Dell Inc.

PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)

SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.6

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

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

CPU Name: Intel Xeon Silver 4316
Max MHz: 3400
Nominal: 2300
Enabled: 20 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 1.25 MB I+D on chip per core
L3: 30 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

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<tbody>
<tr>
<td>perlbench_s</td>
<td>20</td>
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<td>11.6</td>
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<td>mcf_s</td>
<td>20</td>
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<tr>
<td>omnetpp_s</td>
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<td>10.8</td>
<td></td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x264_s</td>
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<tr>
<td>deepsjeng_s</td>
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<tr>
<td>leela_s</td>
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<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td>20</td>
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</tr>
<tr>
<td>xz_s</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECspeed®2017_int_base (11.3) SPECspeed®2017_int_peak (11.6)

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;

Parallel: Yes
Firmware: Version 0.9.0 released May-2021
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.
# SPEC CPU®2017 Integer Speed Result

## Dell Inc.

PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
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<tr>
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<tr>
<td>657.xz_s</td>
<td>20</td>
<td>318</td>
<td>19.5</td>
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<td>19.5</td>
<td>318</td>
<td>19.5</td>
<td>20</td>
<td>318</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.6**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## 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 =

"/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"

MALLOCC_CONF = "retain:true"

OMP_STACKSIZE = "192M"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

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
```

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

sources available from jemalloc.net or


NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
SPEC CPU®2017 Integer Speed Result

Dell Inc.
PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz) SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.6

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

General Notes (Continued)
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:
   Logical Processor : Disabled
   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 Thu May 13 01:08:44 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 4316 CPU @ 2.30GHz
   1 "physical id"s (chips)
   20 "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 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

From lscpu:
   Architecture: x86_64
   CPU op-mode(s): 32-bit, 64-bit
   Byte Order: Little Endian
   CPU(s): 20

(Continued on next page)
Dell Inc.

PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.6**

**CPU2017 License:** 55

**Test Date:** May-2021

**Test Sponsor:** Dell Inc.

**Hardware Availability:** Jul-2021

**Tested by:** Dell Inc.

**Software Availability:** Feb-2021

**Test Date:** May-2021

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Hardware Availability:** Jul-2021

**Tested by:** Dell Inc.

**Software Availability:** Feb-2021

### Platform Notes (Continued)

- **On-line CPU(s) list:** 0-19
- **Thread(s) per core:** 1
- **Core(s) per socket:** 20
- **Socket(s):** 1
- **NUMA node(s):** 1
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 106
- **Model name:** Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
- **Stepping:** 6
- **CPU MHz:** 2924.467
- **BogoMIPS:** 4600.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 1280K
- **L3 cache:** 30720K
- **NUMA node0 CPU(s):** 0-19
- **Flags:** fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpte1gb rdtscp lm constant_tsc art 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 3dnowprefetch cpuid_fault epb cat_l3 invpccd_single intel_pppin ssbd mba ibrs ibpb stibp ibrs_enabled fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmip rd touring rdseed adx xsaveopt avx2 smep bmi2 3dnowprefetch cpuid_fault epb cat_l3 invpccd_single intel_pppin ssbd mba ibrs ibpb stibp ibrs_enabled fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 invpcid cmip rd touring rdseed adx xsaveopt avx2

```markdown
/platform/cpuinfo cache data
   cache size: 30720 KB
```

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 16 17 18 19
- **node 0 size:** 495363 MB
- **node 0 free:** 498559 MB
- **node distances:**
  - **node 0:** 0: 10

From `/proc/meminfo`

```markdown
MemTotal: 527818112 KB
```

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

Dell Inc.

PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)

SPEC CPU 2017 Integer Speed Result

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</table>

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.6**

**Platform Notes (Continued)**

