# SPEC® CPU2017 Floating Point Speed Result

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## Cisco Systems

Cisco UCS B480 M5 (Intel Xeon Gold 6128 3.40 GHz)

$SPECspeed2017\_fp\_base = 113$

$SPECspeed2017\_fp\_peak = 112$

**CPU2017 License:** 9019　　　　　　　　　　　　　　　　　　　　**Test Date:** Nov-2018
**Test Sponsor:** Cisco Systems　　　　　　　　　　　　　　**Hardware Availability:** Aug-2017
**Tested by:** Cisco Systems　　　　　　　　　　　　　　　　**Software Availability:** Mar-2018

| Threads | 0 30.0 60.0 90.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600 650 |
|---|---|
| **603.bwaves_s** 24 | 647 / 643 |
| **607.cactuBSSN_s** 24 | 111 / 111 |
| **619.lbm_s** 24 | 72.2 / 70.7 |
| **621.wrf_s** 24 | 72.4 / 73.7 |
| **627.cam4_s** 24 | 70.6 / 70.7 |
| **628.pop2_s** 24 | 54.3 / 55.5 |
| **638.imagick_s** 24 | 88.8 / 88.3 |
| **644.nab_s** 24 | 186 / 168 |
| **649.fotonik3d_s** 24 | 103 / 103 |
| **654.roms_s** 24 | 138 / 140 |

——— **SPECspeed2017_fp_base (113)**　　　　　　　- - - - - **SPECspeed2017_fp_peak (112)**

## Hardware

CPU Name:　Intel Xeon Gold 6128
　Max MHz.:　3700
　Nominal:　3400
Enabled:　24 cores, 4 chips
Orderable:　2,4 Chips
Cache L1:　32 KB I + 32 KB D on chip per core
　L2:　1 MB I+D on chip per core
　L3:　19.25 MB I+D on chip per chip
　Other:　None
Memory:　1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Storage:　1 x 400 GB SSD SAS
Other:　None

## Software

OS:　SUSE Linux Enterprise Server 12 SP2 (x86_64)
　4.4.103-92.56-default
Compiler:　C/C++: Version 18.0.2.199 of Intel C/C++
　Compiler for Linux;
　Fortran: Version 18.0.2.199 of Intel Fortran
　Compiler for Linux
Parallel:　Yes
Firmware:　Version 3.2.3c released Mar-2018
File System:　xfs
System State:　Run level 3 (multi-user)
Base Pointers:　64-bit
Peak Pointers:　64-bit
Other:　jemalloc memory allocator V5.0.1

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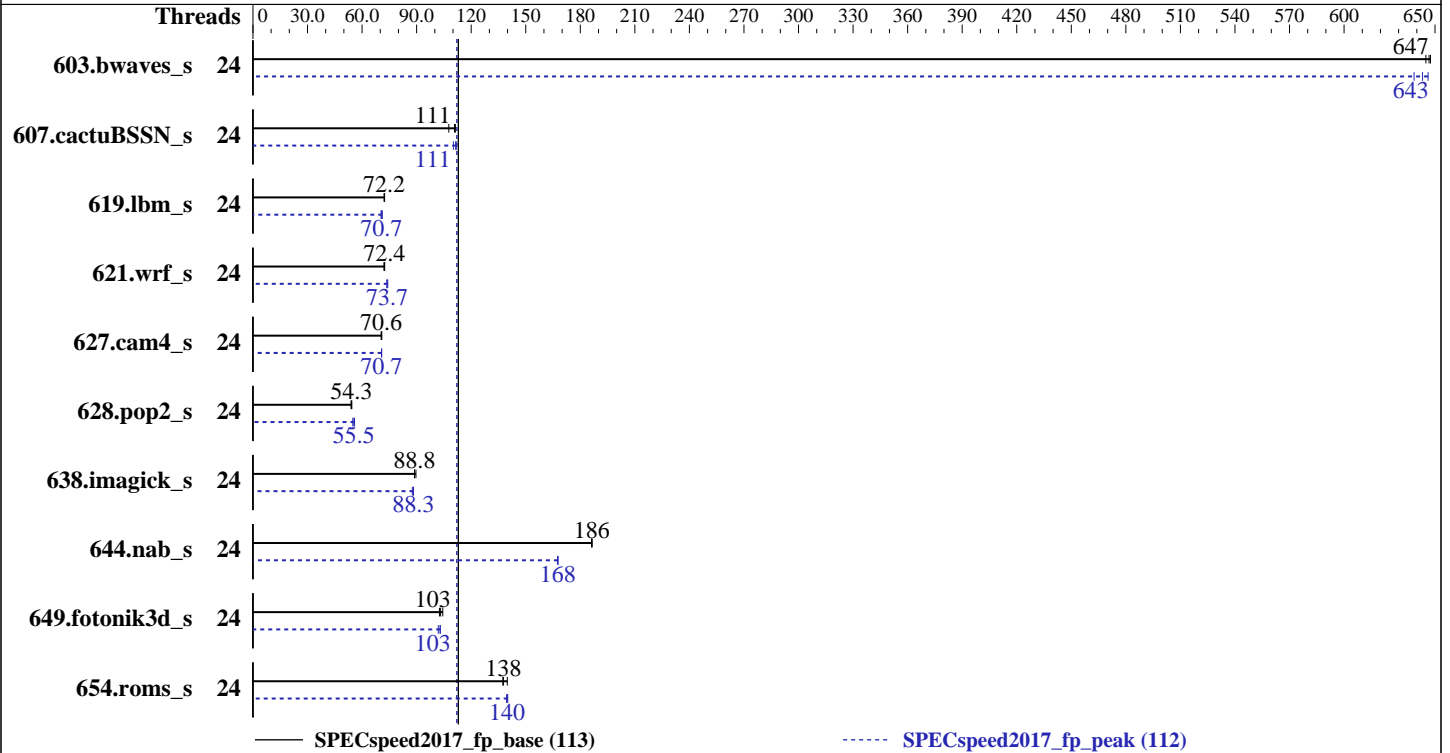SPECspeed2017_fp_peak =   112

