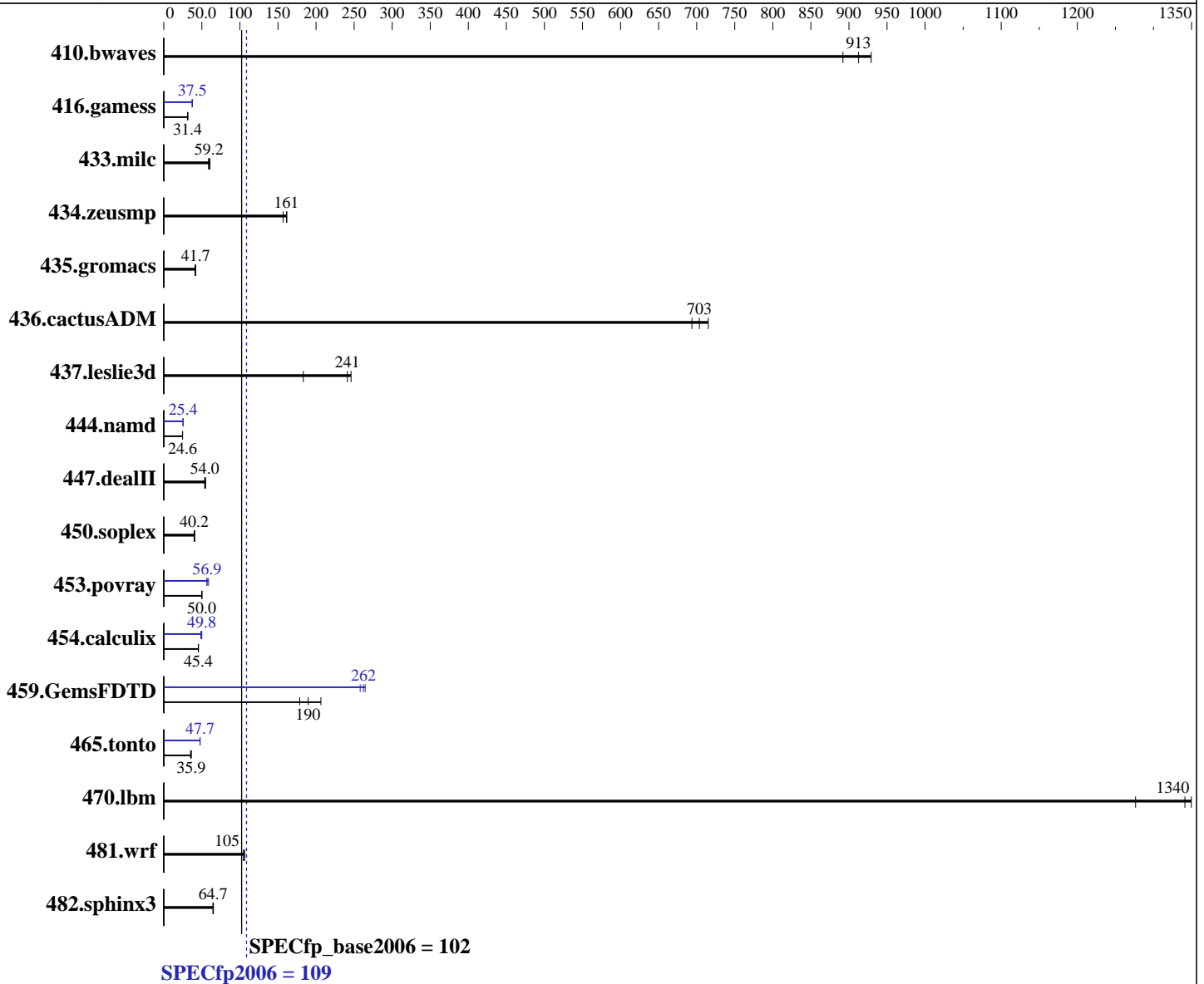
Test date: May-2016

Test sponsor: Dell Inc.

Hardware Availability: Jun-2016

Tested by: Dell Inc.

