



# SPEC<sup>®</sup> CFP2006 Result

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## Dell Inc.

PowerEdge R940  
(Intel Xeon Gold 5122, 3.60 GHz)

SPECfp<sup>®</sup>\_rate2006 = 1060

SPECfp\_rate\_base2006 = 1050

CPU2006 license: 55

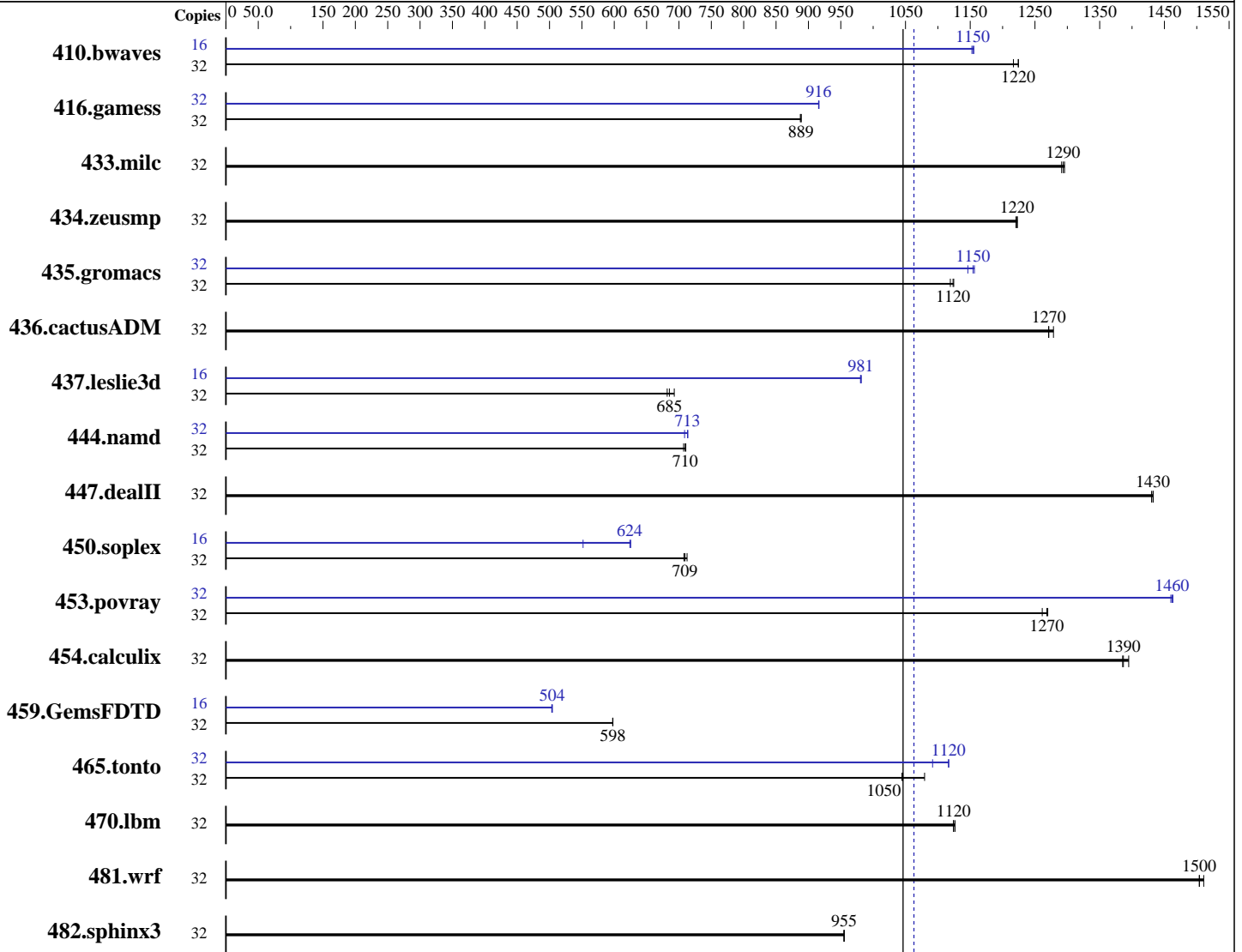
Test sponsor: Dell Inc.

Tested by: Dell Inc.

Test date: Oct-2017

Hardware Availability: Sep-2017

Software Availability: Apr-2017



SPECfp\_rate\_base2006 = 1050

SPECfp\_rate2006 = 1060

### Hardware

CPU Name: Intel Xeon Gold 5122  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz  
 CPU MHz: 3600  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 4 chips, 4 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: 1 MB I+D on chip per core

Continued on next page

### Software

Operating System: SUSE Linux Enterprise Server 12 (x86\_64) SP2 4.4.21-69-default  
 Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux  
 Auto Parallel: Yes  
 File System: xfs  
 System State: Run level 3 (multi-user)

