## Dell Inc.

**PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 196</th>
<th>SPECspeed®2017_fp_peak = 199</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell Inc.</td>
<td>Dell Inc.</td>
</tr>
<tr>
<td>CPU2017 License: 55</td>
<td>Test Date:</td>
</tr>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: 55</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Dell Inc.</td>
</tr>
</tbody>
</table>

### Thread Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>72</td>
<td>136</td>
<td>199</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
<td>183</td>
<td>246</td>
</tr>
<tr>
<td>619.ibm_s</td>
<td>72</td>
<td>194</td>
<td>246</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>72</td>
<td>176</td>
<td>246</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>72</td>
<td>194</td>
<td>246</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>72</td>
<td>194</td>
<td>246</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>72</td>
<td>368</td>
<td>424</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>72</td>
<td>368</td>
<td>424</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>72</td>
<td>194</td>
<td>246</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>72</td>
<td>237</td>
<td>368</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Platinum 8352V
- **Max MHz:** 3500
- **Nominal:** 2100
- **Enabled:** 72 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:** 54 MB I+D on chip per chip
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (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:** Yes
- **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.
PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)

SPECspeed®2017_fp_base = 196
SPECspeed®2017_fp_peak = 199

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>94.6</td>
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<td>94.4</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>38.5</td>
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<td>38.5</td>
<td>136</td>
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<td>38.5</td>
<td>136</td>
<td>38.5</td>
<td>136</td>
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<tr>
<td>621.wrf_s</td>
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<td>71.5</td>
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<tr>
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<td>638.imagick_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>106</td>
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<td>66.1</td>
<td>237</td>
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<td></td>
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</tbody>
</table>

SPECspeed®2017_fp_base = 196
SPECspeed®2017_fp_peak = 199

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/jemalloc5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
General Notes (Continued)

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.

Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:
  Logical Processor : Disabled
  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
  PCI ASPM L1 Link
    Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c64d
running on r650xs.h2rh5y.inside.dell.com Fri Aug 13 20:50:11 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 8352V CPU @ 2.10GHz
    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 : 36
    siblings : 36
    physical 0: cores 0 1 2 3 4 5 6 7 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
    physical 1: cores 0 1 2 3 4 5 6 7 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

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

## Dell Inc.

PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)

| SPECspeed®2017_fp_base = 196 |
| SPECspeed®2017_fp_peak = 199 |

### CPU2017 License: 55

| Test Date: | Aug-2021 |
| Hardware Availability: | Jul-2021 |
| Software Availability: | Dec-2020 |

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

---

## Platform Notes (Continued)

From lscpu from util-linux 2.32.1:

| 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: | 1 |
| Core(s) per socket: | 36 |
| Socket(s): | 2 |
| NUMA node(s): | 2 |
| Vendor ID: | GenuineIntel |
| CPU family: | 6 |
| Model: | 106 |
| Model name: | Intel(R) Xeon(R) Platinum 8352V CPU @ 2.10GHz |
| Stepping: | 6 |
| CPU MHz: | 2505.555 |
| BogoMIPS: | 4200.00 |
| Virtualization: | VT-x |
| L1d cache: | 48K |
| L1i cache: | 32K |
| L2 cache: | 1280K |
| L3 cache: | 55296K |
| NUMA node0 CPU(s): | 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70 |
| NUMA node1 CPU(s): | 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63,65,67,69,71 |
| 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 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 f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqg rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaves cmq_llc cmq_occmap_llc cmq_mbb_total cmq_mbb_local split_lock_detect wbinvd dtc 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.

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

**Dell Inc.**  
PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)  

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base = 196</th>
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<tr>
<td>SPECspeed®2017_fp_peak = 199</td>
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</table>

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

---

**Platform Notes (Continued)**

available: 2 nodes (0-1)  
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62 64 66 68 70  
node 0 size: 242806 MB  
node 0 free: 244734 MB  
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55 57 59 61 63 65 67 69 71  
node 1 size: 243161 MB  
node 1 free: 253722 MB  
node distances:  
node 0 1  
0: 10 20  
1: 20 10  

From /proc/meminfo  
MemTotal: 527411360 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 r650xs.h2zrh5y.inside.dell.com 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  
CVE-2017-5754 (Meltdown): Not affected  
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store

(Continued on next page)
Dell Inc.  
PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)  

SPECspeed®2017_fp_base = 196  
SPECspeed®2017_fp_peak = 199

Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):  
Bypass disabled via prctl and seccomp  
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 13 18:09

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1

Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  225G   11G  215G   5% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor:         Dell Inc.  
Product:        PowerEdge R650 xs  
Product Family: PowerEdge  
Serial:         H2ZRH5Y

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 00AD063200AD HMA84GR7DJR4N-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               | 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.

(Continued on next page)
Dell Inc.  
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CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Test Date: Aug-2021  
Tested by: Dell Inc.  
Hardware Availability: Jul-2021  
Software Availability: Dec-2020

Compiler Version Notes (Continued)

------------------------------------------------------------------------------
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    | 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

(Continued on next page)
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Compiler Version Notes (Continued)
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------------
Fortran, C
621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_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.
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.cactusBSSN_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 byte_order
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Test Date: Aug-2021
Hardware Availability: Jul-2021
Software Availability: Dec-2020
## Base Optimization Flags

C benchmarks:
- `m64 -std=c11 -xCORE-AVX512 -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-AVX512 -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:

Benchmarks using Fortran, C, and C++:

## Peak Compiler Invocation

C benchmarks (except as noted below):
- `icc`
  - `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`
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)  SPECspeed®2017_fp_base = 196

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CPU2017 License: 55  Test Date: Aug-2021
Test Sponsor: Dell Inc.  Hardware Availability: Jul-2021
Tested by: Dell Inc.  Software Availability: Dec-2020

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -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-AVX512
   -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-AVX512 -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

(Continued on next page)
Dell Inc.
PowerEdge R650xs (Intel Xeon Platinum 8352V, 2.10 GHz)  

| SPECspeed®2017_fp_base = 196 |
| SPECspeed®2017_fp_peak = 199 |

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

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

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.xml

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