<table>
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<th>SpecCpu2017 Integer Rate Result</th>
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<td>Dell Inc. PowerEdge XR12 (Intel Xeon Platinum 8351N, 2.40 GHz)</td>
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**SPEC CPU®2017 License:** 55
**Test Sponsor:** Dell Inc.
**Tested by:** Dell Inc.
**Test Date:** Apr-2021
**Hardware Availability:** Jul-2021
**Software Availability:** Feb-2021

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<td>129</td>
<td></td>
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</table>

**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 chip
- **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) 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:** 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:** 32/64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
Dell Inc.
PowerEdge XR12 (Intel Xeon Platinum 8351N, 2.40 GHz)

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

SPECrate®2017_int_base = 235
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Results Table

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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/lib/ia32:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-32"
MALLOCONF = "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
```

(Continued on next page)
General Notes (Continued)

runcpu command invoked through numacll 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 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Tue Apr 27 04:06:15 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"
  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
**Dell Inc.**

PowerEdge XR12 (Intel Xeon Platinum 8351N, 2.40 GHz)

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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

**Test Date:** Apr-2021

**Hardware Availability:** Jul-2021

**Software Availability:** Feb-2021

---

**Platform Notes (Continued)**

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:** 3182.635
- **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
  - mce
  - cmov
  - pat
  - pse36
  - cx8
  - apic
  - mce
  - cmov
  - pat
  - pse36
  - cx8
  - x86_64
  - mmx
  - fxsr
  - sse
  - sse2
  - ss
  - ht
  - tm
  - pbe
  - syscall
  - nx
  - pdpec
  - pdcid
  - pclmulqdq
  - dtes64
  - monitor
  - ds_cpl
  - vmx
  - smx
  - est
  - tm2
  - sse3
  - sdbg
  - fma
  - cx16
  - xtpr
  - pdcm
  - pclmulqdq
  - dtes64
  - monitor
  - ds_cpl
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  - smx
  - est
  - tm2
  - sse3
  - sdbg
  - fma
  - cx16
  - xtpr
  - pdcm

/proc/cpuinfo cache data

(Continued on next page)
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:  246012 MB
node 0 free:  241247 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:  247491 MB
node 1 free:  256861 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

Kernel self-reported vulnerability status:
CVE-2018-12207 (iTLB Multihit): Not affected

(Continued on next page)
Dell Inc.
PowerEdge XR12 (Intel Xeon Platinum 8351N, 2.40 GHz)

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

Platform Notes (Continued)

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 27 04:04
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

Filesystem     Type      Size  Used  Avail   Use% Mounted on
tmpfs          tmpfs    225G   7.0G   219G   4%   /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor:        Dell Inc.
Product:       PowerEdge XR12
Product Family: PowerEdge
Serial:        0990104

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:
  5x 002C0632002C 36ASF8G72FZ-3G2B2 64 GB 2 rank 3200, configured at 2933
  3x 00CE063200CE M393A8G40AB2-CWE 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)

Compiler Version Notes

==============================================================================
| C      | 500.perlbench_r(peak) |
==============================================================================

(Continued on next page)
Dell Inc.
PowerEdge XR12 (Intel Xeon Platinum 8351N, 2.40 GHz)

SPEC CPU®2017 Integer Rate Result

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Compiler Version Notes (Continued)

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.

------------------------------------------------------------------------------
| C       | 502.gcc_r(peak) |
------------------------------------------------------------------------------

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_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       | 500.perlbench_r(peak) |
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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
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
| C       | 502.gcc_r(peak) |
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| C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak) |
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<td>Fortran</td>
<td>548.exchange2_r(base, peak)</td>
<td>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.</td>
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Copyright 2017-2021 Standard Performance Evaluation Corporation

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

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r -DSPEC_LP64
505.mcf_r -DSPEC_LP64
520.omnetpp_r -DSPEC_LP64
523.xalancbmk_r -DSPEC_LP64 -DSPEC_LINUX
525.x264_r -DSPEC_LP64
531.deepsjeng_r -DSPEC_LP64
541.leela_r -DSPEC_LP64
548.exchange2_r -DSPEC_LP64
557.xz_r -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries

(Tested on next page)
**SPEC CPU®2017 Integer Rate Result**

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<td>Jul-2021</td>
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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

**Peak Compiler Invocation**

C benchmarks (except as noted below):
- `icx`
  - `500.perlbench_r: icc`

C++ benchmarks:
- `icpx`

Fortran benchmarks:
- `ifort`

**Peak Portability Flags**

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcfr: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

**Peak Optimization Flags**

C benchmarks:
- `500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)`
- `-xCORE-AVX512 -ipo -O3 -no-prec-div`
- `-qopt-mem-layout-trans=4 -fno-strict-overflow`
- `-mbranches-within-32B-boundaries`
- `-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

(Continued on next page)
Dell Inc.
PowerEdge XR12 (Intel Xeon Platinum 8351N, 2.40 GHz)

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

SPECrate®2017_int_base = 235
SPECrate®2017_int_peak = 245

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

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

Peak Optimization Flags (Continued)

502.gcc_r: -m32
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass1) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmkr: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_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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