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L3 Cache: 16.5 MB I+D on chip per chip  
Other Cache: None  
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)  
Disk Subsystem: 1 x 900 GB 15K RPM SAS12  
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	32	357	1220	<u>355</u>	<u>1220</u>	355	1220	16	189	1150	188	1160	<u>188</u>	<u>1150</u>
416.gamess	32	<u>705</u>	<u>889</u>	706	888	705	889	32	684	916	684	916	<u>684</u>	<u>916</u>
433.milc	32	228	1290	<u>227</u>	<u>1290</u>	227	1300	32	228	1290	<u>227</u>	<u>1290</u>	227	1300
434.zeusmp	32	239	1220	238	1220	<u>238</u>	<u>1220</u>	32	239	1220	238	1220	<u>238</u>	<u>1220</u>
435.gromacs	32	<u>203</u>	<u>1120</u>	203	1120	204	1120	32	199	1150	<u>198</u>	<u>1150</u>	198	1160
436.cactusADM	32	301	1270	<u>301</u>	<u>1270</u>	299	1280	32	301	1270	<u>301</u>	<u>1270</u>	299	1280
437.leslie3d	32	434	693	<u>439</u>	<u>685</u>	441	682	16	<u>153</u>	<u>981</u>	153	980	153	982
444.namd	32	<u>362</u>	<u>710</u>	361	711	363	707	32	362	709	<u>360</u>	<u>713</u>	360	714
447.dealII	32	<u>256</u>	<u>1430</u>	256	1430	256	1430	32	<u>256</u>	<u>1430</u>	256	1430	256	1430
450.soplex	32	375	713	377	708	<u>376</u>	<u>709</u>	16	242	552	<u>214</u>	<u>624</u>	213	626
453.povray	32	134	1270	135	1260	<u>134</u>	<u>1270</u>	32	116	1460	<u>116</u>	<u>1460</u>	117	1460
454.calculix	32	189	1390	191	1390	<u>190</u>	<u>1390</u>	32	189	1390	191	1390	<u>190</u>	<u>1390</u>
459.GemsFDTD	32	<u>568</u>	<u>598</u>	568	598	568	598	16	337	503	337	504	<u>337</u>	<u>504</u>
465.tonto	32	<u>301</u>	<u>1050</u>	301	1040	292	1080	32	<u>282</u>	<u>1120</u>	282	1120	288	1090
470.lbm	32	391	1120	<u>391</u>	<u>1120</u>	390	1130	32	391	1120	<u>391</u>	<u>1120</u>	390	1130
481.wrf	32	<u>238</u>	<u>1500</u>	238	1500	237	1510	32	<u>238</u>	<u>1500</u>	238	1500	237	1510
482.sphinx3	32	653	955	653	955	<u>653</u>	<u>955</u>	32	653	955	653	955	<u>653</u>	<u>955</u>

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

Kernel boot parameter: nohz\_full=1-31  
Stack size set to unlimited using "ulimit -s unlimited"



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Software Availability: Apr-2017

## Platform Notes

BIOS settings:  
Logical Processor Enabled  
Virtualization Technology Disabled  
Sub NUMA Cluster Enabled  
System Profile set to Custom  
CPU Performance set to Maximum Performance  
C1E Disabled  
C States set to Autonomous  
Uncore Frequency set to Dynamic  
Memory Patrol Scrub Disabled  
Energy Efficiency Policy set to Performance  
CPU Interconnect Bus Link Power Management Disabled  
PCI ASPM L1 Link Power Management Disabled  
Sysinfo program /home/cpu2006/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
running on linux-92x1 Wed Oct 11 12:28:01 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) Gold 5122 CPU @ 3.60GHz
 4 "physical id"s (chips)
 32 "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 : 4
siblings : 8
physical 0: cores 2 3 4 10
physical 1: cores 0 5 9 13
physical 2: cores 1 10 11 12
physical 3: cores 1 2 5 11
cache size : 16896 KB
```

```
From /proc/meminfo
MemTotal: 791223344 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2
```

```
From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 2
# 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.
```

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## Platform Notes (Continued)

```
os-release:
  NAME="SLES"
  VERSION="12-SP2"
  VERSION_ID="12.2"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```
uname -a:
Linux linux-92x1 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
(9464f67) x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Oct 11 04:56
```

```
SPEC is set to: /home/cpu2006
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   796G  17G  779G   3% /home
```

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. 1.1.7 08/10/2017
Memory:
48x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666 MHz
```

(End of data from sysinfo program)

## General Notes

Environment variables set by runspec before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2006/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/sh10.2"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.2  
Transparent Huge Pages enabled by default  
Filesystem page cache cleared with:  
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop\_caches' prior to run  
runspec command invoked through numactl i.e.:  
numactl --interleave=all runspec <etc>

## Base Compiler Invocation

C benchmarks:  
icc -m64

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## 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 -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3

Fortran benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

Benchmarks using both Fortran and C:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32  
-qopt-mem-layout-trans=3



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## 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\_2017/linux/lib/ia32

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:

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## Peak Optimization Flags (Continued)

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

447.dealII: basepeak = yes

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

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

### Fortran benchmarks:

410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

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

434.zeusmp: basepeak = yes

437.leslie3d: Same as 410.bwaves

459.GemsFDTD: Same as 410.bwaves

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

### Benchmarks using both Fortran and C:

435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
-par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32  
-qopt-mem-layout-trans=3

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: basepeak = yes



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The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.html>

<http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge14G-revD.20171221.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml>

<http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge14G-revD.20171221.xml>

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