Dell Inc.
PowerEdge XR11 (Intel Xeon Platinum 8351N, 2.40 GHz)

SpecCPU®2017 Floating Point Rate Result
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**Hardware**
- **CPU Name:** Intel Xeon Platinum 8351N
- **Max MHz:** 3500
- **Nominal:** 2400
- **Enabled:** 36 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 54 MB I+D on chip per core
- **Other:** None
- **Memory:** 512 GB (8 x 64 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;
- **Parallel:** No
- **Firmware:** Version 0.6.2 released Apr-2021
- **File System:** tmpfs
- **System State:** Run level 5 (graphical 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.

**SPECrate®2017_fp_base** = 204
**SPECrate®2017_fp_peak** = 217

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**Test Sponsor:** Dell Inc.  
**Hardware Availability:** Jul-2021  
**Software Availability:** Feb-2021

**CPU2017 License:** 55  
**Test Date:** Apr-2021
### Dell Inc.

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**CPU2017 License:** 55  
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**Test Date:** Apr-2021  
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#### Results Table

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**SPECrate®2017_fp_peak = 217**

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CPU2017 License: 55
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General Notes (Continued)

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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
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:
- 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 e664e66d2d7080afeaa89d4b3e2fff
running on localhost.localdomain Fri Apr 23 09:46:45 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

From /proc/cpuinfo
```
model name : Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz
  1 "physical id"s (chips)
    72 "processors"
```

(Continued on next page)
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Platform Notes (Continued)

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
From lscpu:
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: 2
Core(s) per socket: 36
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz
Stepping: 6
CPU MHz: 3124.792
BogoMIPS: 4800.00
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 rdtsdp
cmt constant_tsc art arch_perfmon pebs bts rep_good nopl nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssbe fma cx16
xtr_pdc mc pid 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_pcin ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsgsbase tsc_adjust bmi1 hle avx2
smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesopt xsaves xgetbv1
xsave cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wbnoinvd
dtherm ida arat pld pts avx512vmbi umip pku ospke avx512_vmbi gfn iaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld

(Continued on next page)
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Platform Notes (Continued)

/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: 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: 245802 MB
    node 0 free: 255377 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: 247215 MB
    node 1 free: 242277 MB
    node distances:
      node 0 1
    0: 10 11
    1: 11 10

From /proc/meminfo
  MemTotal: 527806520 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

(Continued on next page)
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### Platform Notes (Continued)

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/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 Apr 23 04:11

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

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<td>/mnt/ramdisk</td>
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From /sys/devices/virtual/dmi/id

- Vendor: Dell Inc.
- Product: PowerEdge XR11
- Product Family: PowerEdge
- Serial: 09A000K

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:
  - 4x 00AD00B300AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2933
  - 1x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2933
  - 3x 00AD069D00AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2933

**BIOS:**
- BIOS Vendor: Dell Inc.
- BIOS Version: 0.6.2
- BIOS Date: 04/12/2021
- BIOS Revision: 0.6

(End of data from sysinfo program)
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Compiler Version Notes

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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) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
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Compiler Version Notes (Continued)

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C++, C, Fortran | 507.cactuBSSN_r(base, peak)
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Tested by: Dell Inc.

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

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
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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==============================================================================

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

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## SPEC CPU®2017 Floating Point Rate Result

### Dell Inc.

**PowerEdge XR11 (Intel Xeon Platinum 8351N, 2.40 GHz)**

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<thead>
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<th>Test Sponsor</th>
<th>Tested by</th>
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**Base Compiler Invocation (Continued)**

- 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`

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**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.fm_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`
- `538.imagick_r: -DSPEC_LP64`
- `544.nab_r: -DSPEC_LP64`
- `549.fotonik3d_r: -DSPEC_LP64`
- `554.roms_r: -DSPEC_LP64`

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**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 -03 -ipo -no-prec-div -qopt-prefetch -ffinite-math-only`

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-`-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`
-`-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`

(Continued on next page)
Peak Compiler Invocation (Continued)

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:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: -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:
503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -03 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only

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Peak Optimization Flags (Continued)

503.bwaves_r (continued):
-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

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_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
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.5 on 2021-04-23 10:46:45-0400.
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