Dell Inc.
PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

SPECspeed2017_fp_base = 59.1
SPECspeed2017_fp_peak = 60.3

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

Hardware
CPU Name: Intel Xeon Silver 4109T
Max MHz.: 3000
Nominal: 2000
Enabled: 16 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: 11 MB I+D on chip per core
Other: None
Memory: 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
Storage: 480 GB SATA SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP2
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;
Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
Parallel: Yes
Firmware: Version 1.3.7 released Feb-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

Threads

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## SPEC CPU2017 Floating Point Speed Result

Dell Inc.

PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

**SPECspeed2017_fp_base** = 59.1

**SPECspeed2017_fp_peak** = 60.3

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</table>

**SPECspeed2017_fp_base** = 59.1

**SPECspeed2017_fp_peak** = 60.3

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"

### General Notes

Environment variables set by runcpu before the start of the run:
- KMP_AFFINITY = "granularity=fine,compact"
- OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

Yes: 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:
- Sub NUMA Cluster disabled
- Virtualization Technology disabled

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

Dell Inc.
PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

SPECspeed2017_fp_base = 59.1
SPECspeed2017_fp_peak = 60.3

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

Test Date: Feb-2018
Hardware Availability: Sep-2017
Software Availability: Feb-2018

Platform Notes (Continued)

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/cpu2017rev5/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bccc091c0f
running on linux-bgfp Wed Feb 28 23:55:08 2018

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 4109T CPU @ 2.00GHz
  2 "physical id"s (chips)
  16 "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 : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4109T CPU @ 2.00GHz
Stepping: 4
CPU MHz: 1995.319
BogoMIPS: 3990.63
Virtualization: VT-x

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

<table>
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<tr>
<th>Cache Type</th>
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<td>32K</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
</tr>
<tr>
<td>L2</td>
<td>1024K</td>
</tr>
<tr>
<td>L3</td>
<td>11264K</td>
</tr>
</tbody>
</table>

NUMA node0 CPU(s): 0,2,4,6,8,10,12,14
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15

Flags:  
- fpu 
vme 
de 
pse 
tsc 
mrs 
pae 
mce 
cx8 
apic 
sep 
mtrr 
pge 
mca 
cmov 
pat 
pse36 
clfflush 
dts 
acpi 
fxsr 
ssse2 
ss 
ht 
tm 
pbe 
syscall 
nx 
pdpe1gb 
rdtscp 
lm 
constant_tsc 
art 
arch_perfmon 
pebs 
bs 
rep_good 
nop1 
xtopology 
nonstop_tsc 
aperfmon 
eagerfpu 
pni 
pclmulqdq 
dtes64 
monitor 
ds_cpl 
vmx 
smx 
est 
tm2 
ssse3 
ssdbg 
fma 
 cx16 
xtpr 
pcdcm 
pcid 
dca 
ssse4 
ssse4_2 
x2apic 
move 
popcnt 
tsc_deadline_timer 
aes 
xf8 
f16c 
rdrand 
lahf_l1m 
abm 
3dnnowprefetch 
ida 
arat 
epb 
invcpcid_single 
pln 
pts 
dtherm 
intel_pt 
rsb_ctxsw 
spec_ctrl 
retpoline 
kaiser 
trp_shadow 
vmmi 
flexpriority 
ept 
vpid 
fsqsb 
tsc_adjust 
bmi1 
hle 
axv2 
smep 
bsmp 
ems 
invcpcid 
rtm 
cqm 
mpx 
avx512f 
avx512dq 
rdseed 
adx 
smap 
clflushopt 
c1wb 
avx512cd 
avx512bw 
avx512vl 
xsavopt 
xsavec 
xgetbv1 
cqm_1lc 
cqm_occup_1lc 
pku 
ospke

From `/proc/cpuinfo` cache data

```bash
  cache size : 11264 KB
```

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

```bash
  available: 2 nodes (0-1)
  node 0 cpus: 0 2 4 6 8 10 12 14
  node 0 size: 191990 MB
  node 0 free: 187961 MB
  node 1 cpus: 1 3 5 7 9 11 13 15
  node 1 size: 193517 MB
  node 1 free: 189768 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10
```

From `/proc/meminfo`

```bash
  MemTotal:       394760024 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB
```

From `/usr/bin/lsb_release -d`

```bash
  SUSE Linux Enterprise Server 12 SP2
```

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

```bash
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 2
```

(Continued on next page)
Dell Inc.
PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

| SPECspeed2017_fp_base | 59.1 |
| SPECspeed2017_fp_peak | 60.3 |

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

**Platform Notes (Continued)**

# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.

```bash
os-release:
NAME="SLES"
VERSION="12-SP2"
VERSION_ID="12.2"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```
uname -a:
Linux linux-bgfp 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
x86_64 x86_64 x86_64 GNU/Linux
```

```
rlevel 3 Feb 28 17:20
```

SPEC is set to: /home/cpu2017rev5/cpu2017

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<thead>
<tr>
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<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
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<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>405G</td>
<td>59G</td>
<td>347G</td>
<td>15%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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.

**Compiler Version Notes**

```
==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
```

```
==============================================================================
CC   619.lbm_s(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```
## Dell Inc.

PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

<table>
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<th>CPU2017 License</th>
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<th>Test Sponsor</th>
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### SPEC CPU2017 Floating Point Speed Result

<table>
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### Compiler Version Notes (Continued)

---

FC 607.cactuBSSN_s(base)

---

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

FC 607.cactuBSSN_s(peak)

---

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

FC 603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)

---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

---

CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)

---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

(Continued on next page)
## Dell Inc.

PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

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**SPEC CPU2017 Floating Point Speed Result**

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### Compiler Version Notes (Continued)

```
CC    621.wrf_s(peak) 628.pop2_s(peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 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:
- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)
Dell Inc.
PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

SPECspeed2017_fp_base = 59.1
SPECspeed2017_fp_peak = 60.3

Base Optimization Flags (Continued)

C benchmarks (continued):
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

Base Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

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

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

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

Dell Inc.
PowerEdge R740xd (Intel Xeon Silver 4109T, 2.00GHz)

SPECspeed2017_fp_base = 59.1
SPECspeed2017_fp_peak = 60.3

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

Test Date: Feb-2018
Hardware Availability: Sep-2017
Software Availability: Feb-2018

Peak Compiler Invocation (Continued)

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: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

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

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-prefetch
-lipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
-align array32byte

Peak Other Flags

C benchmarks:
-m64 -std=c11

Fortran benchmarks:
-m64

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

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

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: