### Dell Inc.

**PowerEdge C6520 (Intel Xeon Gold 5315Y, 3.20 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>163</th>
</tr>
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<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>167</td>
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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** May-2021

**Hardware Availability:** Apr-2021

**Software Availability:** Dec-2020

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<tr>
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<tr>
<td>507.cactuBSSN_r</td>
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<td>519.blas_r</td>
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<td>538.imagick_r</td>
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<tr>
<td>554.roms_r</td>
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<td>74.7</td>
</tr>
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</table>

#### Hardware

- **CPU Name:** Intel Xeon Gold 5315Y
- **Max MHz:** 3600
- **Nominal:** 3200
- **Enabled:** 16 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 12 MB I+D on chip per core
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
- **Storage:** 125 GB on tmpfs
- **Other:** None

#### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.el8.x86_64
- **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 1.1.3 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.

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SPECrate®2017_fp_base = 163
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Test Date: May-2021
Hardware Availability: Apr-2021
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Results Table

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</tr>
</tbody>
</table>

SPECrate®2017_fp_base = 163
SPECrate®2017_fp_peak = 167

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/cpu2017-1.1.1-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.1-ic2021.1/je5.0.1-64"

MALLOCCONF = "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 5315Y, 3.20 GHz)  

**SPECrater®2017_fp_base = 163**  
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<td>Dell Inc.</td>
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<td>Apr-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2020</td>
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</tbody>
</table>

### 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:  
```bash  
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 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost.localdomain Fri May 21 14:52:10 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 5315Y CPU @ 3.20GHz  
2 "physical id"s (chips)
```

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

Dell Inc.

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CPU2017 License: 55
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Platform Notes (Continued)

32 "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 : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
Stepping: 6
CPU MHz: 962.949
BogoMIPS: 6400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 12288K
NUMA node0 CPU(s): 0-7,16-23
NUMA node1 CPU(s): 8-15,24-31
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 rdtsscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmperf pni pclmulqdq dtes64monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrig 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
intel_pinn ssbd mba ibrs ibpb stibp ibrs enhanced fsbgbase tsc_adjust bmi1 hle avx2
smep bmi2 erts invpcid cm qd tdx_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb intel_pq avx512cd sha ni avx512bw avx512vl xsaveopt xsaveopt xsetbv1
xsavec cmqm_llc cmq_occup_llc cmq_mbb_total cmq_mbb_local split_lock_detect wnoinvd
dtherm ida arat pln pts avx512vmbm umip pakm ospe avx512vmbm2 gfn vae vpcmulqdx
avx512_vnni avx512_vitalig tme avx512_vpopcntdq la57 rdrpid md_clear pconfig flush_lld
arch_capabilities

(Continued on next page)
Platform Notes (Continued)

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 16 17 18 19 20 21 22 23
   node 0 size: 252054 MB
   node 0 free: 237004 MB
   node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
   node 1 size: 251773 MB
   node 1 free: 251090 MB
   node distances:
      node 0   1
      0:  10  20
      1:  20  10

From /proc/meminfo
   MemTotal:       527813112 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="8.3 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.3"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
      ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
   Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 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
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 5315Y, 3.20 GHz)

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

| SPECrate®2017_fp_base = 163 | SPECrate®2017_fp_peak = 167 |

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</tbody>
</table>

**Platform Notes (Continued)**

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 May 21 10:23

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-ic2021.1

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<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
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<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>125G</td>
<td>22G</td>
<td>104G</td>
<td>17%</td>
<td>/mnt/ramdisk</td>
</tr>
</tbody>
</table>

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

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.

Memory:
6x 002C00B3002C 18ASF4G72FDZ-3G2E1 32 GB 2 rank 3200, configured at 2933
10x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2933

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.1.3
BIOS Date: 04/27/2021
BIOS Revision: 1.1

(End of data from sysinfo program)

**Compiler Version Notes**

```
C               | 519.libm_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,
**SPEC CPU®2017 Floating Point Rate Result**

*Dell Inc.*

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**SPECrater®2017_fp_base = 163**  
**SPECrater®2017_fp_peak = 167**

**Compiler Version Notes (Continued)**

```plaintext
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)
------------------------------------------------------------------------------
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)
------------------------------------------------------------------------------
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.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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------------------------------------------------------------------------------
C++, C | 511.povray_r(peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
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------------------------------------------------------------------------------
C++, C | 511.povray_r(base) 526.blender_r(base, peak)
(Continued on next page)```
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C++, C, Fortran | 507.cactuBSSN_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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Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
         | 554.roms_r(base, peak)

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, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

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**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

### Base Compiler Invocation

- **C benchmarks:**
  - icx
- **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.lbm_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` `-flto` `-mfpmath=sse` `funroll-loops` `-qopt-mem-layout-trans=4` `-mbranches-within-32B-boundaries` `-ljemalloc` `-L/usr/local/jemalloc64-5.0.1/lib`

(Continued on next page)
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 5315Y, 3.20 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 163</th>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: May-2021
Tested by: Dell Inc.
Hardware Availability: Apr-2021
Software Availability: Dec-2020

Base Optimization Flags (Continued)

C++ benchmarks:
-\texttt{w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto}
-\texttt{-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4}
-\texttt{-mbranches-within-32B-boundaries -ljemalloc}
-\texttt{-L/usr/local/jemalloc64-5.0.1/lib}

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

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

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

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

Peak Compiler Invocation

C benchmarks:
\texttt{icx}

C++ benchmarks:
\texttt{icpx}
Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
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
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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**Dell Inc.**

**PowerEdge C6520 (Intel Xeon Gold 5315Y, 3.20 GHz)**

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

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**Hardware Availability:** Apr-2021

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**Peak Optimization Flags (Continued)**

**Fortran benchmarks:**

- `503.bwaves_r`: basepeak = yes
- `549.fotonik3d_r`: basepeak = yes

**Benchmarks using both Fortran and C:**

- `521.wrf_r`: basepeak = yes
- `527.cam4_r`: basepeak = yes

**Benchmarks using both C and C++:**

- `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


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

### SPEC CPU®2017 Floating Point Rate Result

**Dell Inc.**

PowerEdge C6520 (Intel Xeon Gold 5315Y, 3.20 GHz)

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