



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Gold 6338N, 2.20GHz)

SPECspeed®2017_fp_base = 193

SPECspeed®2017_fp_peak = 193

CPU2017 License: 9019

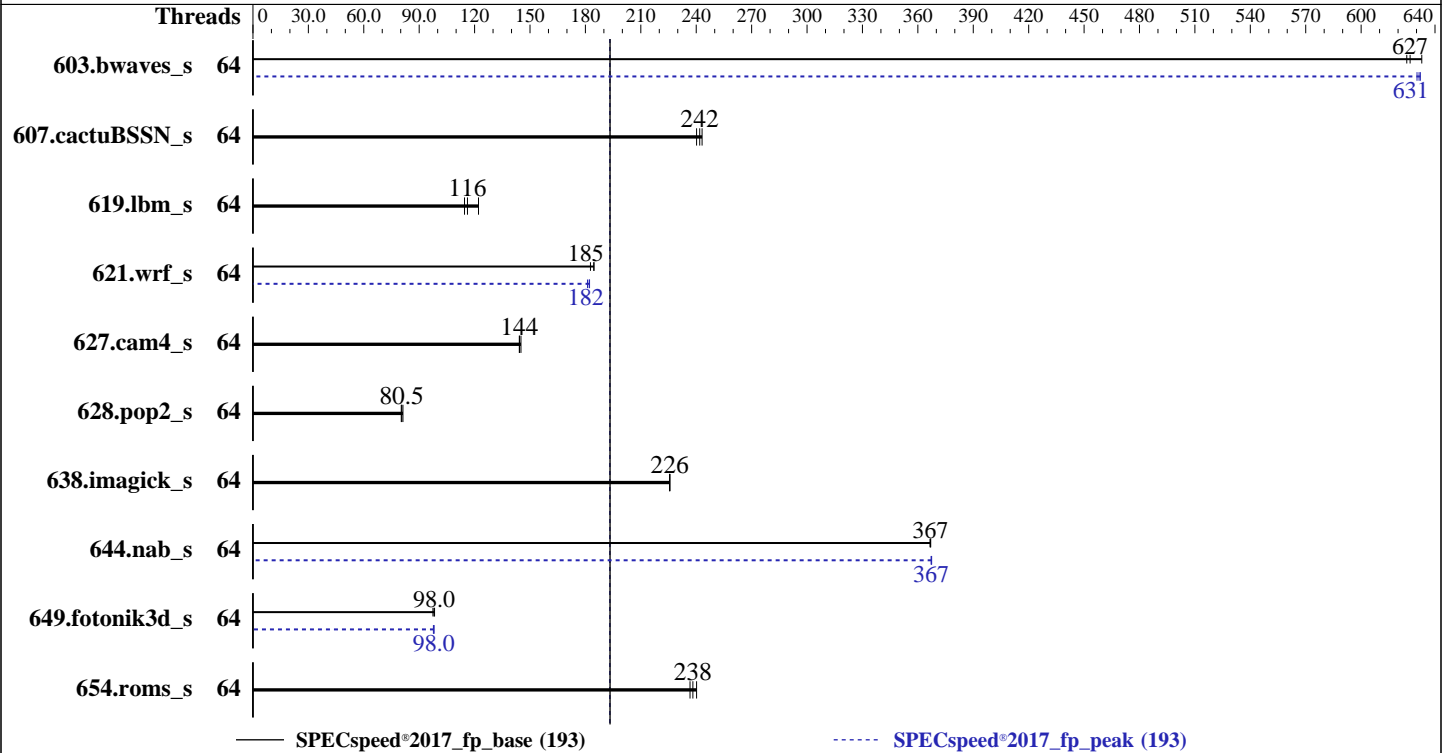
Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Aug-2021

Hardware Availability: Apr-2021

Software Availability: Dec-2020



Hardware

CPU Name: Intel Xeon Gold 6338N
 Max MHz: 3500
 Nominal: 2200
 Enabled: 64 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: 48 MB I+D on chip per chip
 Other: None
 Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200V-R, running at 2666)
 Storage: 1 x 240 GB M.2 SSD SATA
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP2 5.3.18-22-default
 Compiler: 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;
 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: 64-bit
 Other: jemalloc memory allocator V5.0.1
 Power Management: BIOS and OS set to prefer performance at the cost of additional power usage



