Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

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

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

603.bwaves_s 56
607.cactuBSSN_s 56
619.lbm_s 56
621.wrf_s 56
627.cam4_s 56
628.pop2_s 56
638.imagick_s 56
644.nab_s 56
649.fotonik3d_s 56
654.roms_s 56

--- SPECspeed\(^{\text{\textregistered}}\)2017_fp_base (170) ---

--- SPECspeed\(^{\text{\textregistered}}\)2017_fp_peak (174) ---

**Hardware**

CPU Name: Intel Xeon Gold 6330N
Max MHz: 3400
Nominal: 2200
Enabled: 56 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: 42 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
Storage: 125 GB on tmpfs
Other: None

**Software**

OS: Red Hat Enterprise Linux 8.3 (Ootpa)
4.18.0-240.el8.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;
C/C++: Version 2021.1 of Intel C/C++ Compiler
Classic Build 20201112 for Linux
Parallel: Yes
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.
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

SPECspeed®2017_fp_base = 170
SPECspeed®2017_fp_peak = 174

Results Table

<table>
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<tr>
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<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
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</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 170
SPECspeed®2017_fp_peak = 174

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
Dell Inc.  
PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)  

| SPECspeed®2017_fp_base = 170 |
| SPECspeed®2017_fp_peak = 174 |

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
- CIE : 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 Tue May 25 05:05:14 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 6330N CPU @ 2.20GHz
  2 "physical id"s (chips)
  56 "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 : 28
  siblings : 28
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

From lscpu:

(Continued on next page)
Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

SPECspeed®2017_fp_base = 170
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Platform Notes (Continued)

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6330N CPU @ 2.20GHz
Stepping: 6
CPU MHz: 1683.899
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 43008K
NUMA node0 CPU(s): 0-27
NUMA node1 CPU(s): 28-55
Flags:
  fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_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 xtrig 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_pni ssbd mba ibrs ibpb stibp ibrsenhanced fsqsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmpt dt t a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cda sha ni avx512bw avx512vl xsaveopt xsavec xsavev xstoreav xstoreav xsavepgt xsaveas cmq llc cmq_occump llc cmq_mbb t ccm_mbb_local split_lock Detect wnoinvd dtherm ida arat pln pts avx512vbmi umip pk u ospe avx512_vbmi2 gfnl vaes vpcmmlqdq avx512_svnna avx512_bitalg tme avx512_vpoptcntdq 1a57 rdpid md clear pconfig flush_l1d arch_capabilities

/cache data
  cache size: 43008 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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
node 0 size: 245726 MB
node 0 free: 255864 MB
node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52

(Continued on next page)
Dell Inc.
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CPU2017 License: 55
Test Date: May-2021
Hardware Availability: Apr-2021
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Platform Notes (Continued)

53 54 55
node 1 size: 246178 MB
node 1 free: 243237 MB
node distances:
  node  0   1
  0:  10  20
  1:  20  10

From /proc/meminfo
MemTotal: 527807920 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=“rheil"
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.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapsgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB:
CVE-2017-5715 (Spectre variant 2):
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Platform Notes (Continued)

Conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 May 25 02:18
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

Memory:
6x 002C00B3002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666
10x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2666

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,

(Continued on next page)
Dell Inc.  
PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)  

SPECspeed®2017_fp_base = 170  
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Compiler Version Notes (Continued)

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Compiler Version Notes (Continued)

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### Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

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**Test Date:** May-2021  
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### Compiler Version Notes (Continued)

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.  
Intel(R) C 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:**  
  - 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

(Continued on next page)
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

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**Base Optimization Flags (Continued)**

C benchmarks (continued):
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

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
# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

<table>
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### Software Availability:
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## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

### C benchmarks:

- **619.lbm_s**: basepeak = yes
- **638.imagick_s**: basepeak = yes
- **644.nab**: 
  -m64
  -Wl,-z,muldefs
  -xCORE-AVX512
  -Ofast
  -ffast-math
  -flto
  -mfpmath=sse
  -funroll-loops
  -fiopenmp
  -DSPEC_OPENMP
  -qopt-mem-layout-trans=4
  -fimf-accuracy-bits=14:sqrt
  -mbranches-within-32B-boundaries
  -L/usr/local/jemalloc64-5.0.1/lib
  -ljemalloc

### Fortran benchmarks:

- **603.bwaves_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-mem-layout-trans=4
  -qopenmp
  -nostandard-realloc-lhs
  -mbranches-within-32B-boundaries
  -L/usr/local/jemalloc64-5.0.1/lib
  -ljemalloc
- **649.fotonik3d_s**: basepeak = yes
- **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
  -qopenmp
  -nostandard-realloc-lhs
  -mbranches-within-32B-boundaries
  -L/usr/local/jemalloc64-5.0.1/lib
  -ljemalloc
- **627.cam4_s**: basepeak = yes
- **628.pop2_s**: basepeak = yes

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

**Dell Inc.**  
PowerEdge C6520 (Intel Xeon Gold 6330N, 2.20 GHz)

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**Peak Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_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-ic2021-official-linux64_revA.xml  

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