SPEC® CFP2006 Result

Cisco Systems

Cisco UCS B420 M4 (Intel Xeon E5-4660 v4, 2.20 GHz)

$SPECfp^®2006 =$ 120

$SPECfp\_base2006 =$ 115

CPU2006 license: 9019
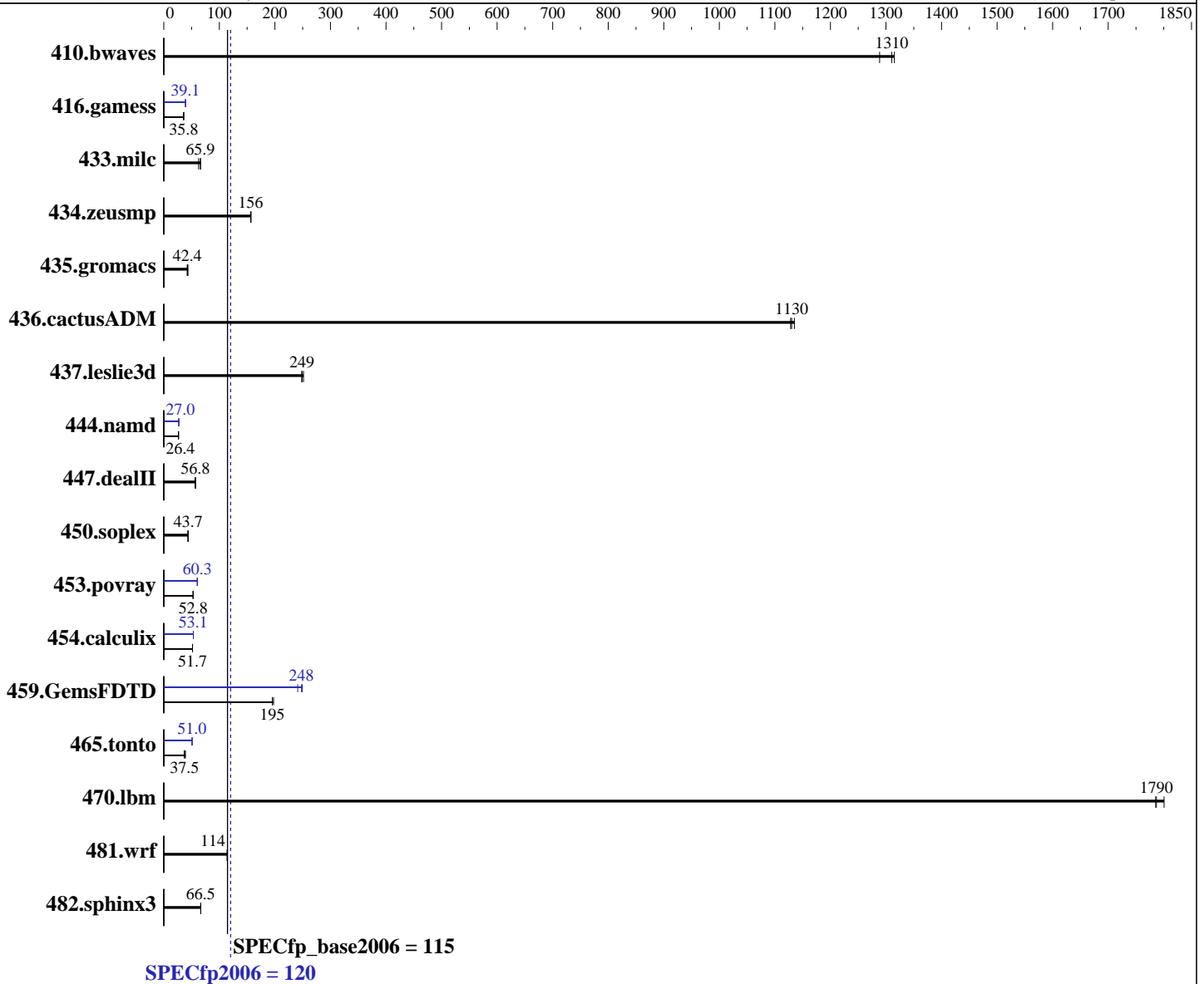**Test sponsor:** Cisco Systems
Tested by: Cisco Systems

Test date: Mar-2017
Hardware Availability: Jun-2016
Software Availability: Sep-2016

410.bwaves	1310
416.gamess	39.1 / 35.8
433.milc	65.9
434.zeusmp	156
435.gromacs	42.4
436.cactusADM	1130
437.leslie3d	249
444.namd	27.0 / 26.4
447.dealII	56.8
450.soplex	43.7
453.povray	60.3 / 52.8
454.calculix	53.1 / 51.7
459.GemsFDTD	248 / 195
465.tonto	51.0 / 37.5
470.lbm	1790
481.wrf	114
482.sphinx3	66.5