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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 | 24 | 91.5 | 645 | 91.1 | 648 | **91.2** | **647** | 24 | **91.7** | **643** | 91.3 | 646 | 92.4 | 638 |
| 607.cactuBSSN_s | 24 | 150 | 111 | **150** | **111** | 155 | 108 | 24 | 149 | 112 | 151 | 110 | **150** | **111** |
| 619.lbm_s | 24 | **72.5** | **72.2** | 72.6 | 72.1 | 72.4 | 72.4 | 24 | 74.4 | 70.4 | 73.7 | 71.1 | **74.1** | **70.7** |
| 621.wrf_s | 24 | 184 | 72.0 | **183** | **72.4** | 183 | 72.4 | 24 | 178 | 74.1 | **179** | **73.7** | 180 | 73.6 |
| 627.cam4_s | 24 | 125 | 70.9 | **126** | **70.6** | 126 | 70.5 | 24 | 125 | 70.8 | **125** | **70.7** | 125 | 70.7 |
| 628.pop2_s | 24 | **219** | **54.3** | 219 | 54.3 | 220 | 53.9 | 24 | 216 | 54.9 | **214** | **55.5** | 213 | 55.8 |
| 638.imagick_s | 24 | **162** | **88.8** | 162 | 88.8 | 161 | 89.6 | 24 | 163 | 88.3 | **163** | **88.3** | 165 | 87.6 |
| 644.nab_s | 24 | 93.9 | 186 | 93.7 | 186 | **93.7** | **186** | 24 | **104** | **168** | 104 | 168 | 104 | 168 |
| 649.fotonik3d_s | 24 | 88.9 | 103 | 87.3 | 104 | **88.3** | **103** | 24 | 89.5 | 102 | **88.5** | **103** | 88.5 | 103 |
| 654.roms_s | 24 | **114** | **138** | 115 | 137 | 113 | 140 | 24 | **113** | **140** | 112 | 140 | 113 | 139 |
| **SPECspeed2017_fp_base =** | | **113** | | | | | | | | | | | | |
| **SPECspeed2017_fp_peak =** | | **112** | | | | | | | | | | | | |

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

## Operating System 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 = "/opt/cpu2017/lib/ia32:/opt/cpu2017/lib/intel64:/opt/cpu2017/je5.0.1-32:/opt/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

 Binaries compiled on a system with 1x Intel Core i7-6700K 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
Yes: 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
```

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## 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 /opt/cpu2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on linux-vb5q Fri Jan  1 01:16:55 2010

 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 6128 CPU @ 3.40GHz
       4  "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 : 6
       siblings  : 6
       physical 0: cores 0 6 9 10 11 13
       physical 1: cores 0 6 9 10 11 13
       physical 2: cores 0 6 9 10 11 13
       physical 3: cores 0 3 4 9 12 14

 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:    6
    Socket(s):             4
    NUMA node(s):          8
    Vendor ID:             GenuineIntel
    CPU family:            6
    Model:                 85
    Model name:            Intel(R) Xeon(R) Gold 6128 CPU @ 3.40GHz
    Stepping:              4
    CPU MHz:               3666.493
    CPU max MHz:           3700.0000
    CPU min MHz:           1200.0000
    BogoMIPS:              6799.96
    Virtualization:        VT-x
```

