## Dell Inc.

**PowerEdge R750 (Intel Xeon Gold 6338N, 2.20 GHz)**

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

### Threads

<table>
<thead>
<tr>
<th>Spec Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
</tr>
<tr>
<td>619.ibm_s</td>
<td>64</td>
</tr>
<tr>
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</tr>
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<td>654.roms_s</td>
<td>64</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_fp_base = 193  
### SPECspeed®2017_fp_peak = 196

### Hardware

**CPU Name:** Intel Xeon Gold 6338N  
**Max MHz:** 3500  
**Nominal:** 2200  
**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, running at 2666)  
**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++ 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  
**jemalloc memory allocator V5.0.1**  
**Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge R750 (Intel Xeon Gold 6338N, 2.20 GHz)

Copyright 2017-2021 Standard Performance Evaluation Corporation

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

SPECspeed®2017_fp_base = 193
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Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
<th>Seconds</th>
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<td>249</td>
<td>62.9</td>
<td>250</td>
<td>63.1</td>
<td>249</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/ramdisk2/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
MALLOCC_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
Filesystem 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.
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/ramdisk2/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Sat May  8 21:40:56 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 6338N CPU @ 2.20GHz
  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)
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SPECspeed®2017_fp_base = 193
SPECspeed®2017_fp_peak = 196

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 6338N CPU @ 2.20GHz
Stepping: 6
CPU MHz: 1597.517
BogoMIPS: 4400.00
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 pdeldgb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmpref pni pclmulqdq dtgts64 monitor ds _cp1 vmx smx est tm2 ssse3 sdbg fma cx16
xtrr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault ebp cat_13 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmp rdt_a avx512f avx512dq rdseed adx smap avx512fma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsxveopt xsave vecx getbv1 xsaves cqm_llc cqm_occ capacitor llc cqm_mbm_total cqm_mbm_local split_lock_detect wbdoinvd dtherm ida pln pts avx512vbmi umpk pku ospe avx512_vmbmi2 gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512 vpopcntdq la57 rdpid md_clear pconfig 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)
Platform Notes (Continued)

```
52 54 56 58 60 62
node 0 size: 246031 MB
node 0 free: 241168 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
node 1 size: 246984 MB
node 1 free: 250572 MB
node distances:
node 0 1
 0: 10 20
 1: 20 10
```

From /proc/meminfo

```
MemTotal:       527808648 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 (Intel Xeon Gold 6338N, 2.20 GHz)

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**Test Sponsor:** Dell Inc.  
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---

### Platform Notes (Continued)

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 5 May 8 17:42**

SPEC is set to: /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1

Filesystem Type Size Used Avail Use% Mounted on  
tmpfs tmpfs 225G 13G 213G 6% /mnt/ramdisk2

From /sys/devices/virtual/dmi/id

Vendor: Dell Inc.  
Product: PowerEdge R750  
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:**

12x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666  
4x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2666  
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)
### Compiler Version Notes (Continued)

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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) 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) 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) 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) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000

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#### Fortran

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Dell Inc.  
PowerEdge R750 (Intel Xeon Gold 6338N, 2.20 GHz) 

**SPECspeed**

| SPECspeed®2017_fp_base = 193 |
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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

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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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---

### 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 byterecl
638.imagick_s: –DSPEC_LP64
644.nab_s: –DSPEC_LP64
649.fotonik3d_s: –DSPEC_LP64
654.roms_s: –DSPEC_LP64
### Dell Inc. PowerEdge R750 (Intel Xeon Gold 6338N, 2.20 GHz)

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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):**

```shell
icc
644.nab_s: icx
```

**Fortran benchmarks:**

```shell
ifort
```

**Benchmarks using both Fortran and C:**

```shell
ifort icc
```

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

```shell
icpc icc ifort
```
# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.

**PowerEdge R750 (Intel Xeon Gold 6338N, 2.20 GHz)**

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**Software Availability:** Feb-2021

### 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`:
  - `basepeak = yes`

- `627.cam4_s`:
  - `basepeak = yes`

- `628.pop2_s`:
  - `basepeak = yes`

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

- `607.cactuBSSN_s`:
  - `basepeak = yes`
### SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

**PowerEdge R750 (Intel Xeon Gold 6338N, 2.20 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
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**CPU2017 License:** 55  
**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:

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Tested with SPEC CPU®2017 v1.1.5 on 2021-05-08 22:40:56-0400.  
Report generated on 2021-06-08 19:58:46 by CPU2017 PDF formatter v6442.  
Originally published on 2021-06-08.