### Dell Inc.

#### PowerEdge R540 (Intel Xeon Silver 4109T, 2.00 GHz)

<table>
<thead>
<tr>
<th>CPU2017 License</th>
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</tr>
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<td>Dell Inc.</td>
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<td>Nov-2017</td>
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<tr>
<td>Hardware Availability</td>
<td>Sep-2017</td>
</tr>
</tbody>
</table>

#### SPECrate2017_fp_base = 80.3

#### SPECrate2017_fp_peak = Not Run

#### Hardware

- **CPU Name:** Intel Xeon Silver 4109T
- **Max MHz.:** 3000
- **Nominal:** 2000
- **Enabled:** 16 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 chip
- **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 chip
- **Other:** None
- **Memory:** 192 GB (12 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 4.4.21-69-default
- **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:** No
- **Firmware:** Version 1.3.0 released Sep-2017
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None

#### SPECrate2017_fp_base (80.3)
SPEC CPU2017 Floating Point Rate Result

Dell Inc. PowerEdge R540 (Intel Xeon Silver 4109T, 2.00 GHz)

SPECrate2017_fp_base = 80.3
SPECrate2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>32</td>
<td>1120</td>
<td>287</td>
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<td>295</td>
<td>1091</td>
<td>294</td>
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<tr>
<td>507.cactuBSSN_r</td>
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<td>615</td>
<td>65.9</td>
<td>615</td>
<td>65.8</td>
<td>615</td>
<td>65.8</td>
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<tr>
<td>508.namd_r</td>
<td>32</td>
<td>570</td>
<td>53.4</td>
<td>570</td>
<td>53.3</td>
<td>571</td>
<td>53.2</td>
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<tr>
<td>510.parest_r</td>
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<td>1473</td>
<td>56.8</td>
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<tr>
<td>511.povray_r</td>
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<td>86.3</td>
<td>864</td>
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<tr>
<td>519.lbm_r</td>
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<td>521.wrf_r</td>
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<td>777</td>
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<td>781</td>
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<td>73.6</td>
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<tr>
<td>527.cam4_r</td>
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<td>538.imagick_r</td>
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<td>756</td>
<td>105</td>
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<tr>
<td>544.nab_r</td>
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<td>92.5</td>
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<td>92.3</td>
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<tr>
<td>549.fotonik3d_r</td>
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<td>84.6</td>
<td>1473</td>
<td>84.6</td>
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<tr>
<td>554.roms_r</td>
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<td>1043</td>
<td>48.8</td>
<td>1055</td>
<td>48.2</td>
<td>1054</td>
<td>48.3</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

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:

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4
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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
SPEC CPU2017 Floating Point Rate Result

Dell Inc.

PowerEdge R540 (Intel Xeon Silver 4109T, 2.00 GHz)

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SPECrade2017_fp_base = 80.3

SPECrade2017_fp_peak = Not Run

Platform Notes

BIOS settings:
- Logical Processor Enabled
- Virtualization Technology Disabled
- Sub NUMA Cluster Enabled
- System Profile set to Custom
- CPU Performance set to Maximum Performance
- C1E Disabled
- C States set to Autonomous
- Uncore Frequency set to Dynamic
- Memory Patrol Scrub Disabled
- Energy Efficiency Policy set to Performance
- CPU Interconnect Bus Link Power Management Disabled
- Sysinfo program /root/cpu2017/bin/sysinfo
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
- running on linux-oq9t Tue Nov 14 23:18:40 2017

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)
  32 "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: 16
  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): 32
- On-line CPU(s) list: 0-31
- Thread(s) per core: 2
- 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

(Continued on next page)
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**SPECrate2017_fp_base = 80.3**

**SPECrate2017_fp_peak = Not Run**

---

**Platform Notes (Continued)**

```plaintext
CPU MHz: 1995.407
BogoMIPS: 3990.81
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
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 acpi mmx mmxext ss sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmprefetch eagerfpunpi pclmulqdq dtel64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcmdca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vmmfocus cx16 xtpr pdcm pcmdca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
nerms invpcid rtm clmep cpl mxsaveopt21 msse3 sdbg clflushopt clwb avx512f avx512dq
rdseed adx smap clflushopt clwb avx512cd avx512bw avx512v1 xsaves opt xgetbv1 cqm_llc cqm_occup_llc
```

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
- node 0 size: 96285 MB
- node 0 free: 95827 MB
- node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31
- node 1 size: 96736 MB
- node 1 free: 96289 MB

From `/proc/meminfo`

- MemTotal: 1976542800 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/usr/bin/lsb_release -d`

- SUSE Linux Enterprise Server 12 SP2

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

- SuSE-release: SUSE Linux Enterprise Server 12 (x86_64)
## Platform Notes (Continued)

```
VERSION = 12
PATCHLEVEL = 2
# 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.

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-oq9t 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)
  x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Nov 14 17:20

SPEC is set to: /root/cpu2017
  Filesystem  Type  Size  Used  Avail  Use% Mounted on
  /dev/sda2   xfs   301G   51G  250G  17%  /
```

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. 1.2.9 10/06/2017
Memory:
  12x 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666, configured at 2400
  4x Not Specified Not Specified

(End of data from sysinfo program)

## Compiler Version Notes

```
==============================================================================
  CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
==============================================================================
  icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
  CXXC 508.namd_r(base) 510.parest_r(base)
```

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

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CC  511.povray_r(base) 526.blender_r(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
FC  507.cactuBSSN_r(base)
==============================================================================
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (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  503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
==============================================================================
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CC  521.wrf_r(base) 527.cam4_r(base)
==============================================================================
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
iccc

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# SPEC CPU2017 Floating Point Rate Result

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**Test Date:** Nov-2017  
**Hardware Availability:** Sep-2017  
**Software Availability:** Sep-2017

## Base Compiler Invocation (Continued)

C++ benchmarks:
- `icpc`

Fortran benchmarks:
- `ifort`

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

Benchmarks using both C and C++:
- `icpc icc`

Benchmarks using Fortran, C, and C++:
- `icpc icc ifort`

## Base Portability Flags

- 503.bwaves_r: `-DSPEC_LP64`
- 507.cactuBSSN_r: `-DSPEC_LP64`
- 508.namd_r: `-DSPEC_LP64`
- 510.parest_r: `-DSPEC_LP64`
- 511.povray_r: `-DSPEC_LP64`
- 519.lbm_r: `-DSPEC_LP64`
- 521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- 526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
- 527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
- 538.imagick_r: `-DSPEC_LP64`
- 544.nab_r: `-DSPEC_LP64`
- 549.fotonik3d_r: `-DSPEC_LP64`
- 554.roms_r: `-DSPEC_LP64`

## Base Optimization Flags

C benchmarks:
- `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

C++ benchmarks:
- `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

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Base Optimization Flags (Continued)

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

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

Benmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

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

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

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

Benmarks using both C and C++:
-m64 -std=c11

Benmarks 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:
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Tested with SPEC CPU2017 v1.0.2 on 2017-11-14 10:18:40-0500.
Originally published on 2017-12-26.