Cisco Systems
Cisco UCS B200 M5 (Intel Xeon Gold 6146, 3.20GHz)

<table>
<thead>
<tr>
<th>Software</th>
<th>SPECspeed®2017_fp_base = 106</th>
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<tr>
<td>CPU2017 License:</td>
<td>9019</td>
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<td>Test Sponsor:</td>
<td>Cisco Systems</td>
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<td>Tested by:</td>
<td>Cisco Systems</td>
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<tr>
<td>Test Date:</td>
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<tr>
<td>Threads</td>
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<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
<td>619.lbm_s</td>
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<tr>
<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
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<td>628.pop2_s</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
<td>24</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>654.roms_s</td>
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<thead>
<tr>
<th>Software</th>
<th>SPECspeed®2017_fp_base (106)</th>
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<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 12 SP2 (x86_64)</td>
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<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux</td>
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<tr>
<td>Parallel:</td>
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<td>Firmware:</td>
<td>Version 3.2.1d released Jul-2017</td>
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<td>File System:</td>
<td>xfs</td>
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<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
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<td>Base Pointers:</td>
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<td>Peak Pointers:</td>
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<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Power Management:</td>
<td>--</td>
</tr>
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</table>

Hardware
CPU Name: Intel Xeon Gold 6146
Max MHz: 4200
Nominal: 3200
Enabled: 24 cores, 2 chips
Orderable: 1.2 Chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 24.75 MB I+D on chip per chip
Other: None
Memory: 384 GB (24 x 16 GB 2Rx4 PC4-2666V-R)
Storage: 1 x 600 GB SAS HDD, 10K RPM
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP2 (x86_64)
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
Parallel: Yes
Firmware: Version 3.2.1d released Jul-2017
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: --
Cisco Systems
Cisco UCS B200 M5 (Intel Xeon Gold 6146, 3.20GHz)

SPECspeed®2017_fp_base = 106
SPECspeed®2017_fp_peak = 108

Results Table

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<tr>
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<th>Seconds</th>
<th>Ratio</th>
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<td>126</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 106
SPECspeed®2017_fp_peak = 108

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

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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

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/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f

(Continued on next page)
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Cisco UCS B200 M5 (Intel Xeon Gold 6146, 3.20GHz)

SPECspeed®2017_fp_base = 106
SPECspeed®2017_fp_peak = 108

Platform Notes (Continued)

running on linux-djj4 Tue Oct 24 06:12:20 2017

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) Gold 6146 CPU @ 3.20GHz
  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 8 9 11 17 18 19 20
physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                24
On-line CPU(s) list:   0-23
Thread(s) per core:    1
Core(s) per socket:    12
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6146 CPU @ 3.20GHz
Stepping:              4
CPU MHz:               1306.154
CPU max MHz:           4200.0000
CPU min MHz:           1200.0000
BogoMIPS:              6399.99
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              25344K
NUMA node0 CPU(s):     0-11
NUMA node1 CPU(s):     12-23
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
 lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
```

(Continued on next page)
Cisco Systems
Cisco UCS B200 M5 (Intel Xeon Gold 6146, 3.20GHz)

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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

SPECspeed®2017_fp_base = 106
SPECspeed®2017_fp_peak = 108

Test Date: Oct-2017
Hardware Availability: Aug-2017
Software Availability: Sep-2017

Platform Notes (Continued)

fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsae avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat ebp pln pts dtherm hwp
hwp_act_window hwp_epp hwp_pkg_req intel_pt tpr_shadow vmxin vmp xeci fpi
dsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f
avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec
xgetbv1 cqm_11c cqm_occup_11c

/proc/cpuinfo cache data
cache size: 25344 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 2 nodes (0-1)
nod 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
node 0 size: 191913 MB
node 0 free: 189484 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
node 1 size: 193504 MB
node 1 free: 188010 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 394667572 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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-djj4 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)

(Continued on next page)
Platform Notes (Continued)

x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jan 8 05:24

SPEC is set to: /home/cpu2017

<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>559G</td>
<td>115G</td>
<td>445G</td>
<td>21%</td>
<td>/</td>
</tr>
</tbody>
</table>

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.

BIOS Cisco Systems, Inc. B200M5.3.2.1d.5.0727171353 07/27/2017
Memory: 24x 0xCE00 M393A2G40EB2-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

=================================================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)</th>
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<td>icc (ICC) 18.0.0 20170811</td>
<td>Copyright (C) 1985-2017 Intel Corporation. All rights reserved.</td>
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</tr>
<tr>
<td>ifort (IFORT) 18.0.0 20170811</td>
<td>Copyright (C) 1985-2017 Intel Corporation. All rights reserved.</td>
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<td>Copyright (C) 1985-2017 Intel Corporation. All rights reserved.</td>
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<th>603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)</th>
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<tbody>
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<td>ifort (IFORT) 18.0.0 20170811</td>
<td>Copyright (C) 1985-2017 Intel Corporation. All rights reserved.</td>
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Cisco Systems
Cisco UCS B200 M5 (Intel Xeon Gold 6146, 3.20GHz)

SPECspeed®2017_fp_base = 106
SPECspeed®2017_fp_peak = 108

Compiler Version Notes (Continued)

==============================================================================
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
-----------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

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
Cisco Systems
Cisco UCS B200 M5 (Intel Xeon Gold 6146, 3.20GHz)

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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

Test Date: Oct-2017
Hardware Availability: Aug-2017
Software Availability: Sep-2017

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

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

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

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

(Continued on next page)
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CPU2017 License: 9019
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Tested by: Cisco Systems

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Software Availability: Sep-2017

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_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=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
-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=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

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=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

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CPU2017 License: 9019
Test Sponsor: Cisco Systems
Tested by: Cisco Systems

Test Date: Oct-2017
Hardware Availability: Aug-2017
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Peak Optimization Flags (Continued)

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
-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=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte

Peak Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml
http://www.spec.org/cpu2017/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 info@spec.org.

Tested with SPEC CPU®2017 v1.0.2 on 2017-10-24 06:12:20-0400.
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