Cisco Systems
Cisco UCS B200 M4 (Intel Xeon E5-2699 v4 2.20 GHz)

SPECfp®2006 = 124
SPECfp_base2006 = 117

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

Test date: Jan-2017
Hardware Availability: Apr-2016
Software Availability: Dec-2015

Hardware

CPU Name: Intel Xeon E5-2699 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 44 cores, 2 chips, 22 cores/chip
CPU(s) orderable: 1,2 chips
Primary Cache: 32 GB I + 32 GB D on chip per core
Secondary Cache: 256 GB I+D on chip per core

Software

Operating System: SUSE Linux Enterprise Server 12 SP1 (x86_64) 3.12.49-11-default
Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;
Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
Auto Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)
## Cisco Systems

Cisco UCS B200 M4 (Intel Xeon E5-2699 v4 2.20 GHz)

| SPECfp2006 = | 124 |
| SPECfp_base2006 = | 117 |

CPU2006 license: 9019  
Test sponsor: Cisco Systems  
Test date: Jan-2017  
Hardware Availability: Apr-2016  
Tested by: Cisco Systems  
Software Availability: Dec-2015

- **L3 Cache:** 55 MB I+D on chip per chip  
- **Other Cache:** None  
- **Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)  
- **Disk Subsystem:** 2 x 1.2 TB 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</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>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>25.1</td>
<td>541</td>
<td>24.0</td>
<td>566</td>
<td>24.2</td>
<td>561</td>
<td>25.1</td>
<td>541</td>
<td>24.0</td>
<td>566</td>
</tr>
<tr>
<td>416.gamess</td>
<td>523</td>
<td>37.5</td>
<td>524</td>
<td>37.4</td>
<td>410</td>
<td>47.7</td>
<td>410</td>
<td>47.7</td>
<td>410</td>
<td>47.7</td>
</tr>
<tr>
<td>433.milc</td>
<td>119</td>
<td>77.4</td>
<td>119</td>
<td>77.0</td>
<td>122</td>
<td>75.5</td>
<td>119</td>
<td>77.4</td>
<td>119</td>
<td>77.0</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>43.3</td>
<td>210</td>
<td>43.2</td>
<td>211</td>
<td>43.1</td>
<td>211</td>
<td>43.3</td>
<td>210</td>
<td>43.2</td>
<td>211</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>159</td>
<td>44.8</td>
<td>159</td>
<td>45.0</td>
<td>157</td>
<td>45.4</td>
<td>159</td>
<td>44.8</td>
<td>159</td>
<td>45.0</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>12.9</td>
<td>929</td>
<td>13.2</td>
<td>903</td>
<td>13.7</td>
<td>875</td>
<td>12.9</td>
<td>929</td>
<td>13.2</td>
<td>903</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>25.5</td>
<td>369</td>
<td>23.7</td>
<td>397</td>
<td>26.1</td>
<td>361</td>
<td>25.5</td>
<td>369</td>
<td>23.7</td>
<td>397</td>
</tr>
<tr>
<td>444.namd</td>
<td>253</td>
<td>31.7</td>
<td>253</td>
<td>31.7</td>
<td>254</td>
<td>31.6</td>
<td>246</td>
<td>32.6</td>
<td>246</td>
<td>32.6</td>
</tr>
<tr>
<td>447.dealII</td>
<td>166</td>
<td>69.0</td>
<td>167</td>
<td>68.7</td>
<td>166</td>
<td>68.9</td>
<td>166</td>
<td>69.0</td>
<td>167</td>
<td>68.7</td>
</tr>
<tr>
<td>450.soplex</td>
<td>164</td>
<td>50.8</td>
<td>166</td>
<td>50.4</td>
<td>168</td>
<td>49.6</td>
<td>164</td>
<td>50.8</td>
<td>166</td>
<td>50.4</td>
</tr>
<tr>
<td>453.povray</td>
<td>82.9</td>
<td>64.2</td>
<td>82.6</td>
<td>64.4</td>
<td>82.7</td>
<td>64.3</td>
<td>73.1</td>
<td>72.8</td>
<td>73.5</td>
<td>72.4</td>
</tr>
<tr>
<td>454.calculix</td>
<td>152</td>
<td>54.4</td>
<td>152</td>
<td>54.3</td>
<td>151</td>
<td>54.5</td>
<td>133</td>
<td>61.9</td>
<td>130</td>
<td>63.3</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>47.5</td>
<td>224</td>
<td>46.1</td>
<td>230</td>
<td>49.8</td>
<td>213</td>
<td>39.9</td>
<td>267</td>
<td>39.6</td>
<td>268</td>
</tr>
<tr>
<td>465.tonto</td>
<td>249</td>
<td>39.6</td>
<td>240</td>
<td>41.0</td>
<td>239</td>
<td>41.1</td>
<td>166</td>
<td>59.2</td>
<td>165</td>
<td>59.5</td>
</tr>
<tr>
<td>470.lbm</td>
<td>15.2</td>
<td>903</td>
<td>15.5</td>
<td>886</td>
<td>15.6</td>
<td>883</td>
<td>15.2</td>
<td>903</td>
<td>15.5</td>
<td>886</td>
</tr>
<tr>
<td>481.wrf</td>
<td>92.6</td>
<td>121</td>
<td>91.9</td>
<td>122</td>
<td>93.0</td>
<td>120</td>
<td>92.6</td>
<td>121</td>
<td>91.9</td>
<td>122</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>278</td>
<td>70.0</td>
<td>282</td>
<td>69.2</td>
<td>279</td>
<td>69.9</td>
<td>278</td>
<td>70.0</td>
<td>282</td>
<td>69.2</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 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.rev6914
  - $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1

