## Dell Inc.

### Dell Inc. PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

<table>
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<tr>
<th>Test Sponsor:</th>
<th>Dell Inc.</th>
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### CPU2017 License: 55

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### Software

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<th>OS:</th>
<th>Red Hat Enterprise Linux 8.2 (Ootpa)</th>
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<td>Compiler:</td>
<td>C/C++: 2021.1 of Intel oneAPI DPC++/C++</td>
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<td>Parallel:</td>
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<td>Firmware:</td>
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<td>File System:</td>
<td>tmpfs</td>
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<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
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<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
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<tr>
<td>Peak Pointers:</td>
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<tr>
<td>Other:</td>
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<td>Power Management:</td>
<td>BIOS and OS set to prefer performance</td>
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<tr>
<td></td>
<td>at the cost of additional power usage.</td>
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### Additional Hardware Details

- **CPU Name:** Intel Xeon Gold 5320T
- **Max MHz:** 3500
- **Nominal:** 2300
- **Enabled:** 40 cores, 2 chips
- **Orderable:** 1.2 chips
- **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 core
- **Other:** None
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R, running at 2933)
- **Storage:** 125 GB on tmpfs
- **Other:** None

### Additional Software Details

- **OS:** Red Hat Enterprise Linux 8.2 (Ootpa)
- **Compiler:** C/C++: 2021.1 of Intel oneAPI DPC++/C++
- **Firmware:** Version 1.1.3 released Apr-2021
- **File System:** tmpfs
- **System State:** Run level 3 (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 Floating Point Speed Result

**Dell Inc.**

PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

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### SPECspeed®2017_fp_base = 161

### SPECspeed®2017_fp_peak = 164

#### Results Table

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SPECspeed®2017_fp_base = 161

SPECspeed®2017_fp_peak = 164

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,compact"
- LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.7-ic2021.1/je5.0.1-64"
- MALLOC_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

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

(Continued on next page)
Dell Inc. PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

SPEC CPU®2017 Floating Point Speed Result

SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 164

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

General Notes (Continued)

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

Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G 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/cpu2017-1.1.7-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Sat May 22 14:01:08 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) Gold 5320T CPU @ 2.30GHz
  2 "physical id"s (chips)
  40 "processors"
core, 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
physical 1: 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

(Continued on next page)
Dell Inc. PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

Dell Inc.

CPU2017 License: 55
Test Sponsor: Dell Inc.
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SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 164

Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

Platform Notes (Continued)

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
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5320T CPU @ 2.30GHz
Stepping: 6
CPU MHz: 3007.337
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 30720K
NUMA node0 CPU(s): 0-19
NUMA node1 CPU(s): 20-39

Flags:

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

(cache size : 30720 KB)

/proc/cpuinfo cache data

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

node distances:

```
node  0  1
  0:  10  20
  1:  20  10
```

From `/proc/meminfo`

- MemTotal: 1056303836 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/sbin/tuned-adm active

- Current active profile: throughput-performance

From `/etc/*release* /etc/*version*`

```
NAME="Red Hat Enterprise Linux"
VERSION="8.2 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.2"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga
```

uname -a:

```
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
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/swaps barriers and __user pointer sanitation
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** No status reported
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

| SPECspeed®2017_fp_base = 161 |
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Platform Notes (Continued)

run-level 3 May 22 11:03

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-ic2021.1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 125G 11G 115G 9% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge C6520
Product Family: PowerEdge
Serial: SDPT078

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:
16x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2933

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.1.3
BIOS Date: 04/27/2021
BIOS Revision: 1.1

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base)
------------------------------------------------------------------------------
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 | 644.nab_s(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.
------------------------------------------------------------------------------

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**Compiler Version Notes (Continued)**

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<th>Fortran, C</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fortran, C</td>
<td>621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)</td>
</tr>
<tr>
<td>Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</td>
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Dell Inc. PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 164

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Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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.

Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

(Continued on next page)
## Dell Inc. PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

<table>
<thead>
<tr>
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<td><strong>CPU2017 License:</strong> 55</td>
<td><strong>Test Date:</strong> May-2021</td>
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<tr>
<td><strong>Test Sponsor:</strong> Dell Inc.</td>
<td><strong>Hardware Availability:</strong> Apr-2021</td>
</tr>
<tr>
<td><strong>Tested by:</strong> Dell Inc.</td>
<td><strong>Software Availability:</strong> Dec-2020</td>
</tr>
</tbody>
</table>

### Base Optimization Flags (Continued)

- Fortran benchmarks:
  - `-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3`  
  - `-no-prec-div -qopt-prefetch -ffinite-math-only`  
  - `-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`  
  - `-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib`  
  - `-ljemalloc`

- Benchmarks using both Fortran and C:
  - `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
  - `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
  - `-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`  
  - `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

- Benchmarks using Fortran, C, and C++:
  - `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
  - `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
  - `-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`  
  - `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

### Peak Compiler Invocation

- C benchmarks (except as noted below):
  - `icc`
  - `644.nab_s: icx`

- Fortran benchmarks:
  - `ifort`

- Benchmarks using both Fortran and C:
  - `ifort icc`

- Benchmarks using Fortran, C, and C++:
  - `icpc icc ifort`

### Peak Portability Flags

Same as Base Portability Flags
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-fito -mfpmath=sse -funroll-loops -fiopenmp
-DSPEC_OPENMP -qopt-mem-layout-trans=4
-ffinite-math-only
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactusBSSN_s: basepeak = yes
Dell Inc. PowerEdge C6520 (Intel Xeon Gold 5320T, 2.30 GHz)

| SPECspeed®2017_fp_base = 161 |
| SPECspeed®2017_fp_peak = 164 |

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

Test Date: May-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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