Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

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

Hardware

- CPU Name: Intel Xeon Platinum 8360Y
- Max MHz: 3500
- Nominal: 2400
- Enabled: 72 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: 54 MB I+D on chip per core
- Other: None
- Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
- Storage: 225 GB on tmpfs
- Other: None

Software

- OS: Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.15.1.el8_3.x86_64
- Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  Classic Build 20201113 for Linux;
  Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
- Parallel: No
- Firmware: Version 1.1.2 released Apr-2021
tmpfs
- System State: Run level 5 (graphical multi-user)
- Base Pointers: 64-bit
- Peak Pointers: 64-bit
- Other: None
- jemalloc memory allocator V5.0.1

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

Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

SPECrate®2017_fp_base = 428
SPECrate®2017_fp_peak = 454

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

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

Software (Continued)
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>144</td>
<td>2040</td>
<td>708</td>
<td>2040</td>
<td>708</td>
<td>72</td>
<td>999</td>
<td>723</td>
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<td></td>
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<tr>
<td>507.cactuBSSN_r</td>
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<td>612</td>
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<td>613</td>
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<td>612</td>
<td>297</td>
<td>613</td>
<td></td>
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<tr>
<td>508.namd_r</td>
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<td>357</td>
<td>383</td>
<td>357</td>
<td>383</td>
<td>144</td>
<td>357</td>
<td>383</td>
<td>357</td>
<td>383</td>
<td></td>
</tr>
<tr>
<td>510.parest_r</td>
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<td>1811</td>
<td>208</td>
<td>1813</td>
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<td></td>
</tr>
<tr>
<td>521.wrf_r</td>
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<td>961</td>
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<td></td>
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<tr>
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<td>512</td>
<td>429</td>
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<td>144</td>
<td>428</td>
<td>512</td>
<td>429</td>
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<tr>
<td>527.cam4_r</td>
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<tr>
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<td>1310</td>
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<td>1310</td>
<td>274</td>
<td>1310</td>
<td></td>
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<tr>
<td>544.nab_r</td>
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<td>144</td>
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<td>879</td>
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<td>2559</td>
<td>219</td>
<td>2556</td>
<td>220</td>
<td></td>
</tr>
<tr>
<td>554.roms_r</td>
<td>144</td>
<td>1491</td>
<td>153</td>
<td>1489</td>
<td>154</td>
<td>72</td>
<td>597</td>
<td>192</td>
<td>599</td>
<td>191</td>
<td></td>
</tr>
</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/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-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
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

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.

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/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Fri Apr 23 10:03:45 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

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

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

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

Platform Notes (Continued)

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Platinum 8360Y CPU @ 2.40GHz
  2 "physical id"s (chips)
144 "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 : 72
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

From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 144
On-line CPU(s) list: 0-143
Thread(s) per core: 2
Core(s) per socket: 36
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8360Y CPU @ 2.40GHz
Stepping: 6
CPU MHz: 3100.000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 55296K
NUMA node0 CPU(s):
0, 4, 8, 12, 16, 20, 24, 28, 32, 36, 40, 44, 48, 52, 56, 60, 64, 68, 72, 76, 80, 84, 88, 92, 96, 100, 104, 108,
112, 116, 120, 124, 128, 132, 136, 140
NUMA node1 CPU(s):
2, 6, 10, 14, 18, 22, 26, 30, 34, 38, 42, 46, 50, 54, 58, 62, 66, 70, 74, 78, 82, 86, 90, 94, 98, 102, 106, 110,
114, 118, 122, 126, 130, 134, 138, 142
NUMA node2 CPU(s):
1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45, 49, 53, 57, 61, 65, 69, 73, 77, 81, 85, 89, 93, 97, 101, 105, 109,
113, 117, 121, 125, 129, 133, 137, 141
NUMA node3 CPU(s):

(Continued on next page)
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

CPU2017 License: 55
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Tested by: Dell Inc.

SPECrate®2017_fp_base = 428
SPECrate®2017_fp_peak = 454

Platform Notes (Continued)

,115,119,123,127,131,135,139,143
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
   aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
   xtrp 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_pni ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2
   smep bmi2 ertz invpcid cqm rdt_a avx512f avx512dq rdseed adx amap avx512ifma
   clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv1
   xsavec qmmi lsc cqm_occup_l1ic cqm_mbm_total cqm_mbm_local split_lock_detect wbenchvd
   dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfnv vaes vpclmulqdq
   avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
   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.
   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 72 76 80 84 88 92 96
      100 104 108 112 116 120 124 128 132 136 140
      node 0 size: 124548 MB
      node 0 free: 127185 MB
      node 1 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
      102 106 110 114 118 122 126 130 134 138 142
      node 1 size: 125730 MB
      node 1 free: 127743 MB
      node 2 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97
      101 105 109 113 117 121 125 129 133 137 141
      node 2 size: 125601 MB
      node 2 free: 119728 MB
      node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99
      103 107 111 115 119 123 127 131 135 139 143
      node 3 size: 125519 MB
      node 3 free: 122207 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: 527788616 kB
   HugePages_Total: 0