Software Availability: Mar-2016



### Hardware

CPU Name: Intel Xeon E5-4650 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 2.80 GHz  
 CPU MHz: 2200  
 FPU: Integrated  
 CPU(s) enabled: 56 cores, 4 chips, 14 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: btrfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 35 MB I+D on chip per chip  
 Other Cache: None  
 Memory: 512 GB (32 x 16 GB 2Rx8 PC4-2400T-R)  
 Disk Subsystem: 1 x 800 GB SATA 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	14.6	929	<b>14.9</b>	<b>913</b>	15.2	892	14.6	929	<b>14.9</b>	<b>913</b>	15.2	892
416.gamess	<b>623</b>	<b>31.4</b>	624	31.4	623	31.4	<b>523</b>	<b>37.5</b>	527	37.2	522	37.5
433.milc	<b>155</b>	<b>59.2</b>	151	60.7	156	58.8	<b>155</b>	<b>59.2</b>	151	60.7	156	58.8
434.zeusmp	<b>56.5</b>	<b>161</b>	56.3	162	58.0	157	<b>56.5</b>	<b>161</b>	56.3	162	58.0	157
435.gromacs	<b>171</b>	<b>41.7</b>	174	41.0	171	41.8	<b>171</b>	<b>41.7</b>	174	41.0	171	41.8
436.cactusADM	16.7	715	17.2	694	<b>17.0</b>	<b>703</b>	16.7	715	17.2	694	<b>17.0</b>	<b>703</b>
437.leslie3d	51.3	183	38.2	246	<b>39.0</b>	<b>241</b>	51.3	183	38.2	246	<b>39.0</b>	<b>241</b>
444.namd	326	24.6	<b>326</b>	<b>24.6</b>	325	24.7	316	25.4	<b>316</b>	<b>25.4</b>	317	25.3
447.dealII	213	53.8	208	55.0	<b>212</b>	<b>54.0</b>	213	53.8	208	55.0	<b>212</b>	<b>54.0</b>
450.soplex	209	39.8	<b>207</b>	<b>40.2</b>	205	40.7	209	39.8	<b>207</b>	<b>40.2</b>	205	40.7
453.povray	<b>106</b>	<b>50.0</b>	106	50.1	107	49.9	<b>93.5</b>	<b>56.9</b>	90.6	58.7	94.0	56.6
454.calculix	181	45.5	<b>182</b>	<b>45.4</b>	182	45.3	<b>166</b>	<b>49.8</b>	166	49.8	170	48.6
459.GemsFDTD	59.4	179	<b>55.9</b>	<b>190</b>	51.4	206	<b>40.5</b>	<b>262</b>	41.1	258	40.1	265
465.tonto	280	35.1	<b>274</b>	<b>35.9</b>	273	36.1	207	47.5	206	47.7	<b>206</b>	<b>47.7</b>
470.lbm	<b>10.2</b>	<b>1340</b>	10.8	1280	10.2	1350	<b>10.2</b>	<b>1340</b>	10.8	1280	10.2	1350
481.wrf	<b>106</b>	<b>105</b>	105	106	107	105	<b>106</b>	<b>105</b>	105	106	107	105
482.sphinx3	302	64.6	299	65.2	<b>301</b>	<b>64.7</b>	302	64.6	299	65.2	<b>301</b>	<b>64.7</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 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  
 Memory Patrol Scrub disabled

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## Platform Notes (Continued)

Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
running on linux-vs2o Tue May 10 16:23:11 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 E5-4650 v4 @ 2.20GHz
4 "physical id"s (chips)
112 "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 : 14
siblings  : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
```

cache size : 35840 KB

From /proc/meminfo

```
MemTotal:      529195644 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"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"
```

uname -a:

```
Linux linux-vs2o 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

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## Platform Notes (Continued)

run-level 3 May 10 10:25

SPEC is set to: /root/cpu2006-1.2

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	xfs	365G	11G	354G	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. 2.0.2 04/14/2016

Memory:

20x 00AD00B300AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz  
 12x 00CE00B300CE M393A2K43BB1-CRC 16 GB 2 rank 2400 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:

KMP\_AFFINITY = "granularity=fine,compact,1,0"

LD\_LIBRARY\_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"

OMP\_NUM\_THREADS = "56"

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

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 -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

```

C++ benchmarks:

```

icpc -m64

```

Fortran benchmarks:

```

ifort -m64

```

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## Peak Compiler Invocation (Continued)

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.dealII: 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-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

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## Peak Optimization Flags (Continued)

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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