Continued on next page
Platform Notes (Continued)

running on linux-q59g Mon Jan 23 14:45:43 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 E5-2699 v4 @ 2.20GHz
  2 "physical id"s (chips)
  44 "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 : 22
siblings : 22
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
cache size : 56320 KB

From /proc/meminfo
MemTotal: 264404096 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-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-q59g 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 Jan 23 14:44

SPEC is set to: /opt/cpu2006-1.2

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda1</td>
<td>xfs</td>
<td>2.2T</td>
<td>14G</td>
<td>2.2T</td>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>

Continued on next page
Cisco Systems
Cisco UCS B200 M4 (Intel Xeon E5-2699 v4 2.20 GHz)

SPECfp2006 = 124
SPECfp_base2006 = 117

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

Test date: Jan-2017
Hardware Availability: Apr-2016
Software Availability: Dec-2015

Platform Notes (Continued)

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. B200M4.3.1.3f.0.110320162243 11/03/2016
Memory:
16x 0xCE00 M393A2G40EB1-CRC 16 GB 2 rank 2400 MHz
8x 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 = "/opt/cpu2006-1.2/libs/32:/opt/cpu2006-1.2/libs/64:/opt/cpu2006-1.2/sh"
OMP_NUM_THREADS = "44"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1
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

Continued on next page
Cisco Systems
Cisco UCS B200 M4 (Intel Xeon E5-2699 v4 2.20 GHz)

SPECfp2006 = 124
SPECfp_base2006 = 117

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

Test date: Jan-2017
Hardware Availability: Apr-2016
Software Availability: Dec-2015

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 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
454. calculix: -DSPEC_CPU_LP64 -nofor_main
459. GemsFDTD: -DSPEC_CPU_LP64
463. 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 -opt-prefetch -ansi-alias

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

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

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -ansi-alias

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 B200 M4 (Intel Xeon E5-2699 v4 2.20 GHz)

SPECfp2006 = 124
SPECfp_base2006 = 117

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: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
         -ipo(pass 2) -03(pass 2) -no-prec-div(pass 2)
         -par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias
         -auto-ilp32

447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
           -ipo(pass 2) -03(pass 2) -no-prec-div(pass 2)
           -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4
           -ansi-alias

Fortran benchmarks:
410.bwaves: basepeak = yes
416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
             -ipo(pass 2) -03(pass 2) -no-prec-div(pass 2)
             -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
             -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
               -ipo(pass 2) -03(pass 2) -no-prec-div(pass 2)
               -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
               -inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
           -ipo(pass 2) -03(pass 2) -no-prec-div(pass 2)
           -par-num-threads=1(pass 1) -prof-use(pass 2) -inline-calloc

Continued on next page
Cisco Systems
Cisco UCS B200 M4 (Intel Xeon E5-2699 v4 2.20 GHz)

| SPECfp2006 = | 124 |
| SPECfp_base2006 = | 117 |

| CPU2006 license: | 9019 |
| Test sponsor: | Cisco Systems |
| Tested by: | Cisco Systems |
| Test date: | Jan-2017 |
| Hardware Availability: | Apr-2016 |
| Software Availability: | Dec-2015 |

Peak Optimization Flags (Continued)

465.tonto (continued):
- opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-1lp32 -ansi-alias
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-ic16.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Cisco-Platform-Settings-V1.2-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Cisco-Platform-Settings-V1.2-revE.xml

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

Tested with SPEC CPU2006 v1.2.

Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/