Cisco Systems
Cisco UCS C220 M4 (Intel Xeon E5-2643 v4, 3.40 GHz)

<table>
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<tr>
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<td>= 66.2</td>
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CPU2006 license: 9019
Test date: Aug-2016
Test sponsor: Cisco Systems
Hardware Availability: Apr-2016
Tested by: Cisco Systems
Software Availability: Dec-2015

### 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
- Auto Parallel: Yes
- File System: xfs
- System State: Run level 3 (multi-user)
- Base Pointers: 32/64-bit
- Peak Pointers: 32/64-bit
- Other Software: Microquill SmartHeap V10.2

### Hardware
- CPU Name: Intel Xeon E5-2643 v4
- CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz
- CPU MHz: 3400
- FPU: Integrated
- CPU(s) enabled: 12 cores, 2 chips, 6 cores/chip
- CPU(s) orderable: 1.2 chips
- Primary Cache: 32 KB I + 32 KB D on chip per core
- Secondary Cache: 256 KB I+D on chip per core
- L3 Cache: 20 MB I+D on chip per chip
- Memory: 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
- Other Cache: None
- Disk Subsystem: 1 x 300 GB SAS HDD, 15K RPM
- Other Hardware: None
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### Results Table

<table>
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<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>
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<tr>
<td>400.perlbench</td>
<td>224</td>
<td>43.6</td>
<td>225</td>
<td>43.4</td>
<td>225</td>
<td>43.4</td>
<td>206</td>
<td>47.3</td>
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<tr>
<td>401.bzip2</td>
<td>361</td>
<td>26.8</td>
<td>360</td>
<td>26.8</td>
<td>361</td>
<td>26.7</td>
<td>355</td>
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<td>403.mcf</td>
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<td>37.4</td>
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<td>37.4</td>
<td>216</td>
<td>37.3</td>
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<tr>
<td>429.gcc</td>
<td>139</td>
<td>65.4</td>
<td>141</td>
<td>64.7</td>
<td>138</td>
<td>65.9</td>
<td>138</td>
<td>66.1</td>
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<tr>
<td>445.gobmk</td>
<td>332</td>
<td>31.6</td>
<td>332</td>
<td>31.6</td>
<td>332</td>
<td>31.6</td>
<td>334</td>
<td>31.4</td>
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<tr>
<td>456.hmmer</td>
<td>102</td>
<td>91.3</td>
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<td>91.3</td>
<td>103</td>
<td>91.0</td>
<td>103</td>
<td>91.0</td>
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<tr>
<td>458.sjeng</td>
<td>339</td>
<td>35.7</td>
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<td>35.7</td>
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<td>35.7</td>
<td>336</td>
<td>36.0</td>
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<tr>
<td>462.libquantum</td>
<td>4.20</td>
<td>4940</td>
<td>4.19</td>
<td>4950</td>
<td>4.19</td>
<td>4940</td>
<td>4.20</td>
<td>4940</td>
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<tr>
<td>464.h264ref</td>
<td>347</td>
<td>63.7</td>
<td>349</td>
<td>63.5</td>
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<td>63.6</td>
<td>347</td>
<td>63.7</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>227</td>
<td>27.5</td>
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<td>27.6</td>
<td>224</td>
<td>27.9</td>
<td>214</td>
<td>40.6</td>
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<tr>
<td>473.astar</td>
<td>187</td>
<td>37.5</td>
<td>183</td>
<td>38.3</td>
<td>183</td>
<td>38.3</td>
<td>186</td>
<td>37.8</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>95.0</td>
<td>72.6</td>
<td>95.0</td>
<td>72.6</td>
<td>95.3</td>
<td>72.4</td>
<td>86.9</td>
<td>79.4</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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### Submit Notes

The config file option 'submit' was used.

