Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Silver 4116, 2.10 GHz)

<table>
<thead>
<tr>
<th>SPECfp(^{\circ}2006) = 122</th>
</tr>
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<tbody>
<tr>
<td>SPECfp(_{\text{base}2006}) = 117</td>
</tr>
</tbody>
</table>

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

CPU Name: Intel Xeon Silver 4116
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 24 cores, 2 chips, 12 cores/chip
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

SPECfp\(_{\text{base}2006}\) = 117

Software
Operating System: SUSE Linux Enterprise Server 12 SP2 (x86_64)
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)

Hardware

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Test date: Dec-2017
Hardware Availability: Aug-2017
Software Availability: Apr-2017

410.bwaves
416.gameess
433.milc
434.zeusmp
435.gromacs
436.cactusADM
437.leslie3d
444.namd
447.dealII
450.soplex
453.povray
454.calculix
459.GemsFDTD
465.tonto
470.lbm
481.wrf
482.sphinx3
SPEC CFP2006 Result

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L3 Cache: 16.5 MB I+D on chip per chip
Other Cache: None
Memory: 384 GB (24 x 16 GB 2Rx4 PC4-2666V-R, running at 2400)
Disk Subsystem: 1 x 600 GB SAS HDD, 10K RPM
Other Hardware: None

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>17.2</td>
<td>789</td>
<td>17.1</td>
<td>796</td>
</tr>
<tr>
<td>416.gamess</td>
<td>509</td>
<td>38.5</td>
<td>508</td>
<td>38.5</td>
</tr>
<tr>
<td>433.milc</td>
<td>134</td>
<td>68.3</td>
<td>137</td>
<td>67.0</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>40.5</td>
<td>225</td>
<td>40.1</td>
<td>227</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>171</td>
<td>41.9</td>
<td>170</td>
<td>41.9</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>11.4</td>
<td>1050</td>
<td>11.3</td>
<td>1060</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>23.6</td>
<td>399</td>
<td>23.5</td>
<td>401</td>
</tr>
<tr>
<td>444.namd</td>
<td>278</td>
<td>28.9</td>
<td>278</td>
<td>28.9</td>
</tr>
<tr>
<td>447.dealII</td>
<td>191</td>
<td>59.8</td>
<td>192</td>
<td>59.7</td>
</tr>
<tr>
<td>450.soplex</td>
<td>202</td>
<td>41.2</td>
<td>203</td>
<td>41.1</td>
</tr>
<tr>
<td>453.povray</td>
<td>94.2</td>
<td>56.5</td>
<td>94.1</td>
<td>56.5</td>
</tr>
<tr>
<td>454.calculix</td>
<td>139</td>
<td>59.4</td>
<td>139</td>
<td>59.3</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>41.4</td>
<td>256</td>
<td>41.5</td>
<td>256</td>
</tr>
<tr>
<td>465.tonto</td>
<td>246</td>
<td>40.1</td>
<td>246</td>
<td>39.9</td>
</tr>
<tr>
<td>470.lbm</td>
<td>11.8</td>
<td>1160</td>
<td>11.8</td>
<td>1160</td>
</tr>
<tr>
<td>481.wrf</td>
<td>107</td>
<td>105</td>
<td>106</td>
<td>106</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>347</td>
<td>56.2</td>
<td>347</td>
<td>56.2</td>
</tr>
</tbody>
</table>

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 HyperThreading Technology set to Disabled
CPU performance set to Enterprise
Power Performance Tuning set to OS
SNC set to Disabled
IMC Interleaving set to Auto
Patrol Scrub set to Disabled
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-3joc Sat Dec 9 18:55:20 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) Silver 4116 CPU @ 2.10GHz
  2 "physical id"s (chips)
  24 "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 : 12
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
cache size : 16896 KB

From /proc/meminfo
MemTotal: 394864792 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.
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-3joc 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 8 18:44

SPEC is set to: /home/cpu2006-1.2
Filesystem Type Size Used Avail Use% Mounted on
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Platform Notes (Continued)
/dev/sda3  xfs  516G  114G  403G  22% /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. C220M5.3.1.1d.0.0615170645 06/15/2017
Memory:
24x 0xCE00 M393A2G40EB2-CTD 16 GB 2 rank 2666 MHz, configured at 2400 MHz
(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/lib/ia32:/home/cpu2006-1.2/lib/intel64:/home/cpu2006-1.2/sh10.2"
OMP_NUM_THREADS = "24"

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

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
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64

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Cisco Systems
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SPECf2006 = 122
SPECfp_base2006 = 117

Base Portability Flags (Continued)

435. gromacs: -DSPEC_CPU_LP64 -nofor_main
436. cactusADM: -DSPEC_CPU_LP64 -nofor_main
437. lesie3d: -DSPEC_CPU_LP64
444. namd: -DSPEC_CPU_LP64 -nofor_main
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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Hardware Availability: Aug-2017
Software Availability: Apr-2017

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-call -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-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.

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