(Continued on next page)
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 428
SPECrate®2017_fp_peak = 454

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

Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Platform Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hugepagesize: 2048 kB</td>
</tr>
<tr>
<td>/sbin/tuned-adm active</td>
</tr>
<tr>
<td>Current active profile: throughput-performance</td>
</tr>
</tbody>
</table>

From /etc/*release* /etc/*version*

<table>
<thead>
<tr>
<th>os-release:</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAME=&quot;Red Hat Enterprise Linux&quot;</td>
</tr>
<tr>
<td>VERSION=&quot;8.3 (Ootpa)&quot;</td>
</tr>
<tr>
<td>ID=&quot;rhel&quot;</td>
</tr>
<tr>
<td>ID_LIKE=&quot;fedora&quot;</td>
</tr>
<tr>
<td>VERSION_ID=&quot;8.3&quot;</td>
</tr>
<tr>
<td>PLATFORM_ID=&quot;platform:el8&quot;</td>
</tr>
<tr>
<td>PRETTY_NAME=&quot;Red Hat Enterprise Linux 8.3 (Ootpa)&quot;</td>
</tr>
<tr>
<td>ANSI_COLOR=&quot;0;31&quot;</td>
</tr>
<tr>
<td>redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)</td>
</tr>
<tr>
<td>system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)</td>
</tr>
<tr>
<td>system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga</td>
</tr>
</tbody>
</table>

uname -a:

Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 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/swapsgs 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 5 Apr 23 04:39

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>225G</td>
<td>6.9G</td>
<td>219G</td>
<td>4%</td>
<td>/mnt/ramdisk</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id (Continued on next page)
Platform Notes (Continued)

Vendor: Dell Inc.
Product: PowerEdge R650
Product Family: PowerEdge
Serial: 1234567

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:
7x 00AD00B300AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
9x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
16x Not Specified Not Specified

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.1.2
BIOS Date: 04/09/2021
BIOS Revision: 1.1

(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
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---

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

(Continued on next page)
Dell Inc.  
PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)  

**Compiler Version Notes (Continued)**

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  
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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  
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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  
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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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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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  
507.cactuBSSN_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, Version 2021.1 Build 20201113  
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(Continued on next page)
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SPECrater**2017** fp_base = 428
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Test Date: Apr-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Compiler Version Notes (Continued)

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  |  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
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran, C  |  521.wrf_r(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.

Fortran, C  |  521.wrf_r(base) 527.cam4_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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Intel (R) oneAPI DPC++/C++ Compiler for applications running on Intel (R) 64,
Version 2021.1 Build 20210113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran, C  |  521.wrf_r(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
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(Continued on next page)
Compiler Version Notes (Continued)

Fortran, C      | 521.wrf_r(base) 527.cam4_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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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.
------------------------------------------------------------------------------

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

(Continued on next page)
### Base Portability Flags (Continued)

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`

#### C++ benchmarks:
- `-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`

#### 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`
Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- 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

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

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:

(Continued on next page)
### Dell Inc.

**PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)**

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<th>CPU2017 License:</th>
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<td>Dell Inc.</td>
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<td>Tested by:</td>
<td>Dell Inc.</td>
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#### SPEC CPU 2017 Floating Point Rate Result

| SPECrate\textsuperscript{®}2017\_fp\_base = 428 |
|------------------|----|
| SPECrate\textsuperscript{®}2017\_fp\_peak = 454 |

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#### Peak Optimization Flags (Continued)

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<thead>
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<th>Options</th>
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</thead>
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<td>519.lbm_r:</td>
<td><code>basepeak = yes</code></td>
</tr>
<tr>
<td>538.imagick_r:</td>
<td><code>basepeak = yes</code></td>
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<tr>
<td>C++ benchmarks:</td>
<td></td>
</tr>
<tr>
<td>508.namd_r:</td>
<td><code>basepeak = yes</code></td>
</tr>
<tr>
<td>510.parest_r:</td>
<td><code>-w -m64 -W1,-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</code></td>
</tr>
<tr>
<td>Fortran benchmarks:</td>
<td></td>
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<tr>
<td>549.fotonik3d_r:</td>
<td><code>basepeak = yes</code></td>
</tr>
<tr>
<td>554.roms_r:</td>
<td>Same as 503.bwaves_r</td>
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</table>

Benchmarks using both Fortran and C:

<table>
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<th>Flag</th>
<th>Options</th>
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<tr>
<td>527.cam4_r:</td>
<td><code>basepeak = yes</code></td>
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</table>

Benchmarks using both C and C++:

---

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

Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8360Y, 2.40 GHz)

SPECrate®2017_fp_base = 428
SPECrate®2017_fp_peak = 454

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

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

Peak Optimization Flags (Continued)

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 -ljemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: 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

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