Dell Inc. PowerEdge M640 (Intel Xeon Gold 6230N, 2.30GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Sep-2019
Tested by: Dell Inc.
Hardware Availability: Apr-2019
Software Availability: Sep-2019

CPU Name: Intel Xeon Gold 6230N
Max MHz: 3900
Nominal: 2300
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 PC4-2933Y-R)
Storage: 1 x 480 GB SATA SSD
Other: None

OS: Ubuntu 18.04.2 LTS
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: Yes
Firmware: Version 2.2.11 released Jun-2019
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: --
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230N, 2.30GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Results Table

<table>
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<th>Benchmark</th>
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</tbody>
</table>

SPECspeed®2017_fp_base = 124
SPECspeed®2017_fp_peak = 125

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

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) 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

Platform Notes

BIOS settings:
ADDDC setting disabled
Sub NUMA Cluster disabled

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

Virtualization Technology disabled  
DCU Streamer Prefetcher 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  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
runtime on intel-sut Sat Sep 14 01:13:13 2019  

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 6230N CPU @ 2.30GHz  
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  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Gold 6230N CPU @ 2.30GHz  
Stepping: 6  
CPU MHz: 3623.391
```
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6230N, 2.30GHz)

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

SPECspeed®2017_fp_base = 124
SPECspeed®2017_fp_peak = 125

Test Date: Sep-2019
Hardware Availability: Apr-2019
Software Availability: Sep-2019

Platform Notes (Continued)

BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39
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 pdpe1gb rdtsscp
        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 lahflm 3dnowprefetch cpuid_fault ebpx mca machine
        cat_l3 cudp cpuid trace cpuid_multiple_features
        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: 199192 MB
    node 0 free: 187908 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: 193510 MB
    node 1 free: 189337 MB
    node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
    MemTotal: 394673276 kB
    HugePages_Total: 0
    Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
    Ubuntu 18.04.2 LTS

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

(Continued on next page)
Dell Inc.  

PowerEdge M640 (Intel Xeon Gold 6230N, 2.30GHz)  

**SPECspeed®2017_fp_base = 124**  
**SPECspeed®2017_fp_peak = 125**

---

**Platform Notes (Continued)**

debian_version: buster/sid  
os-release:  
  NAME="Ubuntu"  
  VERSION="18.04.2 LTS (Bionic Beaver)"  
  ID=ubuntu  
  ID_LIKE=debian  
  PRETTY_NAME="Ubuntu 18.04.2 LTS"  
  VERSION_ID="18.04"  
  HOME_URL="https://www.ubuntu.com/"  
  SUPPORT_URL="https://help.ubuntu.com/"

uname -a:  
  Linux intel-sut 4.15.0-62-generic #69-Ubuntu SMP Wed Sep 4 20:55:53 UTC 2019 x86_64  
  x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected  
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 Sep 13 19:49  

SPEC is set to: /home/cpu2017  
  Filesystem  Type  Size  Used Avail Use% Mounted on  
  /dev/sda2  ext4  439G  38G  379G  10% /

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.

  BIOS Dell Inc. 2.2.11 06/14/2019  
  Memory:  
  6x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
  3x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
  3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933  
  4x Not Specified Not Specified

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
C  | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
```

(Continued on next page)
Dell Inc. PowerEdge M640 (Intel Xeon Gold 6230N, 2.30GHz)

**SPEC CPU®2017 Floating Point Speed Result**

SPECspeed®2017_fp_base = 124
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### Base Compiler Invocation

C benchmarks:

```bash
c -m64 -std=c11
```

(Continued on next page)
Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

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:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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

Benchmarks using Fortran, C, and C++:
- `xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
- `ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`
- `nostandard-realloc-lhs`

### Peak Compiler Invocation

**C benchmarks:**
```
icc -m64 -std=c11
```

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

**Benchmarks using both Fortran and C:**
```
ifort -m64 icc -m64 -std=c11
```

**Benchmarks using Fortran, C, and C++:**
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**
```
xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

**Fortran benchmarks:**
```
603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
```

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

(Continued on next page)
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PowerEdge M640 (Intel Xeon Gold 6230N, 2.30GHz)

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---

**Peak Optimization Flags (Continued)**

654.roms_s (continued):
- -qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512  
- qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div  
- qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp  
- DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- ffinte-math-only -qopt-mem-layout-trans=4 -qopenmp  
- DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

- xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- nostandard-realloc-lhs

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

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