Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Platinum 8276L, 2.20GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>148</td>
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</tbody>
</table>

**CPU2017 License:** 9019  
**Test Sponsor:** Cisco Systems  
**Tested by:** Cisco Systems  
**Test Date:** Oct-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** May-2019

| Threads | 0 | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 |
|---------|---|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 603.bwaves_s | 56 | 180 | 515 | 518 | 519 | 520 |
| 607.cactuBSSN_s | 56 | 180 | 180 | 180 | 180 | 180 |
| 619.lbm_s | 56 | 106 | 106 | 106 | 106 | 106 |
| 621.wrf_s | 56 | 121 | 121 | 121 | 121 | 121 |
| 627.cam4_s | 56 | 118 | 118 | 118 | 118 | 118 |
| 628.pop2_s | 56 | 54.4 | 54.4 | 54.4 | 54.4 | 54.4 |
| 638.imagick_s | 56 | 162 | 162 | 162 | 162 | 162 |
| 644.nab_s | 56 | 293 | 293 | 293 | 293 | 293 |
| 649.fotonik3d_s | 56 | 87.3 | 87.3 | 87.3 | 87.3 | 87.3 |
| 654.roms_s | 56 | 157 | 157 | 157 | 157 | 157 |

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8276L  
- **Max MHz:** 4000  
- **Nominal:** 2200  
- **Enabled:** 56 cores, 2 chips  
- **Orderable:** 1.2 Chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 38.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 768 GB (24 x 32 GB 2Rx4 PC4-2933V-R)  
- **Storage:** 1 x 600 GB 15K RPM SAS HDD  
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)  
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.4.227 of Intel Fortran Compiler for Linux  
- **Parallel:** Yes  
- **Firmware:** Version 4.0.4g released Jul-2019  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None  
- **Power Management:** default
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Cisco UCS C220 M5 (Intel Xeon Platinum 8276L, 2.20GHz)

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
<td>56</td>
<td>114</td>
<td>517</td>
<td></td>
<td>114</td>
<td>517</td>
<td>114</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>56</td>
<td>92.5</td>
<td>180</td>
<td>92.8</td>
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<tr>
<td>619.lbm_s</td>
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<td>50.5</td>
<td>104</td>
<td>49.2</td>
<td>106</td>
<td>49.4</td>
<td>106</td>
<td>49.2</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>56</td>
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<td>121</td>
<td></td>
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<td>121</td>
<td>109</td>
<td>121</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>56</td>
<td>75.0</td>
<td>118</td>
<td>74.8</td>
<td>119</td>
<td>75.0</td>
<td>118</td>
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</tr>
<tr>
<td>628.pop2_s</td>
<td>56</td>
<td>217</td>
<td>54.7</td>
<td>223</td>
<td>53.3</td>
<td>218</td>
<td>54.4</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>56</td>
<td>88.1</td>
<td>164</td>
<td></td>
<td>88.9</td>
<td>162</td>
<td>92.5</td>
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<td>644.nab_s</td>
<td>56</td>
<td>59.7</td>
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<td>59.7</td>
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<td>59.6</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
<td>104</td>
<td>87.3</td>
<td>104</td>
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<td>105</td>
<td>86.8</td>
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<td>654.roms_s</td>
<td>56</td>
<td>100</td>
<td>157</td>
<td>101</td>
<td>155</td>
<td>99.4</td>
<td>158</td>
<td></td>
</tr>
</tbody>
</table>

Operating System Notes
Stack size set to unlimited using "ulimit -s unlimited"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
Platform Notes

BIOS Settings:
Intel HyperThreading Technology set to Disabled
CPU performance set to Enterprise
Power Performance Tuning set to OS Controls
SNC set to Disabled
Patrol Scrub set to Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46ae485a0011
running on linux-ylla Sun Oct 27 08:34:19 2019

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Platinum 8276L CPU @ 2.20GHz
  2 "physical id"s (chips)
  56 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
  28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
  28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276L CPU @ 2.20GHz
Stepping: 7
CPU MHz: 2200.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00

