## Dell Inc.

**PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)**

### SPEC CPU®2017 Floating Point Rate Result

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate®2017_fp_base = 317</th>
<th>SPECrate®2017_fp_peak = 329</th>
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<td>507.cactuBSSN_r 72</td>
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<td>508.namd_r 72</td>
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<tr>
<td>554.roms_r 72</td>
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</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6354  
- **Max MHz:** 3600  
- **Nominal:** 3000  
- **Enabled:** 36 cores, 2 chips, 2 threads/core  
- **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:** 39 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)  
- **Storage:** 125 GB on tmpfs  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.2 (Ootpa)  
- **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:** No  
- **Firmware:** Version 1.1.1 released Apr-2021  
- **File System:** tmpfs  
- **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.
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

SPECrate®2017_fp_base = 317
SPECrate®2017_fp_peak = 329

Results Table

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</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:
LD_LIBRARY_PATH = 
"/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1

(Continued on next page)
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 317
SPECrate®2017_fp_peak = 329

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

General Notes (Continued)

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.

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.:
numactl --interleave=all runcpu <etc>
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:
   Sub NUMA Cluster : 2-Way Clustering
   Virtualization Technology : Disabled

   System Profile : Custom
   CPU Power Management : Maximum Performance
   C1E : Disabled
   C States : Autonomous
   Memory Patrol Scrub : Disabled
   Energy Efficiency Policy : Performance
   CPU Interconnect Bus Link

   Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.7-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d27080afeaa89d4b38e2f1c
running on localhost.localdomain Mon Apr 12 21:13:36 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 6354 CPU @ 3.00GHz

(Continued on next page)
Platform Notes (Continued)

2 "physical id"s (chips)
72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
Stepping: 6
CPU MHz: 3599.767
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39936K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68
NUMA node1 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70
NUMA node2 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71
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 xapic xp经济技术
ap服役 perf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrpr pdcm pclid 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 ibp bts ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbased
adj tsc_adjust bmi1 hle avx2 smep bmi2 ersed cmpid rtmq rdt_a avx512f avx512dq
rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw
avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total
cqm_mbb_local wbinvd dtsc rta arat pln ptv avx512vmbi umip pku ospe
avx512_vmbi2 gfnv vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
(Continued on next page)
Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

SPECrates®2017_fp_base = 317
SPECrates®2017_fp_peak = 329

Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Feb-2021

Platform Notes (Continued)

```
la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 39936 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
  available: 4 nodes (0-3)
    node 0 cpus:  0  4  8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68
    node 0 size: 257438 MB
    node 0 free: 245744 MB
    node 1 cpus:  2  6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70
    node 1 size: 258016 MB
    node 1 free: 250934 MB
    node 2 cpus:  1  5  9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69
    node 2 size: 258043 MB
    node 2 free: 241814 MB
    node 3 cpus:  3  7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71
    node 3 size: 258041 MB
    node 3 free: 250991 MB
  node distances:
    node 0 1 2 3
      0:  10 11 20 20
      1:  11 10 20 20
      2:  20 20 10 11
      3:  20 20 11 10

From /proc/meminfo
  MemTotal:       1056296368 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.2 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.2"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
```

(Continued on next page)
Dell Inc.
PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

**SPEC CPU®2017 Floating Point Rate Result**

- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Apr-2021
- **Hardware Availability:** Apr-2021
- **Software Availability:** Feb-2021

**SPECrate®2017_fp_base = 317**

**SPECrate®2017_fp_peak = 329**

**Platform Notes (Continued)**

```
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
    Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
    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-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Apr 12 16:53

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-ic2021.1
    Filesystem     Type   Size  Used Avail Use% Mounted on
    tmpfs          tmpfs  125G   36G   90G  29% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge C6520
    Product Family: PowerEdge
    Serial:         SDPT078

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 SMI BIOS" standard.

Memory:
    16x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200

BIOS:
    BIOS Vendor:   Dell Inc.
    BIOS Version:  1.1.1
    BIOS Date:     04/02/2021
    BIOS Revision: 1.1

(Continued on next page)
Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
|                 | 544.nab_r(base, 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++              | 508.namd_r(base, peak) 510.parest_r(base, peak) |
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| 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           | 511.povray_r(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.          |
------------------------------------------------------------------------------

==============================================================================
| C++, C           | 511.povray_r(base) 526.blender_r(base, peak) |
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**PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)**

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| Test Sponsor:   | Dell Inc. |
| Tested by:      | Dell Inc. |
| Test Date:      | Apr-2021 |
| Hardware Availability: | Apr-2021 |
| Software Availability: | Feb-2021 |

### Compiler Version Notes (Continued)

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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C++, C  | 511.povray_r(base) 526.blender_r(base, peak)

---

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---

C++, C, Fortran | 507.cactuBSSN_r(base, peak)

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran  | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)

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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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Fortran, C  | 521.wrf_r(peak)

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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

SPECrater®2017_fp_base = 317

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CPUx2017 License: 55
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Intel (R) C Intel (R) 64 Compiler Classic for applications running on Intel (R)
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Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)

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Intel (R) Fortran Intel (R) 64 Compiler Classic for applications running on Intel (R)
64, Version 2021.1 Build 20201112_000000
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Intel (R) oneAPI DPC++/C++ Compiler for applications running on Intel (R) 64,
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Fortran, C | 521.wrf_r(peak)

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Base Compiler Invocation

C benchmarks:
icx

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Dell Inc.
PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

SPECrate®2017_fp_base = 317
SPECrate®2017_fp_peak = 329

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Feb-2021

Base Compiler Invocation (Continued)

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.ibm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

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

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -gopt-mem-layout-trans=4

(Continued on next page)
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**Base Optimization Flags (Continued)**

C++ benchmarks (continued):
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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**Peak Compiler Invocation**

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

(Continued on next page)
Dell Inc.  
PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)  

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<td>Software Availability: Feb-2021</td>
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</table>

**Peak Compiler Invocation (Continued)**

Benchmarks using both Fortran and C:

- 521.wrf_r: ifort icc
- 527.cam4_r: ifort icx

Benchmarks using both C and C++:

- 511.povray_r: icpc icc
- 526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifort

**Peak Portability Flags**

Same as Base Portability Flags

**Peak Optimization Flags**

C benchmarks:

- 519.lbm_r: basepeak = yes
- 538.imagick_r: basepeak = yes

C++ benchmarks:

- 508.namd_r: basepeak = yes
- 510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

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### Peak Optimization Flags (Continued)

510.parest_r (continued):

```bash
-1jemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:

503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
- no-prec-div -qopt-prefetch -ffinite-math-only
- qopt-multiple-gather-scatter-by-shuffles
- qopt-mem-layout-trans=4 -nostandard-realloc-lhs
- align array32byte -auto -mbranches-within-32B-boundaries
- 1jemalloc -L/usr/local/jemalloc64-5.0.1/lib

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
- qopt-multiple-gather-scatter-by-shuffles
- qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- nostandard-realloc-lhs -align array32byte -auto
- L/usr/local/jemalloc64-5.0.1/lib -1jemalloc

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
- qopt-multiple-gather-scatter-by-shuffles
- qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- L/usr/local/jemalloc64-5.0.1/lib -1jemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

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

### Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6354, 3.00 GHz)

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You can also download the XML flags sources by saving the following links:


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