**(Continued on next page)**

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## Platform Notes (Continued)

```
      L1d cache:            32K
      L1i cache:            32K
      L2 cache:             1024K
      L3 cache:             19712K
      NUMA node0 CPU(s):    0,2,3
      NUMA node1 CPU(s):    1,4,5
      NUMA node2 CPU(s):    6,8,9
      NUMA node3 CPU(s):    7,10,11
      NUMA node4 CPU(s):    12,14,15
      NUMA node5 CPU(s):    13,16,17
      NUMA node6 CPU(s):    18,19,21
      NUMA node7 CPU(s):    20,22,23
      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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
    aperfmperf eagerfpu 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 ida arat epb invpcid_single pln pts
    dtherm hwp hwp_act_window hwp_epp hwp_pkg_req intel_pt spec_ctrl kaiser tpr_shadow
    vnmi flexpriority ept vpid fsgsbase 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_llc cqm_occup_llc

 /proc/cpuinfo cache data
   cache size : 19712 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 8 nodes (0-7)
   node 0 cpus: 0 2 3
   node 0 size: 191934 MB
   node 0 free: 191209 MB
   node 1 cpus: 1 4 5
   node 1 size: 193528 MB
   node 1 free: 192784 MB
   node 2 cpus: 6 8 9
   node 2 size: 193528 MB
   node 2 free: 192799 MB
   node 3 cpus: 7 10 11
   node 3 size: 193528 MB
   node 3 free: 193169 MB
   node 4 cpus: 12 14 15
   node 4 size: 193528 MB
   node 4 free: 191599 MB
   node 5 cpus: 13 16 17
   node 5 size: 193528 MB
   node 5 free: 192907 MB
```

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## Platform Notes (Continued)

```
   node 6 cpus: 18 19 21
   node 6 size: 193528 MB
   node 6 free: 193140 MB
   node 7 cpus: 20 22 23
   node 7 size: 193525 MB
   node 7 free: 191020 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  21  21  21  21  21  21
     1:  11  10  21  21  21  21  21  21
     2:  21  21  10  11  21  21  21  21
     3:  21  21  11  10  21  21  21  21
     4:  21  21  21  21  10  11  21  21
     5:  21  21  21  21  11  10  21  21
     6:  21  21  21  21  21  21  10  11
     7:  21  21  21  21  21  21  11  10

 From /proc/meminfo
   MemTotal:       1583750376 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-vb5q 4.4.103-92.56-default #1 SMP Wed Dec 27 16:24:31 UTC 2017 (2fd2155)
   x86_64 x86_64 x86_64 GNU/Linux

 run-level 3 Dec 31 19:15

 SPEC is set to: /opt/cpu2017
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda1       xfs   280G   83G  197G  30% /
```

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## Platform Notes (Continued)

```
 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. B480M5.3.2.3c.0.0307181316 03/07/2018
   Memory:
    48x 0xCE00 M393A4K40BB2-CTD 32 GB 2 rank 2666

 (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
 CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 CC   619.lbm_s(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 FC  607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
```

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## Compiler Version Notes (Continued)

```
FC   603.bwaves_s(peak) 649.fotonik3d_s(peak)
------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==============================================================================
 CC   621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------


==============================================================================
CC   621.wrf_s(peak) 628.pop2_s(peak)
------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------
```

## Base 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`

## Base Portability Flags

603.bwaves_s: `-DSPEC_LP64`
607.cactuBSSN_s: `-DSPEC_LP64`
619.lbm_s: `-DSPEC_LP64`

**(Continued on next page)**

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# Base Portability Flags (Continued)

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:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc`

Fortran benchmarks:
`-Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

Benchmarks using both Fortran and C:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

Benchmarks using Fortran, C, and C++:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc`

# 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`

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## Peak Compiler Invocation (Continued)

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:

```
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:

```
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=3
-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=3
-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=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
```

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

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# Peak Optimization Flags (Continued)

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`

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=3 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`

---

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

`http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html`
`http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.html`

---

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml`
`http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.xml`

---

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

Tested with SPEC CPU2017 v1.0.2 on 2010-01-01 01:16:54-0500.
Report generated on 2018-11-27 13:37:41 by CPU2017 PDF formatter v6067.
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