(Continued on next page)
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**SPEC CPU®2017 Floating Point Speed Result**

<table>
<thead>
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**CPU2017 License:** 9019

**Test Sponsor:** Cisco Systems

**Test Date:** Oct-2019

**Tested by:** Cisco Systems

**Hardware Availability:** Apr-2019

**Software Availability:** May-2019

**Platform Notes (Continued)**

- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 1024K
- L3 cache: 39424K
- NUMA node0 CPU(s): 0-27
- NUMA node1 CPU(s): 28-55
- Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtex64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat _13 cd t _3 invpcid_single intel_pinn tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mp x rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsave ic qm _llc qm _occup _llc qm _mbm _total qm _mbm _local ibpb ibrs stibp dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg _req pk u ospke avx512_vnni arch_capabilities ssbd

/proc/cpuinfo cache data

```
cache size : 39424 KB
```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

```
available: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
node 0 size: 385603 MB
node 0 free: 384732 MB
node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55
node 1 size: 387054 MB
node 1 free: 379808 MB
node distances:
node 0 distance 1:
  0: 10 21
  1: 21 10
```

From /proc/meminfo

```
MemTotal: 791202012 kB
HugePages_Total: 0
Hugepagesize: 2048 KB
```

From /etc/*release* /etc/*version*

```
NAME="SLES"
VERSION="15"
```

(Continued on next page)
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SPECspeed®2017_fp_base = 148
SPECspeed®2017_fp_peak = 148

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Test Date: Oct-2019
Hardware Availability: Apr-2019
Tested by: Cisco Systems
Software Availability: May-2019

Platform Notes (Continued)

VERSION_ID="15"
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
 Linux linux-ylla 4.12.14-23-default #1 SMP Tue May 29 21:04:44 UTC 2018 (cd0437b)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): No status reported
Microarchitectural Data Sampling: No status reported
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation, IBPB, IBRS_FW

run-level 3 Oct 27 03:50

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb2 xfs 559G 76G 484G 14% /

From /sys/devices/virtual/dmi/id
BIOS: Cisco Systems, Inc. C220M5.4.0.4g.0.0712190011 07/12/2019
Vendor: Cisco Systems Inc
Product: UCSC-C220-M5SX
Serial: WZP22380ZAS

Additional information from dmidecode follows. 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.

Memory:
24x 0xCE00 M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2934

(End of data from sysinfo program)
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Cisco UCS C220 M5 (Intel Xeon Platinum 8276L, 2.20GHz)

Specspeed®2017_fp_base = 148
Specspeed®2017_fp_peak = 148

CPU2017 License: 9019
Test Sponsor: Cisco Systems
Hardware Availability: Apr-2019
Test Date: Oct-2019
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Software Availability: May-2019

Compiler Version Notes

<table>
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<tr>
<th>Compiler</th>
<th>Programs Tested</th>
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<tr>
<td>C</td>
<td>619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)</td>
</tr>
<tr>
<td>C++, C, Fortran</td>
<td>607.cactuBSSN_s(base, peak)</td>
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<td>Fortran</td>
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Cisco Systems
Cisco UCS C220 M5 (Intel Xeon Platinum 8276L, 2.20GHz)

**SPECspeed®2017_fp_base = 148**
**SPECspeed®2017_fp_peak = 148**

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**Base Compiler Invocation**

C benchmarks:
```bash
icc -m64 -std=c11
```

Fortran benchmarks:
```bash
ifort -m64
```

Benchmarks using both Fortran and C:
```bash
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
```bash
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:
```bash
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:
```bash
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```

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Cisco UCS C220 M5 (Intel Xeon Platinum 8276L, 2.20GHz)

SPECspeed®2017_fp_base = 148
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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard realloc-lhs

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

(Continued on next page)
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Software Availability: May-2019

Peak Optimization Flags (Continued)

654.roms_s (continued):
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revJ.xml

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