# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.

PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>97.0</td>
<td>98.2</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55  
**Test Date:** Dec-2021  
**Hardware Availability:** Apr-2019  
**Software Availability:** May-2021  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  

<table>
<thead>
<tr>
<th>Software</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux 8.4 (Ootpa) 4.18.0-305.el8.x86_64</td>
</tr>
</tbody>
</table>
| Compiler          | Fortran: Version 2021.1 of Intel Fortran Compiler  
                    | C/C++: Version 2021.1 of Intel C/C++ Compiler  
                    | Classic Build 20201112 for Linux; Classic Build 20201112 for Linux |
| Firmware          | Version 2.12.2 released Jul-2021                                      |
| File System       | xfs                                                                    |
| System State      | Run level 3 (multi-user)                                              |
| Base Pointers     | 64-bit                                                                |
| Peak Pointers     | 64-bit                                                                |
| Power Management  | BIOS and OS set to prefer performance at the cost of additional power usage. |

## Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (97.0)</th>
<th>SPECspeed®2017_fp_peak (98.2)</th>
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<td></td>
<td></td>
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<tr>
<td>24</td>
<td></td>
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</tr>
</tbody>
</table>

**CPU Name:** Intel Xeon Silver 4214R  
**Max MHz:** 3500  
**Nominal:** 2400  
**Enabled:** 24 cores, 2 chips  
**Orderable:** 1.2 cores  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 1 MB I+D on chip per core  
**L3:** 16.5 MB I+D on chip per chip  
**Other:** None  
**Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)  
**Storage:** 1 x 1.6 TB SATA SSD  
**Other:** None
### Dell Inc.

**PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)**

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

**SPECspeed®2017_fp_base = 97.0**  
**SPECspeed®2017_fp_peak = 98.2**

#### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>24</td>
<td>152</td>
<td>388</td>
<td>152</td>
<td>388</td>
<td>24</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>141</td>
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<tr>
<td>627.cam4_s</td>
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<td>649.fotonik3d_s</td>
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</tbody>
</table>

**SPECspeed®2017_fp_base = 97.0**  
**SPECspeed®2017_fp_peak = 98.2**

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** = "/root/cpu2017-1.1.8-ic2021.1/lib/intel64:/root/cpu2017-1.1.8-ic2021.1/j
e5.0.1-64"
- **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  
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)
Dell Inc.
PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)

SPEC CPU®2017 Floating Point Speed Result

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SPECspeed®2017_fp_base = 97.0
SPECspeed®2017_fp_peak = 98.2

Dell Inc.

GHz)

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

Test Date: Dec-2021
Hardware Availability: Apr-2019
Software Availability: May-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.

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
   PCI ASPM L1 Link
   Power Management : Disabled

Sysinfo program /root/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d4
running on localhost.localdomain Wed Dec  1 08:29:56 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 4214R CPU @ 2.40GHz
   2 "physical id"s (chips)
   24 "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 : 12
   siblings : 12
   physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
   physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

From lscpu from util-linux 2.32.1:
   Architecture: x86_64
   CPU op-mode(s): 32-bit, 64-bit
   Byte Order: Little Endian

(Continued on next page)
Dell Inc.
PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)  

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

| SPECspeed®2017_fp_base = 97.0 |
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**Platform Notes (Continued)**

```plaintext
CPU(s): 24  
On-line CPU(s) list: 0-23  
Thread(s) per core: 1  
Core(s) per socket: 12  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
BIOS Vendor ID: Intel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz  
BIOS Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz  
Stepping: 7  
CPU MHz: 2984.316  
CPU max MHz: 3500.0000  
CPU min MHz: 1000.0000  
BogoMIPS: 4800.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 16896K  
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22  
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23  
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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdb fma cx16 xtpre 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 cdp_l3 invpcid_single intel_pppin ssbd mba ibrs ibpb stibp ibrs_enhanced fsgbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmq mxpx rd tỉ rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512v1 xsaveopt xsavec xgetbv1 xsaves cmq llvm cmq_occup_llc cmq_mbm_total cmq_mbm_local dtherm ida arat pln pts pkup ospke avx512_vnni md_clear flush_l1d arch_capabilities
```

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
node 0 size: 192037 MB
node 0 free: 177751 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
node 1 size: 193532 MB
```
Dell Inc.
PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)

Platform Notes (Continued)

node 1 free: 192327 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10

From /proc/meminfo
MemTotal: 394824212 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release*/etc/*version*
o-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.4 (Ootpa)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="8.4"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):
KVM: Mitigation: Split huge pages
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: userscopy/swappgs barriers and __user pointer sanitation

CVE-2017-5753 (Spectre variant 1):

(Continued on next page)
Dell Inc.
PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)

Specspeed®2017_fp_base = 97.0
Specspeed®2017_fp_peak = 98.2

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Software Availability: May-2021

Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected

run-level 3 Dec 1 05:14

SPEC is set to: /root/cpu2017-1.1.8-ic2021.1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 931G 38G 894G 4% /

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge FC640
Product Family: PowerEdge
Serial: 1234567

Additional information from dmidecode 3.2 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:
3x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
6x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400
3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2400

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 2.12.2
BIOS Date: 07/12/2021
BIOS Revision: 2.12

(End of data from sysinfo program)

Compiler Version Notes

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

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.

(Continued on next page)
### Dell Inc.

PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)

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#### Compiler Version Notes (Continued)

*C++, C, Fortran | 607.cactuBSSN_s(base, peak)*

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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  
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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.

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.

---

*Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_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.

---

*Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)*

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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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**Base Compiler Invocation**

**C benchmarks:**  
`icc`

**Fortran benchmarks:**  
`ifort`

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

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

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>-DSPEC_LP64</td>
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<tr>
<td>621.wrf_s</td>
<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl</td>
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<td>-DSPEC_LP64 -DSPEC_CASE_FLAG</td>
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</tbody>
</table>

## Base Optimization Flags

### C benchmarks:

- `m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`
- `ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`
- `mbranches-within-32B-boundaries`

### Fortran benchmarks:

- `m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -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-AVX2 -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-AVX2 -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`
Dell Inc.
PowerEdge FC640 (Intel Xeon Silver 4214R, 2.40 GHz)

| SPECspeed®2017_fp_base = 97.0 |
| SPECspeed®2017_fp_peak = 98.2 |

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

Test Date: Dec-2021
Hardware Availability: Apr-2019
Software Availability: May-2021

Peak 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

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: basepeak = yes

Fortran benchmarks:
603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2
-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: Same as 603.bwaves_s
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

(Continued on next page)
Peak Optimization Flags (Continued)

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
       -prof-use(pass 2) -ipo -xCORE-AVX2 -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

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
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.5.xml