**Cisco Systems**
Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)

<table>
<thead>
<tr>
<th>Software</th>
<th>Operating System: SUSE Linux Enterprise Server 12 SP1 (x86_64) 3.12.49-11-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>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</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>CPU Name: Intel Xeon E7-8891 v4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.50 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2800</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>40 cores, 4 chips, 10 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>2.4 chips</td>
</tr>
<tr>
<td>Primary Cache:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache:</td>
<td>256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SPECfp®2006 = 134</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006 = 128</td>
</tr>
</tbody>
</table>

Test date: April 2017
Hardware Availability: April 2016
Software Availability: September 2016
## SPEC CFP2006 Result

### Cisco Systems

Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)

<table>
<thead>
<tr>
<th>CPU2006 license:</th>
<th>9019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor:</td>
<td>Cisco Systems</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Cisco Systems</td>
</tr>
<tr>
<td>L3 Cache:</td>
<td>60 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>1 TB (32 x 32 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 400 GB SAS SSD</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>None</td>
</tr>
</tbody>
</table>

### SPECfp2006 = 134

### SPECfp_base2006 = 128

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>11.6</td>
<td>1170</td>
<td>11.6</td>
<td>1170</td>
<td>11.7</td>
<td>1170</td>
<td>11.6</td>
<td>1170</td>
<td>11.7</td>
<td>1170</td>
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<tr>
<td>416.gamess</td>
<td>457</td>
<td>42.8</td>
<td>457</td>
<td>42.8</td>
<td>456</td>
<td>42.9</td>
<td>430</td>
<td>45.6</td>
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<tr>
<td>433.milc</td>
<td>138</td>
<td>66.5</td>
<td>138</td>
<td>66.6</td>
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<td>138</td>
<td>66.6</td>
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<td>434.zeusmp</td>
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<td>184</td>
<td>48.3</td>
<td>188</td>
<td>48.9</td>
<td>186</td>
<td>49.4</td>
<td>184</td>
<td>48.3</td>
<td>188</td>
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<tr>
<td>435.gromacs</td>
<td>127</td>
<td>56.2</td>
<td>127</td>
<td>56.4</td>
<td>127</td>
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<td>127</td>
<td>56.4</td>
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<td>56.3</td>
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<td>436.cactusADM</td>
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<td>11.4</td>
<td>1050</td>
<td>11.3</td>
<td>1060</td>
<td>11.3</td>
<td>1050</td>
<td>11.3</td>
<td>1060</td>
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<tr>
<td>437.leslie3d</td>
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<td>394</td>
<td>23.7</td>
<td>396</td>
<td>24.6</td>
<td>382</td>
<td>23.8</td>
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<td>396</td>
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<td>444.namd</td>
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<td>260</td>
<td>30.8</td>
<td>260</td>
<td>30.8</td>
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<td>63.1</td>
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<td>453.povray</td>
<td>87.0</td>
<td>61.2</td>
<td>85.9</td>
<td>62.0</td>
<td>86.5</td>
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<td>454.calculix</td>
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<td>60.1</td>
<td>137</td>
<td>60.1</td>
<td>137</td>
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<td>133</td>
<td>61.8</td>
<td>132</td>
<td>62.6</td>
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<tr>
<td>459.GemsFDTD</td>
<td>51.3</td>
<td>207</td>
<td>48.5</td>
<td>219</td>
<td>49.5</td>
<td>214</td>
<td>39.2</td>
<td>271</td>
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<td>272</td>
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<tr>
<td>465.tonto</td>
<td>207</td>
<td>47.4</td>
<td>208</td>
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<td>168</td>
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<td>168</td>
<td>58.4</td>
</tr>
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<td>470.lbm</td>
<td>9.77</td>
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<td>9.82</td>
<td>1400</td>
<td>9.71</td>
<td>1420</td>
<td>9.77</td>
<td>1410</td>
<td>9.82</td>
<td>1400</td>
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<tr>
<td>481.wrf</td>
<td>90.5</td>
<td>123</td>
<td>90.3</td>
<td>124</td>
<td>90.3</td>
<td>124</td>
<td>90.5</td>
<td>123</td>
<td>90.3</td>
<td>124</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>240</td>
<td>81.4</td>
<td>239</td>
<td>81.4</td>
<td>240</td>
<td>81.4</td>
<td>240</td>
<td>81.4</td>
<td>239</td>
<td>81.4</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 Hyper-Threading Technology option set to Disabled
- CPU performance set to Enterprise
- Power Technology set to Energy Efficient
- Energy Performance BIAS setting 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 /opt/cpu2006-1.2/config/sysinfo.rev6993

Continued on next page
Cisco Systems
Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)

SPECf2006 = 134
SPECfp_base2006 = 128

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

Platform Notes (Continued)

Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-3y2r Fri Apr 14 11:01:39 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 E7-8891 v4 @ 2.80GHz
4 "physical id"s (chips)
40 "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 : 10
siblings : 10
physical 0: cores 5 9 10 11 13 18 24 26 28 29
physical 1: cores 5 9 10 11 13 18 24 26 28 29
physical 2: cores 5 9 10 11 13 18 24 26 28 29
physical 3: cores 5 9 10 11 13 18 24 26 28 29
cache size : 61440 KB

From /proc/meminfo

MemTotal: 1058512784 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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-3y2r 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 Apr 14 06:44

SPEC is set to: /opt/cpu2006-1.2

Cisco Systems  
Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)  

SPECfp2006 = 134  
SPECfp_base2006 = 128

CPU2006 license: 9019  
Test date: Apr-2017  
Test sponsor: Cisco Systems  
Hardware Availability: Apr-2016  
Tested by: Cisco Systems  
Software Availability: Sep-2016

Platform Notes (Continued)
/dev/sdai xfs 373G 21G 353G 6% /

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. EXM4.3.1.2c.0.080220161434 08/02/2016
Memory:
32x 0xCE00 M393A4K40BB0-CPB 32 GB 2 rank 2133 MHz, configured at 1600 MHz
64x NO DIMM NO DIMM 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 = "/opt/cpu2006-1.2/libs/32:/opt/cpu2006-1.2/libs/64:/opt/cpu2006-1.2/sh10.2"
OMP_NUM_THREADS = "40"

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

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Cisco Systems
Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)

| SPECfp2006 | 134 |
| SPECfp_base2006 | 128 |

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

| Test date: | Apr-2017 |
| Hardware Availability: | Apr-2016 |
| Software Availability: | Sep-2016 |

Base Portability Flags (Continued)

- 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
- 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
Cisco Systems
Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)

**SPEC CFP2006 Result**

<table>
<thead>
<tr>
<th>SPECfp2006</th>
<th>134</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>128</td>
</tr>
</tbody>
</table>

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

Test date: Apr-2017
Hardware Availability: Apr-2016
Software Availability: Sep-2016

**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-iip32
- 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
Cisco Systems
Cisco UCS B460 M4 (Intel Xeon CPU E7-8891 v4 2.80 GHz)

| SPECfp2006 = | 134 |
| SPECfp_base2006 = | 128 |

CPU2006 license: 9019  
Test sponsor: Cisco Systems  
Test date: Apr-2017  
Tested by: Cisco Systems  
Hardware Availability: Apr-2016  
Software Availability: Sep-2016

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

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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For other inquiries, please contact webmaster@spec.org.

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