# SPEC CPU®2017 Integer Speed Result

## Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316, 2.30GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>11.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### CPU2017 License
9019

### Test Sponsor
Cisco Systems

### Tested by
Cisco Systems

### Test Date
Jul-2021

### Hardware Availability
Jun-2021

### Software Availability
Dec-2020

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 SP2 5.3.18-22-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version 4.2.1c released Jul-2021</td>
</tr>
<tr>
<td>File System:</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

### Hardware

| CPU Name: | Intel Xeon Silver 4316 |
| Max MHz: | 3400 |
| Nominal: | 2300 |
| Enabled: | 40 cores, 2 chips |
| Orderable: | 1.2 Chips |
| Cache L1: | 32 KB I + 48 KB D on chip per core |
| L2: | 1.25 MB I+D on chip per core |
| L3: | 30 MB I+D on chip per chip |
| Other: | None |
| Memory: | 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666) |
| Storage: | 1 x 480 GB SATA SSD |
| Other: | None |

### Threads

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>6.94</td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>10.4</td>
<td></td>
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<tr>
<td>605.mcf_s</td>
<td></td>
<td>18.8</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td></td>
<td>9.91</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>5.75</td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td></td>
<td>18.9</td>
</tr>
<tr>
<td>657.xz_s</td>
<td></td>
<td>21.9</td>
</tr>
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Tested by: Cisco Systems
Test Date: Jul-2021
Hardware Availability: Jun-2021
Software Availability: Dec-2020

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>40</td>
<td>256</td>
<td>6.94</td>
<td>259</td>
<td>6.85</td>
<td>256</td>
<td>6.95</td>
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<tr>
<td>602.gcc_s</td>
<td>40</td>
<td>384</td>
<td>10.4</td>
<td>382</td>
<td>10.4</td>
<td>387</td>
<td>10.3</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>40</td>
<td>252</td>
<td>18.8</td>
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<td>18.8</td>
<td>254</td>
<td>18.6</td>
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<tr>
<td>620.omnetpp_s</td>
<td>40</td>
<td>165</td>
<td>9.91</td>
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<td>9.88</td>
<td>163</td>
<td>10.0</td>
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<tr>
<td>623.xalancbmk_s</td>
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<td>109</td>
<td>12.9</td>
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<td>13.0</td>
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<td>13.0</td>
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<tr>
<td>625.x264_s</td>
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<td>108</td>
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<td>16.3</td>
<td>108</td>
<td>16.3</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>40</td>
<td>249</td>
<td>5.75</td>
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<td>5.75</td>
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<td>5.74</td>
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<td>641.leela_s</td>
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<td>359</td>
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<td>18.9</td>
<td>156</td>
<td>18.9</td>
<td>156</td>
<td>18.8</td>
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<tr>
<td>657.xz_s</td>
<td>40</td>
<td>281</td>
<td>22.0</td>
<td>282</td>
<td>21.9</td>
<td>283</td>
<td>21.9</td>
</tr>
</tbody>
</table>

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

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,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOCC_CONF = "retain: true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7940X CPU + 64GB RAM memory using openSUSE Leap 15.2
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
runcpu command invoked through numactl i.e.:

(Continued on next page)
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SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = Not Run

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

General Notes (Continued)
numactl --interleave=all runcpu <etc>
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 Hyper-Threading Technology set to Disabled
DCU Streamer Prefetch set to Disabled
UPI Link Enablement set to Auto
UPI Power Management set to Disabled
Sub NUMA Clustering set to Disabled
LLC Dead Line set to Disabled
Memory Refresh Rate set to 1x Refresh
ADDDC Sparing set to Disabled
Patrol Scrub set to Disabled
Enhanced CPU performance set to Disabled
Energy Efficient Turbo set to Enabled
Processor C6 Report set to Enabled
Processor C1E set to Enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on install Sat Jul 31 14:28:16 2021

