SPEC CPU®2017 Floating Point Speed Result

Cisco Systems

Cisco UCS C240 M6 (Intel Xeon Platinum 8351N, 2.40GHz)

$SPECspeed®2017\_fp\_base =$ 136

$SPECspeed®2017\_fp\_peak =$ Not Run

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

Test Date: Aug-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

Threads — scale: 0, 15.0, 30.0, 45.0, 60.0, 75.0, 90.0, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240, 255, 270, 285, 300, 315, 330, 355

Benchmark	Threads	Result
603.bwaves_s	36	353
607.cactuBSSN_s	36	197
619.lbm_s	36	73.5
621.wrf_s	36	159
627.cam4_s	36	99.8
628.pop2_s	36	94.0
638.imagick_s	36	160
644.nab_s	36	272
649.fotonik3d_s	36	64.0
654.roms_s	36	100

—— SPECspeed®2017_fp_base (136)

Hardware

CPU Name: Intel Xeon Platinum 8351N
 Max MHz: 3500
 Nominal: 2400
Enabled: 36 cores, 1 chip
Orderable: 1 Chip
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 1.25 MB I+D on chip per core
 L3: 54 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200V-R, running at 2933)
Storage: 1 x 240 GB SATA SSD
Other: None

Software

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

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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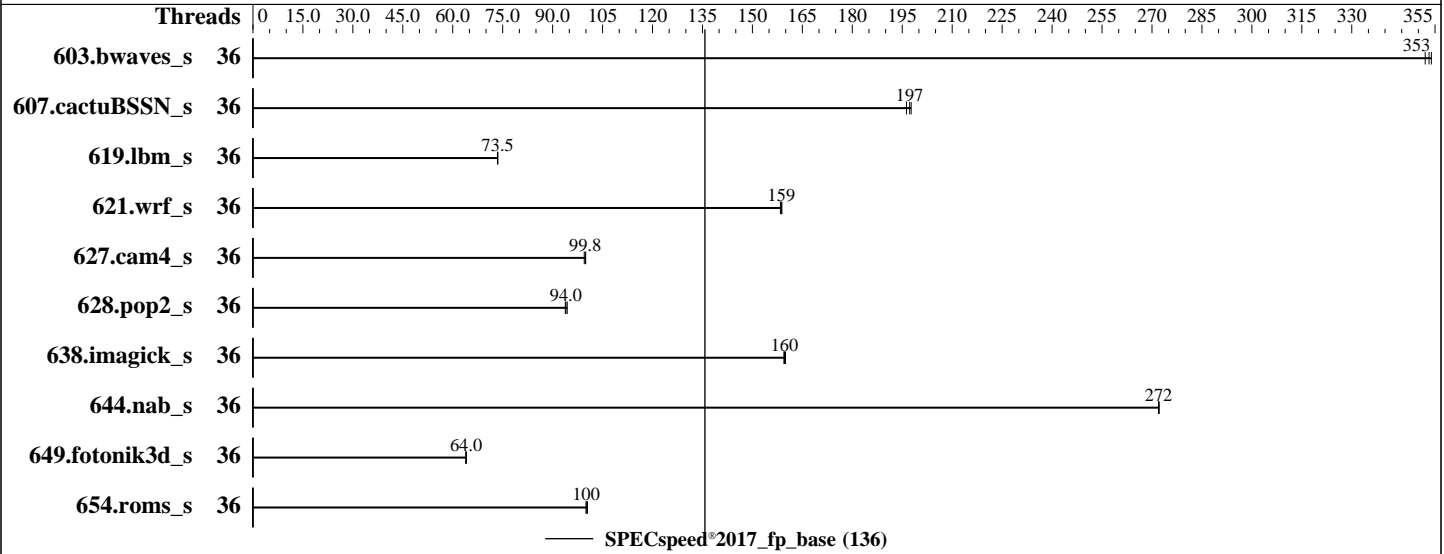
SPECspeed®2017_fp_peak = Not Run

