**Dell Inc.**

PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 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.

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (161)</th>
<th>SPECspeed®2017_fp_peak (164)</th>
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<td>603.bwaves_s</td>
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<td>607.cactuBSSN_s</td>
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<td>121</td>
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<tr>
<td>619.ibm_s</td>
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<td>149</td>
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<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>160</td>
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<td>627.cam4_s</td>
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<td>104</td>
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<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>82.6</td>
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<td>638.imagick_s</td>
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<td>125</td>
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<td>644.nab_s</td>
<td>32</td>
<td>253</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>106</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>199</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: Intel Xeon Gold 6326
Max MHz: 3500
Nominal: 2900
Enabled: 32 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: 24 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
Storage: 225 GB on tmpfs
Other: None

**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;
C/C++: Version 2021.1 of Intel C/C++ Compiler
Classic Build 20201112 for Linux
Parallel: Yes
Firmware: Version 1.2.4 released May-2021
File System: 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.
Dell Inc.  
PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 GHz)

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
<th>Seconds</th>
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<td>78.9</td>
<td>199</td>
<td>79.1</td>
<td>199</td>
</tr>
</tbody>
</table>

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

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

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

**Dell Inc.**

**PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 GHz)**

<table>
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<th>SPECspeed®2017_fp_base</th>
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**CPU2017 License:** 55  
**Test Date:** Jun-2021  
**Test Sponsor:** Dell Inc.  
**Hardware Availability:** May-2021  
**Tested by:** Dell Inc.  
**Software Availability:** Feb-2021

### 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 Jun 3 13:07:09 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/cpuintof**  
```
model name : Intel(R) Xeon(R) Gold 6326 CPU @ 2.90GHz
2 "physical id"s (chips)
32 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuintof might not be reliable. Use with caution.)
cpu cores : 16
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

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

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

Dell Inc.

PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 GHz)

**SPECspeed®2017_fp_base = 161**

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<td>Feb-2021</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

- CPU(s): 32
- On-line CPU(s) list: 0-31
- Thread(s) per core: 1
- Core(s) per socket: 16
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 106
- Model name: Intel(R) Xeon(R) Gold 6326 CPU @ 2.90GHz
- Stepping: 6
- CPU MHz: 1813.656
- BogoMIPS: 5800.00
- Virtualization: VT-x
- L1d cache: 48K
- L1i cache: 32K
- L2 cache: 1280K
- L3 cache: 24576K
- NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
- NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
- Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acp1 mmx fxsr sse sse2 ss ht tm pbe syscall nx pdemlb 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 pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abr mm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pmm ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaves cqm_occup_l1c cqm_mbb_total cqm_mbb_local split_lock_detect wbinvd dtherm ida arat pln pts avx512vmbi umip pku ospe avx512_vmbi gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data

- cache size : 24576 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: 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30
- node 0 size: 250202 MB
- node 0 free: 234674 MB
- node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
- node 1 size: 250983 MB
- node 1 free: 245511 MB
- node distances:

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

Dell Inc.
PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 GHz)

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

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Jun-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Platform Notes (Continued)

node 0 1
0: 10 20
1: 20 10

From /proc/meminfo
MemTotal: 527815412 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="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 (Melttdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapsq barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

(Continued on next page)
Dell Inc.  

PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 GHz)  

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

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

---

**Platform Notes (Continued)**

run-level 5 Jun 3 09:07

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

Filesystem Type Size Used Avail Use% Mounted on  
tmpfs tmpfs 225G 19G 207G 9% /mnt/ramdisk

From /sys/devices/virtual/dmi/id  
Vendor: Dell Inc.  
Product: PowerEdge R750xa  
Product Family: PowerEdge  
Serial: 1234567

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 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200  
16x Not Specified Not Specified

BIOS:  
BIOS Vendor: Dell Inc.  
BIOS Version: 1.2.4  
BIOS Date: 05/28/2021  
BIOS Revision: 1.2

(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.
```

(Continued on next page)
## Compiler Version Notes (Continued)

```
<table>
<thead>
<tr>
<th>Language</th>
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</tr>
</thead>
<tbody>
<tr>
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<td>Intel(R)</td>
<td>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.</td>
</tr>
<tr>
<td>C++, C, Fortran</td>
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Compiler Version Notes (Continued)
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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)
**SPEC CPU®2017 Floating Point Speed Result**

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Test Date:** Jun-2021  
**Hardware Availability:** May-2021  
**Tested by:** Dell Inc.  
**Software Availability:** Feb-2021  

### 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
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: -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

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
-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.cactuBSSN_s: basepeak = yes
## SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

### PowerEdge R750xa (Intel Xeon Gold 6326, 2.90 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak</th>
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<td>161</td>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  

**Test Date:** Jun-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Feb-2021

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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 Tested with SPEC CPU®2017 v1.1.5 on 2021-06-03 01:07:08-0400.  
Originally published on 2021-07-06.