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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 | 64 | 93.2 | 633 | 94.4 | 625 | <u>94.2</u> | <u>627</u> | 64 | <u>93.4</u> | <u>631</u> | 93.3 | 632 | 93.6 | 630 |
| 607.cactuBSSN_s | 64 | <u>68.9</u> | <u>242</u> | 68.6 | 243 | 69.4 | 240 | 64 | <u>68.9</u> | <u>242</u> | 68.6 | 243 | 69.4 | 240 |
| 619.lbm_s | 64 | <u>45.1</u> | <u>116</u> | 42.9 | 122 | 45.7 | 115 | 64 | <u>45.1</u> | <u>116</u> | 42.9 | 122 | 45.7 | 115 |
| 621.wrf_s | 64 | 72.4 | 183 | 71.6 | 185 | <u>71.7</u> | <u>185</u> | 64 | 72.6 | 182 | <u>72.7</u> | <u>182</u> | 73.0 | 181 |
| 627.cam4_s | 64 | <u>61.4</u> | <u>144</u> | 61.1 | 145 | 61.5 | 144 | 64 | <u>61.4</u> | <u>144</u> | 61.1 | 145 | 61.5 | 144 |
| 628.pop2_s | 64 | 146 | 81.2 | <u>147</u> | <u>80.5</u> | 148 | 80.3 | 64 | 146 | 81.2 | <u>147</u> | <u>80.5</u> | 148 | 80.3 |
| 638.imagick_s | 64 | 64.0 | 226 | 63.9 | 226 | <u>63.9</u> | <u>226</u> | 64 | 64.0 | 226 | 63.9 | 226 | <u>63.9</u> | <u>226</u> |
| 644.nab_s | 64 | <u>47.6</u> | <u>367</u> | 47.7 | 367 | 47.6 | 367 | 64 | 47.6 | 367 | 47.5 | 367 | <u>47.6</u> | <u>367</u> |
| 649.fotonik3d_s | 64 | <u>93.0</u> | <u>98.0</u> | 93.5 | 97.4 | 92.7 | 98.3 | 64 | 93.3 | 97.7 | <u>93.1</u> | <u>98.0</u> | 93.0 | 98.0 |
| 654.roms_s | 64 | 65.6 | 240 | <u>66.1</u> | <u>238</u> | 66.5 | 237 | 64 | 65.6 | 240 | <u>66.1</u> | <u>238</u> | 66.5 | 237 |

SPECspeed®2017_fp_base = **193**

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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"
MALLOCONF = "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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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  
Memory Refresh Rate set to 1x Refresh  
ADDDC Sparing set to Disabled  
Patrol Scrub set to Disabled  
Energy Efficient Turbo set to Enabled  
Processor C6 Report set to Enabled  
Processor ClE set to Enabled
```

```
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d  
running on localhost Thu Aug 26 14:02:29 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) Gold 6338N CPU @ 2.20GHz  
 2 "physical id"s (chips)  
64 "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 : 32  
siblings : 32  
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  
physical 1: 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
```

```
From lscpu from util-linux 2.33.1:  
Architecture: x86_64
```

(Continued on next page)



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Platform Notes (Continued)

```

CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
Address sizes:       46 bits physical, 57 bits virtual
CPU(s):              64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s):           2
NUMA node(s):       2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Gold 6338N CPU @ 2.20GHz
Stepping:            6
CPU MHz:             1177.805
CPU max MHz:         3500.0000
CPU min MHz:         800.0000
BogoMIPS:            4400.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            49152K
NUMA node0 CPU(s):  0-31
NUMA node1 CPU(s):  32-63
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
aperfmpperf 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 bmil 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 : 49152 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

```

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Platform Notes (Continued)

```

28 29 30 31
node 0 size: 1031513 MB
node 0 free: 1024631 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 1 size: 1031904 MB
node 1 free: 1030566 MB
node distances:
node  0  1
  0:  10  20
  1:  20  10

From /proc/meminfo
MemTotal:          2112939420 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 localhost 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/swaps
barriers and __user pointer
sanitization

```

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Platform Notes (Continued)

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 26 09:48

SPEC is set to: /home/cpu2017

| Filesystem | Type | Size | Used | Avail | Use% | Mounted on |
|------------|-------|------|------|-------|------|------------|
| /dev/sda2 | btrfs | 222G | 15G | 206G | 7% | /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:     B200M6.4.2.1d.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, peak) 638.imagick_s(base, peak)
          | 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          | 644.nab_s(peak)
-----
```

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,

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Compiler Version Notes (Continued)

Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 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 | 644.nab_s(peak)

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++, C, Fortran | 607.cactuBSSN_s(base, peak)

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.

=====
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)

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, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)

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Compiler Version Notes (Continued)

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
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

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-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
```

Peak Compiler Invocation

C benchmarks (except as noted below):

icc

644.nab_s: icx

Fortran benchmarks:

ifort

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



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Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

```
644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -fiopenmp
-DSPEC_OPENMP -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:

```
603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2
-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
```

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

```
621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes



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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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