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### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

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### Platform Notes

BIOS Settings:  
Intel Hyper-Threading Technology option set to Disabled  
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 /home/CISCO_Benchmarks/cpu2006/config/sysinfo.rev6914  
$Rev: 6914 $ $Date:: 2014-06-25 #e3fbb867b5a285932ceab81e28219e1  
running on linux-f3gd Wed Aug 17 03:43:40 2016

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 E5-2643 v4 @ 3.40GHz  
2 "physical id"s (chips)  
Continued on next page
Cisco Systems
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Platform Notes (Continued)

12 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)

cpu cores : 6
siblings : 6
physical 0: cores 0 1 2 3 6 7
physical 1: cores 0 1 2 3 6 7
cache size : 20480 KB

From /proc/meminfo
MemTotal: 264370140 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:
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 15 22:54

SPEC is set to: /home/CISCO_Benchmarks/cpu2006
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb1 xfs 238G 44G 194G 19% /

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. C220M4.2.0.10e.0.0620162104 06/20/2016

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SPEC CINT2006 Result

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Platform Notes (Continued)

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 = */home/CISCO_Benchmarks/cpu2006/1ibs/32:/home/CISCO_Benchmarks/cpu2006/1ibs/64:/home/CISCO_Benchmarks/cpu2006/sh"
OMP_NUM_THREADS = "12"

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

Base Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -DSPEC_CPU_LP64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32

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### Base Optimization Flags (Continued)

**C++ benchmarks:**
- `-xCORE-AVX2`  
- `-ipo`  
- `-no-prec-div`  
- `-opt-prefetch`  
- `-auto-p32`  
- `-Wl,-z,muldefs`  
- `-L/sh`  
- `-lsmartheap64`

### Base Other Flags

**C benchmarks:**
- `403.gcc`  
  - `-Dalloca=_alloca`

### Peak Compiler Invocation

**C benchmarks (except as noted below):**
- `icc -m64`
- `icc`  
  - `m32`  
  - `-L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`
- `icc`  
  - `-L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`

**C++ benchmarks (except as noted below):**
- `icpc -m64`
- `icpc`  
  - `m32`  
  - `-L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`
- `icpc`  
  - `-L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`

### Peak Portability Flags

**400.perlbench:**
- `-D_FILE_OFFSET_BITS=64`
- `-DSPEC_CPU_LINUX_IA32`

**401.bzip2:**
- `-DSPEC_CPU_LP64`

**403.gcc:**
- `-DSPEC_CPU_LP64`

**429.mcf:**
- `-DSPEC_CPU_LP64`

**445.gobmk:**
- `-D_FILE_OFFSET_BITS=64`

**456.hmmer:**
- `-DSPEC_CPU_LP64`

**458.sjeng:**
- `-DSPEC_CPU_LP64`

**462.libquantum:**
- `-DSPEC_CPU_LP64`
- `-DSPEC_CPU_LINUX`

**464.h264ref:**
- `-DSPEC_CPU_LP64`

**471.omnetpp:**
- `-D_FILE_OFFSET_BITS=64`

**473.astar:**
- `-DSPEC_CPU_LP64`

**483.xalancbmk:**
- `-D_FILE_OFFSET_BITS=64`
- `-DSPEC_CPU_LINUX`
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Peak Optimization Flags

C benchmarks:

400.perlbench: -xCORE-AVX2(pass 2) -prof-gen:threadsafepass 1 -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -opt-prefetch -ansi-alias

401.bzip2: -xCORE-AVX2(pass 2) -prof-gen:threadsafepass 1 -ipo(pass 2) -O3(pass 2) -no-prec-div -par-num-threads=1(pass 1) -prof-use(pass 2) -auto-ilp32 -opt-prefetch -ansi-alias

403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc -opt-malloc-options=3 -auto-ilp32

429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32

445.gobmk: -xCORE-AVX2(pass 2) -prof-gen:threadsafepass 1 -prof-use(pass 2) -par-num-threads=1(pass 1) -ansi-alias

456.hmmer: basepeak = yes

458.sjeng: -xCORE-AVX2(pass 2) -prof-gen:threadsafepass 1 -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: -xCORE-AVX2(pass 2) -prof-gen:threadsafepass 1 -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -opt-ra-region-strategy=block -ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32 -Wl,-z,muldefs -L/sh -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap
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**Peak Other Flags**

C benchmarks:

403.gcc: -Dalloca=_alloca

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

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