



# SPEC® CFP2006 Result

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## Cisco Systems

Cisco UCS C240 M5 (Intel Xeon Gold 6146, 3.20 GHz)

**SPECfp®\_rate2006 = 1290**

**SPECfp\_rate\_base2006 = 1270**

CPU2006 license: 9019

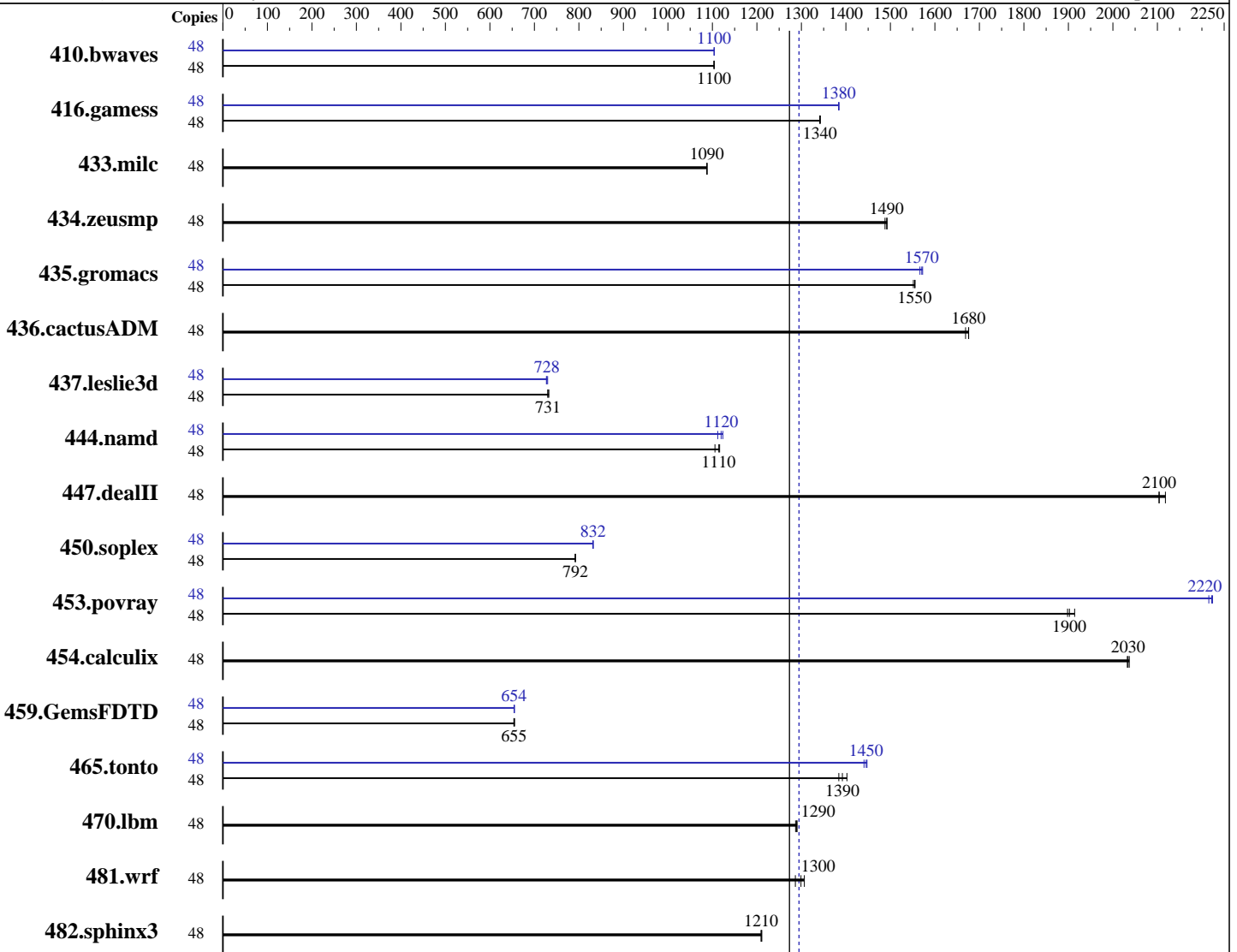
Test sponsor: Cisco Systems

Tested by: Cisco Systems

Test date: Dec-2017

Hardware Availability: Aug-2017

Software Availability: Apr-2017



SPECfp\_rate\_base2006 = 1270

**SPECfp\_rate2006 = 1290**

### Hardware

CPU Name: Intel Xeon Gold 6146  
 CPU Characteristics: Intel Turbo Boost Technology up to 4.20 GHz  
 CPU MHz: 3200  
 FPU: Integrated  
 CPU(s) enabled: 24 cores, 2 chips, 12 cores/chip, 2 threads/core  
 CPU(s) orderable: 1,2 chips  
 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 SP2 (x86\_64) 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: 24.75 MB I+D on chip per chip  
Other Cache: None  
Memory: 384 GB (24 x 16 GB 2Rx4 PC4-2666V-R)  
Disk Subsystem: 1 x 1 TB SAS HDD, 7.2K RPM  
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    | 48     | <u>591</u> | <u>1100</u> | 591        | 1100        | 591        | 1100        | 48     | <u>591</u> | <u>1100</u> | 591        | 1100        | 591        | 1100        |
| 416.gamess    | 48     | 701        | 1340        | 700        | 1340        | <u>700</u> | <u>1340</u> | 48     | 679        | 1380        | 679        | 1380        | <u>679</u> | <u>1380</u> |
| 433.milc      | 48     | <u>405</u> | <u>1090</u> | 405        | 1090        | 405        | 1090        | 48     | <u>405</u> | <u>1090</u> | 405        | 1090        | 405        | 1090        |
| 434.zeusmp    | 48     | 294        | 1490        | <u>293</u> | <u>1490</u> | 293        | 1490        | 48     | 294        | 1490        | <u>293</u> | <u>1490</u> | 293        | 1490        |
| 435.gromacs   | 48     | 220        | 1560        | 221        | 1550        | <u>220</u> | <u>1550</u> | 48     | <u>218</u> | <u>1570</u> | 219        | 1570        | 218        | 1570        |
| 436.cactusADM | 48     | 344        | 1670        | <u>342</u> | <u>1680</u> | 342        | 1680        | 48     | 344        | 1670        | <u>342</u> | <u>1680</u> | 342        | 1680        |
| 437.leslie3d  | 48     | <u>618</u> | <u>731</u>  | 616        | 732         | 618        | 730         | 48     | 618        | 730         | 621        | 727         | <u>620</u> | <u>728</u>  |
| 444.namd      | 48     | 345        | 1120        | 348        | 1110        | <u>345</u> | <u>1110</u> | 48     | 346        | 1110        | <u>344</u> | <u>1120</u> | 343        | 1120        |
| 447.dealII    | 48     | 261        | 2100        | <u>261</u> | <u>2100</u> | 259        | 2120        | 48     | 261        | 2100        | <u>261</u> | <u>2100</u> | 259        | 2120        |
| 450.soplex    | 48     | 506        | 792         | <u>505</u> | <u>792</u>  | 505        | 792         | 48     | 481        | 831         | <u>481</u> | <u>832</u>  | 481        | 832         |
| 453.povray    | 48     | 133        | 1910        | 135        | 1900        | <u>134</u> | <u>1900</u> | 48     | 115        | 2220        | 115        | 2220        | <u>115</u> | <u>2220</u> |
| 454.calculix  | 48     | <u>195</u> | <u>2030</u> | 194        | 2040        | 195        | 2030        | 48     | <u>195</u> | <u>2030</u> | 194        | 2040        | 195        | 2030        |
| 459.GemsFDTD  | 48     | 777        | 655         | 779        | 654         | <u>778</u> | <u>655</u>  | 48     | 777        | 655         | 778        | 654         | <u>778</u> | <u>654</u>  |