SPECfp_base2006 = 115

SPECfp2006 = 120

Hardware

CPU Name:	Intel Xeon E5-4660 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz:	2200
FPU:	Integrated
CPU(s) enabled:	64 cores, 4 chips, 16 cores/chip
CPU(s) orderable:	2,4 chips
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 12 SP1 (x86_64) 3.12.49-11-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 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:	40 MB I+D on chip per chip
Other Cache:	None
Memory:	1 TB (32 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem:	1 x 300 GB SAS, 15K RPM
Other Hardware:	None

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

Results Table

Benchmark	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
410.bwaves	10.5	1290	**10.4**	**1310**	10.3	1320	10.5	1290	**10.4**	**1310**	10.3	1320
416.gamess	546	35.9	550	35.6	**547**	**35.8**	501	39.1	**501**	**39.1**	501	39.0
433.milc	**139**	**65.9**	139	66.1	147	62.6	**139**	**65.9**	139	66.1	147	62.6
434.zeusmp	58.2	156	**58.1**	**156**	57.9	157	58.2	156	**58.1**	**156**	57.9	157
435.gromacs	**168**	**42.4**	164	43.5	169	42.2	**168**	**42.4**	164	43.5	169	42.2
436.cactusADM	**10.6**	**1130**	10.5	1140	10.6	1130	**10.6**	**1130**	10.5	1140	10.6	1130
437.leslie3d	37.8	248	**37.8**	**249**	37.4	251	37.8	248	**37.8**	**249**	37.4	251
444.namd	**303**	**26.4**	303	26.4	304	26.4	297	27.0	**297**	**27.0**	297	27.0
447.dealII	200	57.1	**201**	**56.8**	202	56.7	200	57.1	**201**	**56.8**	202	56.7
450.soplex	**191**	**43.7**	192	43.5	190	43.9	**191**	**43.7**	192	43.5	190	43.9
453.povray	101	52.7	101	52.8	**101**	**52.8**	88.0	60.4	**88.2**	**60.3**	88.3	60.2
454.calculix	**160**	**51.7**	160	51.6	159	51.8	155	53.4	**155**	**53.1**	155	53.1
459.GemsFDTD	53.7	198	**54.3**	**195**	54.3	195	42.6	249	**42.8**	**248**	44.0	241
465.tonto	**263**	**37.5**	267	36.8	252	39.0	**193**	**51.0**	193	51.0	193	50.9
470.lbm	**7.69**	**1790**	7.63	1800	7.70	1790	**7.69**	**1790**	7.63	1800	7.70	1790
481.wrf	98.0	114	**97.8**	**114**	97.5	115	98.0	114	**97.8**	**114**	97.5	115
482.sphinx3	**293**	**66.5**	293	66.6	294	66.4	**293**	**66.5**	293	66.6	294	66.4

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:
Intel Hyper-Threading Technology option set to Disabled
CPU performance set to Enterprise
Power Technology set to Energy Efficient
Energy Performance set to Balanced Performance
Memory RAS configuration set to Maximum Performance
Memory Power Saving Mode set to Disabled
QPI Snoop Mode set to Home Directory Snoop with OSB
 Sysinfo program /home/cpu2006-1.2/config/sysinfo.rev6993
 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
```

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Platform Notes (Continued)

```
running on linux-84bk Wed Mar  1 03:15:43 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) CPU E5-4660 v4 @ 2.20GHz
      4 "physical id"s (chips)
      64 "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 : 16
      siblings  : 16
      physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
   cache size : 40960 KB

From /proc/meminfo
   MemTotal:       1058474120 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-84bk 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 Feb 28 21:47
```

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Platform Notes (Continued)

```
   SPEC is set to: /home/cpu2006-1.2
      Filesystem      Type  Size  Used Avail Use% Mounted on
      /dev/sda7       xfs   236G   12G  225G   5% /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 Cisco Systems, Inc. B420M4.3.1.2d.0.081120161622 08/11/2016
    Memory:
     32x 0xCE00 M393A4K40BB1-CRC 32 GB 2 rank 2400 MHz
     16x NO DIMM NO DIMM

   (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006-1.2/libs/32:/home/cpu2006-1.2/libs/64:/home/cpu2006-1.2/sh10.2"
OMP_NUM_THREADS = "64"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 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
```

Base Portability Flags

```
   410.bwaves: -DSPEC_CPU_LP64
```

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Base Portability Flags (Continued)

```
   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 -qopt-prefetch
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

Fortran benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
```

Peak 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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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: `-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`

    447.dealII: basepeak = yes

    450.soplex: basepeak = yes

    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 -ansi-alias`

Fortran benchmarks:

    410.bwaves: basepeak = yes

    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: basepeak = yes

  459.GemsFDTD: `-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`
             `-qopt-prefetch -parallel`

    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) -inline-calloc -qopt-malloc-options=3`
             `-auto -unroll4`

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Peak Optimization Flags (Continued)

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

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.html
http://www.spec.org/cpu2006/flags/Cisco-Platform-Settings-V1.2-revD.20170404.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.xml
http://www.spec.org/cpu2006/flags/Cisco-Platform-Settings-V1.2-revD.20170404.xml

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