```
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): Mitigation: Speculative Store
  Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass):
  Mitigation: usercopy/swapgs
  barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1):
  Mitigation: Enhanced IBRS, IBPB:
  conditional, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
run-level 5 May 13 00:51
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
  Filesystem   Type    Size  Used Avail Use% Mounted on
  tmpfs         tmpfs   225G   6.9G  219G   4%   /mnt/ramdisk
```

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

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

Platform Notes (Continued)

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge XR11
Product Family: PowerEdge
Serial: 09900TO

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:
1x 002C069D002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2666
7x 00AD069D00AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 0.9.0
BIOS Date: 05/10/2021
BIOS Revision: 0.9

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<p>| C | 600.perlbench_s(peak) |
|-----------------------------------------------|
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |</p>
<table>
<thead>
<tr>
<th>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</th>
</tr>
</thead>
</table>

==============================================================================
<p>| 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) oneAPI DPC+/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113 |</p>
<table>
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</table>

==============================================================================
<p>| C | 600.perlbench_s(peak) |
|-----------------------------------------------|</p>
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<tr>
<th>Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</th>
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(Continued on next page)
Dell Inc.
PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)

SPEC CPU®2017 Integer Speed Result

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Dell Inc.
PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)

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Compiler Version Notes (Continued)

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------------------------------------------------------------------------------
| 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) |
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| 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++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(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. |
------------------------------------------------------------------------------

------------------------------------------------------------------------------
| Fortran | 648.exchange2_s(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. |
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64

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

## Dell Inc.

**PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)**

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</table>

### CPU2017 License: 55

**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

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**Base Portability Flags (Continued)**

<table>
<thead>
<tr>
<th>Portability Flags</th>
</tr>
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<tbody>
<tr>
<td>602.gcc_s: -DSPEC_LP64</td>
</tr>
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<tr>
<td>623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX</td>
</tr>
<tr>
<td>625.x264_s: -DSPEC_LP64</td>
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</tr>
<tr>
<td>657.xz_s: -DSPEC_LP64</td>
</tr>
</tbody>
</table>

---

**Base Optimization Flags**

**C benchmarks:**

-DSPEC_OPENMP  
-std=c11  
-m64  
-fiopenmp  
-Wl,-z,muldefs  
-xCORE-AVX512  
-O3  
-ffast-math  
-flto  
-mfpmath=sse  
-funroll-loops  
-qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc

**C++ benchmarks:**

-DSPEC_OPENMP  
-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:**

-m64  
-xCORE-AVX512  
-O3  
-ipo  
-no-prec-div  
-qopt-mem-layout-trans=4  
-nostandard-realloc-lhs  
-align array32byte  
-auto  
-mbranches-within-32B-boundaries

---

**Peak Compiler Invocation**

**C benchmarks (except as noted below):**

icx

600.perlbench_s: icc

**C++ benchmarks:**

icpx

**Fortran benchmarks:**

ifort
## Dell Inc.

**PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)**

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Test Date</th>
<th>Test Sponsor</th>
<th>Hardware Availability</th>
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<tbody>
<tr>
<td>55</td>
<td>May-2021</td>
<td>Dell Inc.</td>
<td>Jul-2021</td>
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<table>
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<th>Software Availability</th>
</tr>
</thead>
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<tr>
<td>Dell Inc.</td>
<td>Feb-2021</td>
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</table>

### SPECspeed®2017

- **`SPECspeed®2017_int_base` = 11.3**
- **`SPECspeed®2017_int_peak` = 11.6**

---

## Peak Portability Flags

Same as Base Portability Flags

---

## Peak Optimization Flags

### C benchmarks:

- 600.perlbench_s: `-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/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

- 602.gcc_s: `-m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)`
- `-fprofile-use=default.profdatalib` `-xCORE-AVX512 -flto`
- `-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

- 605.mcf_s: `basepeak = yes`

- 625.x264_s: `-DSPEC_OPENMP -fiopenmp` `-std=c11 -m64 -Wl,-z,muldefs`
- `-xCORE-AVX512 -flto -O3 -ffast-math`
- `-qopt-mem-layout-trans=4 -fno-alias`
- `-mbranches-within-32B-boundaries`
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

- 657.xz_s: `basepeak = yes`

### C++ benchmarks:

- 620.omnetpp_s: `basepeak = yes`

### Fortran benchmarks:

- 648.exchange2_s: `basepeak = yes`
## SPEC CPU®2017 Integer Speed Result

**Dell Inc.**  
PowerEdge XR11 (Intel Xeon Silver 4316, 2.30 GHz)  

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<thead>
<tr>
<th><strong>SPECspeed®2017_int_base</strong></th>
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<td><strong>Hardware Availability:</strong></td>
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You can also download the XML flags sources by saving the following links:

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