Dell Inc.

PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)

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

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

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = 203

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<td>619.lbm_s</td>
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<td>638.imagick_s</td>
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<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>260</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Gold 6338
Max MHz: 3200
Nominal: 2000
Enabled: 64 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: 48 MB I+D on chip per chip
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)
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 1.1.2 released Apr-2021
File System: tmpfs
System State: Run level 5 (graphical multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS and OS set to prefer performance
at the cost of additional power usage.

jemalloc memory allocator V5.0.1
Dell Inc.

PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)

Results Table

<table>
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<tr>
<th>Benchmark</th>
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<td>260</td>
<td>58.9</td>
<td>267</td>
<td>60.6</td>
<td>260</td>
</tr>
</tbody>
</table>

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/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
- MALLOC_CONF = "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
Files System page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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

Dell Inc. PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc. SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = 203

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

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

Sysinfo program /mnt/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Fri May 7 15:21:13 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 6338 CPU @ 2.00GHz
    2 "physical id"s (chips)
    64 "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 : 32
  siblings : 32
physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

From lscpu:
  Architecture: x86_64

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

Dell Inc.

PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)

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</table>

SPECspeed®2017_fp_base = 201
SPECspeed®2017_fp_peak = 203

**Platform Notes (Continued)**

- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 64
- On-line CPU(s) list: 0-63
- Thread(s) per core: 1
- Core(s) per socket: 32
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 106
- Model name: Intel(R) Xeon(R) Gold 6338 CPU @ 2.00GHz
- Stepping: 6
- CPU MHz: 1949.018
- BogoMIPS: 4000.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 49152K
- 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
- 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
- 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 aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcd dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat13 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_endenhanced fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmq rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ha avx512bw avx512vl xsaveopt xsaveopt xsaveopt xgetbv1 xsaves cqm_llc cmq_occullc cmq_mbb_total cmq_mbb_local split_lock_detect wbnoinvd dtherm ida pln pts avx512vbmi umip pku ospe avx512_vbmi2 gfnl vaes vclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfug flush_l1d arch_capabilities

/proc/cpuinfo cache data
- cache size : 49152 KB

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 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

(Continued on next page)
52 54 56 58 60 62
node 0 size: 243663 MB
node 0 free: 238928 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
node 1 size: 244542 MB
node 1 free: 252848 MB
node distances:
node 0 1
0: 10 20
1: 20 10

From /proc/meminfo
MemTotal: 527808488 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 4.18.0-240.15.1.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

(Continued on next page)
Dell Inc.  

PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)  

SPEC CPU®2017 Floating Point Speed Result  

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SPECspeed®2017_fp_base = 201  

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

Platform Notes (Continued)  

CVE-2017-5753 (Spectre variant 1):  
Mitigation: usercopy/swapsqgs barriers and __user pointer sanitation  

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 May 7 11:10  

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

Filesystem     Type   Size  Used Avail Use% Mounted on  
tmpfs          tmpfs  225G   13G  213G   6% /mnt/ramdisk  

From /sys/devices/virtual/dmi/id  
Vendor:         Dell Inc.  
Product:        PowerEdge R750 xa  
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:  
16x 002C069D002C 18ASF4G72PDZ-3G2E1 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                     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.

PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)

Compiler Version Notes (Continued)

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<th>C</th>
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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.  
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`

Benmarks using both Fortran and C:  
`ifort icc`

Benmarks using Fortran, C, and C++:  
`icpc icc ifort`

### Base Portability Flags

- `603bwaves_s: -DSPEC_LP64`
- `607cactuBSSN_s: -DSPEC_LP64`
- `619lbm_s: -DSPEC_LP64`
- `621wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `627cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG`
- `628pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl`
- `638imagick_s: -DSPEC_LP64`
- `644nab_s: -DSPEC_LP64`
- `649fotonik3d_s: -DSPEC_LP64`
- `654roms_s: -DSPEC_LP64`
Dell Inc.

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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:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
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
## 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`:

### Fortran benchmarks:

- `603.bwaves_s`: `basepeak = yes`
- `649.fotonik3d_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`

- `654.roms_s`: `basepeak = yes`

### Benchmarks using both Fortran and C:

- `621.wrf_s`: `basepeak = yes`
- `627.cam4_s`: `basepeak = yes`
- `628.pop2_s`: `basepeak = yes`

### Benchmarks using Fortran, C, and C++:

- `607.cactuBSSN_s`: `basepeak = yes`
Dell Inc. PowerEdge R750 xa (Intel Xeon Gold 6338, 2.00 GHz)

| SPECspeed\(^\text{®} 2017\) \(\text{fp}_\text{base}\) | 201 |
| SPECspeed\(^\text{®} 2017\) \(\text{fp}_\text{peak}\) | 203 |

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

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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