| 465.tonto     | 48     | 337        | 1400        | 341        | 1380        | <u>339</u> | <u>1390</u> | 48     | 328        | 1440        | 326        | 1450        | <u>327</u> | <u>1450</u> |
| 470.lbm       | 48     | <u>512</u> | <u>1290</u> | 512        | 1290        | 511        | 1290        | 48     | <u>512</u> | <u>1290</u> | 512        | 1290        | 511        | 1290        |
| 481.wrf       | 48     | 417        | 1290        | 410        | 1310        | <u>413</u> | <u>1300</u> | 48     | 417        | 1290        | 410        | 1310        | <u>413</u> | <u>1300</u> |
| 482.sphinx3   | 48     | 772        | 1210        | <u>773</u> | <u>1210</u> | 774        | 1210        | 48     | 772        | 1210        | <u>773</u> | <u>1210</u> | 774        | 1210        |

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:  
Intel HyperThreading Technology set to Enabled  
CPU performance set to Enterprise

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Tested by: Cisco Systems

Test date: Dec-2017

Hardware Availability: Aug-2017

Software Availability: Apr-2017

### Platform Notes (Continued)

Power Performance Tuning set to OS  
 SNC set to Enabled  
 IMC Interleaving set to 1-way Interleave  
 Patrol Scrub set to Disabled  
 Sysinfo program /home/cpu2006-1.2/config/sysinfo.rev6993  
 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
 running on linux-nvug Thu Dec 7 14:45:13 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 6146 CPU @ 3.20GHz
 2 "physical id"s (chips)
 48 "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 : 12
  siblings  : 24
  physical 0: cores 0 1 2 3 8 9 10 11 18 19 24 27
  physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26
cache size : 25344 KB
```

```
From /proc/meminfo
MemTotal:      394862792 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
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.
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-nvug 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 Dec 7 06:24

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### Platform Notes (Continued)

SPEC is set to: /home/cpu2006-1.2  
Filesystem    Type    Size    Used   Avail   Use%   Mounted on  
/dev/sda2    xfs    644G   141G   503G   22%   /  
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 Cisco Systems, Inc. C240M5.3.1.1d.0.0615170707 06/15/2017  
Memory:  
24x 0xCE00 M393A2G40EB2-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/cpu2006-1.2/lib/ia32:/home/cpu2006-1.2/lib/intel64:/home/cpu2006-1.2/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 with:  
echo always > /sys/kernel/mm/transparent\_hugepage/enabled  
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

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 -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

```

## 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
```

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## Peak Compiler Invocation (Continued)

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:

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

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## Peak Optimization Flags (Continued)

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

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/Cisco-Platform-Settings-V1.2-revH.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/Cisco-Platform-Settings-V1.2-revH.xml>



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For questions about this result, please contact the tester.  
For other inquiries, please contact [webmaster@spec.org](mailto:webmaster@spec.org).

Tested with SPEC CPU2006 v1.2.  
Report generated on Thu Dec 28 13:37:07 2017 by SPEC CPU2006 PS/PDF formatter v6932.  
Originally published on 26 December 2017.