# SPEC CPU® 2017 Integer Rate Result

## Dell Inc.

**PowerEdge XR12 (Intel Xeon Silver 4309Y, 2.80 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<tr>
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### Hardware

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

*CPU Name:* Intel Xeon Silver 4309Y  
*Max MHz:* 3600  
*Nominal:* 2800  
*Enabled:* 8 cores, 1 chip, 2 threads/core  
*Orderable:* 1 chip  
*Cach e L1:* 32 KB I + 48 KB D on chip per core  
*L2:* 1.25 MB I+D on chip per core  
*L3:* 12 MB I+D on chip per chip  
*Other:* None  
*Memory:* 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)  
*Storage:* 225 GB on tmpfs  
*Other:* None  

### Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
**Compiler:** 4.18.0-240.15.1.el8_3.x86_64  
**Parallel:** No  
**Firmware:** Version 1.0.0 released May-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.

### Test Results

<table>
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<tr>
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<td>52.5</td>
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<tr>
<td>gcc_r</td>
<td>16</td>
<td>56.3</td>
<td>64.2</td>
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<td>deepsjeng_r</td>
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<tr>
<td>leela_r</td>
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**SPECrate®2017_int_base (67.5)**  
---  

**SPECrate®2017_int_peak (69.9)**
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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"
MALLOC_CONF = "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
runcpu command invoked through numactl i.e.:
General Notes (Continued)

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 Wed May 26 03:07:57 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) Silver 4309Y CPU @ 2.80GHz
- 1 "physical id"s (chips)
- 16 "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 : 8
- siblings : 16

(Continued on next page)
Dell Inc.

PowerEdge XR12 (Intel Xeon Silver 4309Y, 2.80 GHz)

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

SPECrate®2017_int_base = 67.5
SPECrate®2017_int_peak = 69.9

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

Platform Notes (Continued)

physical 0: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Silver 4309Y CPU @ 2.80GHz
Stepping: 6
CPU MHz: 3400.000
BogoMIPS: 5600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 12288K
NUMA node0 CPU(s): 0-15

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 rdtsscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aerpmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtr pdcm pcid 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_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase 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 xsaveopt xsaves xsavev
l x saves cqm l lc cqm_occu p l lc cqm mbm_total cqm mbm_local split_lock_detect wbnoinvd
dtherm ida arat pln pts avx512vmbi umpk pku ospke avx512_vmbi2 gfn i vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rpdpd md_clear pconfig flush_l1d
arch_capabilities

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 12 13 14 15
node 0 size: 50184 MB

(Continued on next page)
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Platform Notes (Continued)

node 0 free: 498333 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 527818988 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
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

(Continued on next page)
Dell Inc. PowerEdge XR12 (Intel Xeon Silver 4309Y, 2.80 GHz)  

**SPEC CPU®2017 Integer Rate Result**  

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**SPECrate®2017_int_base = 67.5**  
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### Compiler Version Notes

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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.

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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.

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Platform Notes (Continued)

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run-level 5 May 26 03:05

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

Filesystem Type Size Used Avail Use% Mounted on

tmpfs tmpfs 225G 7.1G 218G 4% /mnt/ramdisk

From /sys/devices/virtual/dmi/id

Vendor: Dell Inc.
Product: PowerEdge XR12
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 2666
1x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666
3x 00AD069D00AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.0.0
BIOS Date: 05/20/2021
BIOS Revision: 1.0

(End of data from sysinfo program)

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## Compiler Version Notes (Continued)

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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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### Base Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifort
Dell Inc.

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**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
-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

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

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

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## Peak Compiler Invocation (Continued)

**C++ benchmarks:**  
`icpx`

**Fortran benchmarks:**  
`ifort`

---

## Peak Portability Flags

### C benchmarks:

500.perlbnc_h_r: `-DSPEC_LP64` `-DSPEC_LINUX_X64`  
502.gcc_r: `-D_FILE_OFFSET_BITS=64`  
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`

---

## Peak Optimization Flags

### C benchmarks:

500.perlbnc_h_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`

502.gcc_r: `-m32`  
-`-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin`  
-`-std=gnu89` `-Wl,-z,muldefs` `-fprofile-generate(pass 1)`  
-`-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto`  
-`-Ofast(pass 1) -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: `--std=c11 -m64` `-Wl,-z,muldefs` `-xCORE-AVX512 -flto`  
-`-O3` `-ffast-math -qopt-mem-layout-trans=4` `-fno-alias`

(Continued on next page)
**Dell Inc.**

PowerEdge XR12 (Intel Xeon Silver 4309Y, 2.80 GHz)

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### Peak Optimization Flags (Continued)

525.x264_r (continued):
- `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.xalancbmk_r`: 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:

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