## SPEC CPU®2017 Integer Rate Result

### Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jan-2020</th>
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<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Feb-2020</td>
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<td>Software Availability:</td>
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**SPECrate®2017_int_base = 212**

**SPECrate®2017_int_peak = 222**

<table>
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<th>Copies</th>
<th>SPECrate®2017_int_base (212)</th>
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<td>523.xalancbmk_r</td>
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<td>80</td>
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**Hardware**

- **CPU Name:** Intel Xeon Gold 5218R
- **Max MHz:** 4000
- **Nominal:** 2100
- **Enabled:** 40 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 27.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933V-R, running at 2666)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP1
  - kernel 4.12.14-195-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
  - Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
- **Parallel:** No
- **Firmware:** Version 2.5.4 released Jan-2020
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
**SPEC CPU®2017 Integer Rate Result**

Dell Inc.  
PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

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**SPECrater®2017_int_peak = 222**

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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 = 
"/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"
```

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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)
**Dell Inc.**  
PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)  

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### General Notes (Continued)

- 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.:
  ```
  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

### Platform Notes

- BIOS settings:
  - Sub NUMA Cluster enabled
  - Virtualization Technology disabled
  - System Profile set to Custom
  - CPU Performance set to Maximum Performance
  - C States set to Autonomous
  - C1E disabled
  - Uncore Frequency set to Dynamic
  - Energy Efficiency Policy set to Performance
  - Memory Patrol Scrub set to standard
  - Logical Processor enabled
  - CPU Interconnect Bus Link Power Management disabled
  - PCI ASPM L1 Link Power Management disabled

- Sysinfo program /home/cpu2017/bin/sysinfo
- Rev: r6365 of 2019-08-21 295195f888a3d7edbb1e6e46a485a0011
- running on linux-g3ob Fri Jan 17 05:14:42 2020

- 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 5218R CPU @ 2.10GHz
  2 "physical id"s (chips)
  80 "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 : 20
  siblings : 40
  physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
  ```

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

From `lscpu`:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **Address sizes:** 46 bits physical, 48 bits virtual
- **CPU(s):** 80
- **On-line CPU(s) list:** 0-79
- **Thread(s) per core:** 2
- **Core(s) per socket:** 20
- **Socket(s):** 2
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
- **Stepping:** 7
- **CPU MHz:** 2100.000
- **BogoMIPS:** 4200.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 28160K
- **NUMA node0 CPU(s):** 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76
- **NUMA node1 CPU(s):** 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77
- **NUMA node2 CPU(s):** 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78
- **NUMA node3 CPU(s):** 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79
- **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 pdelgb rdtscp lm constant-ts tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop-tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppiin ssbd mba ibrs ibp bts ibrs_encrupted tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bm1i hle avx2 smep bmi2 erms invvpidd rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsavex xsaveopt xsave xsetbx1 xsaves cmq_llc cmq_occupp_llc cmq_mbb_total cmq_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

`/proc/cpuinfo` cache data  
**cache size:** 28160 KB

From `numactl --hardware` WARNING: a numactl 'node' might or might not correspond to a physical chip.  
**available:** 4 nodes (0-3)  
**node 0 cpus:** 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76

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

```
node 0 size: 95304 MB  
node 0 free: 94995 MB  
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77  
node 1 size: 96764 MB  
node 1 free: 96461 MB  
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78  
node 2 size: 96764 MB  
node 2 free: 96478 MB  
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79  
node 3 size: 96733 MB  
node 3 free: 96501 MB  
node distances:  
  node 0 1 2 3  
  0: 10 21 11 21  
  1: 21 10 21 11  
  2: 11 21 10 21  
  3: 21 11 21 10
```

From `/proc/meminfo`  
MemTotal: 394819468 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

From `/etc/*release* /etc/*version*`  
o$s-release:  
  NAME="SLES"  
  VERSION="15-SP1"  
  VERSION_ID="15.1"  
  PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"  
  ID="sles"  
  ID_LIKE="suse"  
  ANSI_COLOR="0;32"  
  CPE_NAME="cpe:/o:suse:sles:15:sp1"

`uname -a:`  
Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)  
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

- **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: __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS, IBPB: conditional,
**Platform Notes (Continued)**

**RSB filling**

run-level 3 Jan 17 05:12 last=5

SPEC is set to: /home/cpu2017

Filesystem | Type  | Size  | Used | Avail | Use% | Mounted on
---|------|------|------|-------|------|----------
/dev/sda2  | xfs   | 440G  | 48G  | 393G  | 11%  | /

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.5.4 01/13/2020
Vendor: Dell Inc.
Product: PowerEdge R740xd
Product Family: PowerEdge
Serial: F5BLCS2

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:
2x 002C069D002C 18ASF2G72PD2-2G9E1 16 GB 2 rank 2933
7x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
3x 00AD063200AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
12x 00AD069D00AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)

**Compiler Version Notes**

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

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
| C             | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak) |
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(Continued on next page)
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C | 502.gcc_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++ | 523.xalancbmk_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++ | 523.xalancbmk_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
**Dell Inc.**

**PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)**

**Compiler Version Notes (Continued)**

Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

-----------------------------------------------------------------------------

Fortran | 548.exchange2_r(base, peak)
-----------------------------------------------------------------------------

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)  
64, Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

-----------------------------------------------------------------------------

**Base Compiler Invocation**

C benchmarks:

```bash
icc -m64 -std=c11
```

C++ benchmarks:

```bash
icpc -m64
```

Fortran benchmarks:

```bash
ifort -m64
```

**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:

```bash
-Wl, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
```

(Continued on next page)
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#### Base Optimization Flags (Continued)

- **C benchmarks (continued):**
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
  - `-lqkmalloc`

- **C++ benchmarks:**
  - `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
  - `-qopt-mem-layout-trans=4`
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
  - `-lqkmalloc`

- **Fortran benchmarks:**
  - `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
  - `-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte`
  - `-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
  - `-lqkmalloc`

#### Peak Compiler Invocation

- **C benchmarks (except as noted below):**
  - `icc -m64 -std=c11`

  - `502.gcc_r icc -m32 -std=c11 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin`

- **C++ benchmarks (except as noted below):**
  - `icpc -m64`

  - `523.xalancbmk_r icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin`

- **Fortran benchmarks:**
  - `ifort -m64`

#### Peak Portability Flags

- `500.perlbench_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 -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX`
- `525.x264_r -DSPEC_LP64`
- `531.deepsjeng_r -DSPEC_LP64`
- `541.leela_r -DSPEC_LP64`

(Continued on next page)
Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Jan-2020
Hardware Availability: Feb-2020
Software Availability: Jun-2019

Peak Portability Flags (Continued)

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) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

502.gcc_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -pass 1 -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
SPEC CPU®2017 Integer Rate Result

Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 5218R, 2.10 GHz)

SPECrate®2017_int_base = 212
SPECrate®2017_int_peak = 222

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

Test Date: Jan-2020
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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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