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) Silver 4316 CPU @ 2.30GHz
  2 "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 : 20
siblings : 20
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

(Continued on next page)
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Test Date: Jul-2021
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Hardware Availability: Jun-2021
Software Availability: Dec-2020

Platform Notes (Continued)

From lscpu from util-linux 2.33.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 57 bits virtual
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 1
Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
Stepping: 6
CPU MHz: 800.000
CPU max MHz: 3400.0000
CPU min MHz: 800.0000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 30720K
NUMA node0 CPU(s): 0-19
NUMA node1 CPU(s): 20-39
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 cli flush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 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 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesep xsaves xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local wboinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512vmbi umip pku ospke avx512_vmbi2 gfeni vaes vpcmldqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq 1a57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 30720 KB

From numactl --hardware

(Continued on next page)
## Platform Notes (Continued)

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 
node 0 size: 1031588 MB 
node 0 free: 1030930 MB 
node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 
node 1 size: 1032183 MB 
node 1 free: 1031841 MB 
node distances: 
node 0 1 
0: 10 20 
1: 20 10 

From /proc/meminfo 
MemTotal: 2113302688 kB 
HugePages_Total: 0 
Hugepagesize: 2048 kB 

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance 

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

```
NAME="SLES" 
VERSION="15-SP2" 
VERSION_ID="15.2" 
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2" 
ID="sles" 
ID_LIKE="suse" 
ANSI_COLOR="0;32" 
CPE_NAME="cpe:/o:suse:sles:15:sp2"
```

uname -a: 
Linux install 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64 x86_64 GNU/Linux 

Kernel self-reported vulnerability status: 

| CVE-2018-12207 (iTLB Multihit) | Not affected |
| CVE-2018-3620 (L1 Terminal Fault) | Not affected |
| Microarchitectural Data Sampling | Not affected |
| CVE-2017-5754 (Meltdown) | Mitigation: Speculative Store Bypass disabled via prctl and seccomp |
| CVE-2018-3639 (Speculative Store Bypass) | Mitigation: userscopy/swaps barriers and __user pointer |

(Continued on next page)
Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): sanitation
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jul 31 13:57

SPEC is set to: /home/cpu2017

```
Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda4      btrfs  445G   16G  428G   4% /home
```

From /sys/devices/virtual/dmi/id

```
Vendor:         Cisco Systems Inc
Product:        UCSB-B200-M6
Serial:         FCH24097576
```

Additional information from dmidecode 3.2 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:
32x 0xCE00 M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666

BIOS:
```
BIOS Vendor:       Cisco Systems, Inc.
BIOS Version:      B200M6.4.2.1c.10.0723211453
BIOS Date:         07/23/2021
BIOS Revision:     5.22
```

(End of data from sysinfo program)

Compiler Version Notes

```
C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
        | 625.x264_s(base) 657.xz_s(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
C++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
        | 641.leela_s(base)
```

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### Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran | 648.exchange2_s(base)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

### Base Compiler Invocation

**C benchmarks:**
- icx

**C++ benchmarks:**
- icpx

**Fortran benchmarks:**
- ifort

### Base Portability Flags

- 600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
- 602.gcc_s: -DSPEC_LP64
- 605.mcf_s: -DSPEC_LP64
- 620.omnetpp_s: -DSPEC_LP64
- 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
- 625.x264_s: -DSPEC_LP64
- 631.deepsjeng_s: -DSPEC_LP64
- 641.leela_s: -DSPEC_LP64
- 648.exchange2_s: -DSPEC_LP64
- 657.xz_s: -DSPEC_LP64
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Base Optimization Flags

C benchmarks:
-DSPEC_OPENMP -std=c11 -m64 -fopenmp -Wl,-z,muldefs -xCORE-AVX512
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-DSPEC_OPENMP -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin/

Fortran benchmarks:
-m64 -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries

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/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-ICX-revF.xml

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

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