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	36	167	354	168	352	**167**	**353**							
607.cactuBSSN_s	36	84.3	198	**84.5**	**197**	84.9	196							
619.lbm_s	36	**71.3**	**73.5**	71.2	73.5	71.3	73.4							
621.wrf_s	36	83.5	158	**83.3**	**159**	83.3	159							
627.cam4_s	36	89.1	99.5	**88.8**	**99.8**	88.7	99.9							
628.pop2_s	36	**126**	**94.0**	127	93.8	126	94.4							
638.imagick_s	36	90.2	160	**90.4**	**160**	90.5	159							
644.nab_s	36	**64.2**	**272**	64.2	272	64.2	272							
649.fotonik3d_s	36	**142**	**64.0**	142	64.1	143	63.9							
654.roms_s	36	**157**	**100**	157	100	157	100							
SPECspeed®2017_fp_base =	**136**													
SPECspeed®2017_fp_peak =	**Not Run**													

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,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_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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Test Sponsor:	Cisco Systems	**Hardware Availability:**	Apr-2021
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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.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
BIOS Settings:
Intel Hyper-Threading Technology set to Disabled
DCU Streamer Prefetch 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 Auto
Processor C6 Report set to Enabled

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on install Mon Aug 30 02:56:56 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) Platinum 8351N CPU @ 2.40GHz
       1  "physical id"s (chips)
       36 "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 : 36
       siblings  : 36
       physical 0: cores 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 28 29 30 31 32 33 34 35

 From lscpu from util-linux 2.33.1:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
```

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Platform Notes (Continued)

```
        Address sizes:         46 bits physical, 57 bits virtual
        CPU(s):                36
        On-line CPU(s) list:   0-35
        Thread(s) per core:    1
        Core(s) per socket:    36
        Socket(s):             1
        NUMA node(s):          1
        Vendor ID:             GenuineIntel
        CPU family:            6
        Model:                 106
        Model name:            Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz
        Stepping:              6
        CPU MHz:               2791.035
        CPU max MHz:           3500.0000
        CPU min MHz:           800.0000
        BogoMIPS:              4800.00
        Virtualization:        VT-x
        L1d cache:             48K
        L1i cache:             32K
        L2 cache:              1280K
        L3 cache:              55296K
        NUMA node0 CPU(s):     0-35
        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 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_l3 invpcid_single ssbd
        mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi 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 xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
        cqm_mbm_local wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp
        hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni
        avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
        arch_capabilities

 /proc/cpuinfo cache data
    cache size : 55296 KB

 From numactl --hardware
 WARNING: a numactl 'node' might or might not correspond to a physical chip.
   available: 1 nodes (0)
   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
   28 29 30 31 32 33 34 35
   node 0 size: 1031355 MB
   node 0 free: 1018797 MB
```

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Hardware Availability: Apr-2021
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Platform Notes (Continued)

```
  node distances:
  node   0
    0:  10

 From /proc/meminfo
    MemTotal:       1056107812 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

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

 From /etc/*release* /etc/*version*
    os-release:
       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 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):                            Not affected
 CVE-2018-3639 (Speculative Store Bypass):            Mitigation: Speculative Store
                                                      Bypass disabled via prctl and
                                                      seccomp
 CVE-2017-5753 (Spectre variant 1):                   Mitigation: usercopy/swapgs
                                                      barriers and __user pointer
                                                      sanitization
 CVE-2017-5715 (Spectre variant 2):                   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 Aug 29 17:49

 SPEC is set to: /home/cpu2017
```

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Platform Notes (Continued)

```
   Filesystem      Type   Size  Used Avail Use% Mounted on
   /dev/sda2       btrfs  222G   46G  175G  21% /home


 From /sys/devices/virtual/dmi/id
    Vendor:         Cisco Systems Inc
    Product:        UCSC-C240-M6S
    Serial:         WZP24460JDZ


 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:
     16x 0xCE00 M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2933
     16x NO DIMM NO DIMM


 BIOS:
    BIOS Vendor:       Cisco Systems, Inc.
    BIOS Version:      C240M6.4.2.1d.0.0730210924
    BIOS Date:         07/30/2021
    BIOS Revision:     5.22

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C                    | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
Intel(R) C 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.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) C++ 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.
Intel(R) C 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.
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.
```

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------

==========================================================================
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_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.
--------------------------------------------------------------------------

==========================================================================
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_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.
Intel(R) C 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:
`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`

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Base Portability Flags (Continued)

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:
```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries
```

Fortran benchmarks:
```
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using both Fortran and C:
```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

The flags files that were used to format this result can be browsed at
  http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.html
  http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-ICX-revG.html

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-revG.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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