**SPEC CPU®2017 Integer Speed Result**

**Dell Inc.**

PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

**SPECspeed®2017_int_base** = 11.2

**SPECspeed®2017_int_peak** = 11.4

---

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

---

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<td></td>
</tr>
<tr>
<td>40</td>
<td>23.1</td>
<td></td>
</tr>
</tbody>
</table>

---

**Hardware**

- CPU Name: Intel Xeon Gold 5218R
- Max MHz: 4000
- Nominal: 2100
- Enabled: 40 cores, 2 chips
- 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 (12 x 32 GB 2Rx4 PC4-3200AA-R, running at 2666)
- Storage: 1 x 1.92 TB SATA SSD
- Other: None

**Software**

- OS: Red Hat Enterprise Linux 8.1
- Parallel: Yes
- Firmware: Version 2.7.7 released May-2020
- File System: xfs
- System State: Run level 3 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: 64-bit
- Other: None
- Power Management: BIOS set to prefer performance at the cost of additional power usage

---

jemalloc memory allocator V5.0.1
### Dell Inc.

PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

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

### SPEC CPU®2017 Integer Speed Result

**SPECspeed®2017_int_base = 11.2**  
**SPECspeed®2017_int_peak = 11.4**

**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

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</table>

### Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux. The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux.

### 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:
- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"
General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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.
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 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

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 disabled
Logical Processor disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch enabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed81e6e46a485a0011
running on localhost.localdomain Sun Jul 12 04:11:23 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
Dell Inc.

PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

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

**SPECspeed®2017_int_base = 11.2**  
**SPECspeed®2017_int_peak = 11.4**

---

### Platform Notes (Continued)

From `/proc/cpuinfo`

- model name: Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz  
  - 2 "physical id"s (chips)  
  - 40 "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: 20

  - 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

From `lscpu`:

- Architecture: x86_64  
- CPU op-mode(s): 32-bit, 64-bit  
- Byte Order: Little Endian  
- CPU(s): 40  
- On-line CPU(s) list: 0-39  
- Thread(s) per core: 1  
- Core(s) per socket: 20  
- Socket(s): 2

---

This completed the platform notes. The detailed specifications and data points provide insights into the system's capabilities and configurations, which are crucial for understanding its performance characteristics. The platform notes also serve as a reference for anyone analyzing or working with the system, ensuring that all necessary information is accessible and accurate.
Dell Inc.

PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

| SPECspeed®2017_int_base = 11.2 |
| SPECspeed®2017_int_peak = 11.4 |

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Test Date:** May-2020  
**Tested by:** Dell Inc.  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

---

### Platform Notes (Continued)

- `cqm_mbm_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: 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`  
- `node 0 size: 192073 MB`  
- `node 0 free: 191263 MB`  
- `node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39`  
- `node 1 size: 193505 MB`  
- `node 1 free: 192434 MB`  
- `node distances:`  
- `node 0 1`  
- `0: 10 21`  
- `1: 21 10`

From `/proc/meminfo`  
- `MemTotal: 394833816 kB`  
- `HugePages_Total: 0`  
- `Hugepagesize: 2048 kB`

From `/etc/*release*` /`etc/*version*`  
- `os-release:`  
  - `NAME="Red Hat Enterprise Linux"`  
  - `VERSION="8.1 (Ootpa)"`  
  - `ID="rhel"`  
  - `ID_LIKE="fedora"`  
  - `VERSION_ID="8.1"`  
  - `PLATFORM_ID="platform:el8"`  
  - `PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"`  
  - `ANSI_COLOR="0;31"`

redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)  
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)  
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:  
- `Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019`  
- `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

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

Dell Inc.
PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

| SPECspeed®2017_int_base = 11.2 |
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Platform Notes (Continued)

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

run-level 3 Jul 12 03:54 last=5
SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.7T 23G 1.7T 2% /home

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.7.7 05/06/2020
Vendor: Dell Inc.
Product: PowerEdge R440
Product Family: PowerEdge
Serial: F9TD613

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:
12x 002C069D002C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) |
|         | 625.x264_s(base, peak) 657.xz_s(base, peak) |
==============================================================================

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
| C       | 600.perlbench_s(peak) |
==============================================================================

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,

(Continued on next page)
## Dell Inc.

PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

### SPEC CPU®2017 Integer Speed Result

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<td>Software Availability:</td>
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</table>

### SPECspeed®2017_int_base = 11.2

| SPECspeed®2017_int_peak = 11.4 |

---

**Compiler Version Notes (Continued)**

**Version 19.1.1.217 Build 20200306**  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

```plaintext
C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)  
        | 625.x264_s(base, peak) 657.xz_s(base, peak)
---
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---
C       | 600.perlbench_s(peak)
---
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---
C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)  
        | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
---
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---
Fortran | 648.exchange2_s(base, peak)
---
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---
```

---

### Base Compiler Invocation

**C benchmarks:**  
icc

**C++ benchmarks:**  
icpc

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

**Dell Inc.**

PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

| SPECspeed®2017_int_base = 11.2 |
| SPECspeed®2017_int_peak = 11.4 |

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

**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

---

### Base Compiler Invocation (Continued)

**Fortran benchmarks:**
ifort

---

### Base Portability Flags

| 600.perlbench_s: -DSPEC_LP64  
| 602.gcc_s: -DSPEC_LP64  
| 605.mcf_s: -DSPEC_LP64  
| 620.omnetpp_s: -DSPEC_LP64  
| 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX  
| 625.x264_s: -DSPEC_LP64  
| 631.deepsjeng_s: -DSPEC_LP64  
| 641.leela_s: -DSPEC_LP64  
| 648.exchange2_s: -DSPEC_LP64  
| 657.xz_s: -DSPEC_LP64 |

---

### Base Optimization Flags

**C benchmarks:**
-m64 -m64 -qnextgen -std=c11  
-Wl, -plugin-opt=-x86-branches-within-32B-boundaries -Wl, -z, muldefs  
-xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops  
-fuse-ld=gold -qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**C++ benchmarks:**
-m64 -qnextgen -Wl, -plugin-opt=-x86-branches-within-32B-boundaries  
-Wl, -z, muldefs -xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse  
-funroll-loops -fuse-ld=gold -qopt-mem-layout-trans=4  
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin  
-lqkmalloc

**Fortran benchmarks:**
-m64 -Wl, -plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX2  
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte  
-mbranches-within-32B-boundaries
## SPEC CPU®2017 Integer Speed Result

### Dell Inc.

**PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)**

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

**Test Date:** May-2020  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

### Peak Compiler Invocation

**C benchmarks:**  
`icc`

**C++ benchmarks:**  
`icpc`

**Fortran benchmarks:**  
`ifort`

### Peak Portability Flags

1. `600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64`
2. `602.gcc_s: -DSPEC_LP64(*) -DSPEC_LP64`
3. `605.mcf_s: -DSPEC_LP64`
4. `620.omnetpp_s: -DSPEC_LP64`
5. `623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX`
6. `625.x264_s: -DSPEC_LP64`
7. `631.deepsjeng_s: -DSPEC_LP64`
8. `641.leela_s: -DSPEC_LP64`
9. `648.exchange2_s: -DSPEC_LP64`
10. `657.xz_s: -DSPEC_LP64`

`(*)` Indicates a portability flag that was found in a non-portability variable.

### Peak Optimization Flags

**C benchmarks:**

1. `600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
   -xCORE-AVX2 -ipo -O3 -no-prec-div
   -qopt-mem-layout-trans=4 -fnoc-strict-overflow
   -mbranches-within-32B-boundaries
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`
2. `602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
   -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
   -Wl,-z,muldefs -fprofile-generate(pass 1)
   -fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto
   -Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

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

Dell Inc.
PowerEdge R440 (Intel Xeon Gold 5218R, 2.10 GHz)

SPECspeed®2017_int_base = 11.2
SPECspeed®2017_int_peak = 11.4

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: May-2020
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Peak Optimization Flags (Continued)

605.mcf_s: basepeak = yes
625.x264_s: -m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -flto -O3 -ffast-math
-fuse-ld=gold -qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
657.xz_s: basepeak = yes
C++ benchmarks:
620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes
641.leela_s: basepeak = yes
Fortran benchmarks:
648.exchange2_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-ic19.1u1-official-linux64_revA.xml

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