Dell Inc.

PowerEdge T350 (Intel Xeon E-2336, 2.90 GHz)

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

**Copyright 2017-2021 Standard Performance Evaluation Corporation**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tr>
<td>603.bwaves_s 6</td>
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<td>607.cactuBSSN_s 6</td>
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<td>619.lbm_s 6</td>
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<td>654.roms_s 6</td>
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</tbody>
</table>

**Software**

- **OS:** Red Hat Enterprise Linux 8.4 (Ootpa)
  4.18.0-305.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:** Yes
- **Firmware:** Version 1.0.1 released Aug-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.

**Hardware**

- **CPU Name:** Intel Xeon E-2336
- **Max MHz:** 4800
- **Nominal:** 2900
- **Enabled:** 6 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 512 KB I+D on chip per core
- **L3:** 12 MB I+D on chip per chip
- **Other:** None
- **Memory:** 64 GB (2 x 32 GB 2Rx8 PC4-3200AA-E)
- **Storage:** 70 GB on tmpfs
- **Other:** None

**CPU2017 License:** 55
**Test Sponsor:** Dell Inc.
**Hardware Availability:** Oct-2021
**Test Date:** Aug-2021
**Tested by:** Dell Inc.
**Software Availability:** May-2021
**Hardware Availability:** Oct-2021
**Software Availability:** May-2021
RESULTS TABLE

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<tr>
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SPECspeed®2017_fp_base = 38.3
SPECspeed®2017_fp_peak = 39.1

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,1,0"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.1-64"
MALLOCS_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.

(Continued on next page)
## Dell Inc.

**PowerEdge T350 (Intel Xeon E-2336, 2.90 GHz)**

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<tr>
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### 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 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"

### Platform Notes

**BIOS settings:**

- Virtualization Technology: Disabled
- System Profile: Custom
- CPU Power Management: Maximum Performance
- C1E: Disabled
- C States: Autonomous
- 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 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Mon Aug 30 21:46:34 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) E-2336 CPU @ 2.90GHz
  1 "physical id"s (chips)
  12 "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 : 6
  siblings : 12
  physical 0: cores 0 1 2 3 4 5
```

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): 12
- On-line CPU(s) list: 0-11
- Thread(s) per core: 2
- Core(s) per socket: 6
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Platform Notes (Continued)

Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel
CPU family: 6
Model: 167
Model name: Intel(R) Xeon(R) E-2336 CPU @ 2.90GHz
BIOS Model name: Intel(R) Xeon(R) E-2336 CPU @ 2.90GHz
Stepping: 1
CPU MHz: 4600.000
BogoMIPS: 5808.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 512K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11

Flags: fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsdp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perfctr tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 stp sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault invpcid_single ssbd ibrs ibpb stibp ibrs_enabled fs.gsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx avx512f avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha ni avx512bw avx512vl xsaves dtherm ida arat pln pts avx512vbmi umip kpu ospke avx512_vbm2 gfn vaes vpcmtd dq avx512_vnni avx512_vbta il avx512_vpsnop dq rdpid fsrm md_clear flush_l1d arch_capabilities

From /proc/cpuinfo cache data

    cache size : 12288 KB

From numactl --hardware

    WARNING: a numactl 'node' might or might not correspond to a physical chip.
    available: 1 nodes (0)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
    node 0 size: 64285 MB
    node 0 free: 48261 MB
    node distances:
    node 0
      0: 10

From /proc/meminfo

    MemTotal: 65828588 kB
    HugePages_Total: 0
    Hugempagesize: 2048 kB

(Continued on next page)
Dell Inc.

PowerEdge T350 (Intel Xeon E-2336, 2.90 GHz)

| SPECspeed®2017_fp_base | 38.3 |
| SPECspeed®2017_fp_peak | 39.1 |

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

Test Date: Aug-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Platform Notes (Continued)

/sbin/tuned-adm active
Current active profile: throughput-performance

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

os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.4 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.4"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 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/swaps 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 3 Aug 30 19:14

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 70G 11G 60G 15% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge T350

(Continued on next page)
Platform Notes (Continued)

Product Family: PowerEdge

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:
2x 00AD00000C01 HMAA4GU7CJR8N-XN 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.0.1
BIOS Date: 08/18/2021
BIOS Revision: 1.0

(End of data from sysinfo program)
Dell Inc.

PowerEdge T350 (Intel Xeon E-2336, 2.90 GHz)

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PowerEdge T350 (Intel Xeon E-2336, 2.90 GHz)

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CPU2017 License: 55
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Compilator 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 20201112
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
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
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran

| 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Fortran, C

| 621.wrf_s(base, peak) 627.cam4_s(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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Base Compiler Invocation

C benchmarks:

icc

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**Base Compiler Invocation (Continued)**

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.cactuBSSN_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`

**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 -gopenmp -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 -gopenmp -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 -gopenmp`

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-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: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-fflat -mfpmath=sse -funroll-loops -fiopenmp

(Continued on next page)
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Peak Optimization Flags (Continued)

644.nab_s (continued):
-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

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