Dell Inc.
PowerEdge R940
(Intel Xeon Gold 6126, 2.60 GHz)

Dell Inc.

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

Test Date: Oct-2017
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Threads

<table>
<thead>
<tr>
<th>Name</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>48</td>
<td>141</td>
<td>139</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>48</td>
<td>78</td>
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<tr>
<td>619.lbm_s</td>
<td>48</td>
<td>191</td>
<td>191</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>48</td>
<td>262</td>
<td>262</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>48</td>
<td>103</td>
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<tr>
<td>628.pop2_s</td>
<td>48</td>
<td>54</td>
<td>54</td>
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<tr>
<td>638.imagick_s</td>
<td>48</td>
<td>107</td>
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<tr>
<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>48</td>
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<tr>
<td>654.roms_s</td>
<td>48</td>
<td>204</td>
<td>204</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: Intel Xeon Gold 6126
Max MHz.: 3700
Nominal: 2600
Enabled: 48 cores, 4 chips
Orderable: 2,4 chip
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB L+D on chip per core
L3: 19.25 MB L+D on chip per core
Other: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Storage: 1 x 900 GB 15K RPM SAS12
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++
Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux:
Firmware: Version 1.1.7 released Sep-2017
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
SPEC CPU2017 Floating Point Speed Result

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PowerEdge R940
(Intel Xeon Gold 6126, 2.60 GHz)

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Software Availability: Sep-2017

SPECspeed2017_fp_base = 139
SPECspeed2017_fp_peak = 141

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td><strong>97.7</strong></td>
<td><strong>171</strong></td>
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<td>96.1</td>
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<td><strong>85.8</strong></td>
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<td>85.1</td>
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<td>628.pop2_s</td>
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<td>66.8</td>
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<td>66.9</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>112</td>
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<td><strong>82.5</strong></td>
<td><strong>191</strong></td>
<td>48</td>
<td>81.9</td>
<td>192</td>
<td><strong>77.0</strong></td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 139
SPECspeed2017_fp_peak = 141

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"
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 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

Platform Notes

BIOS settings:
Logical Processor Disabled
Virtualization Technology Disabled
Sub NUMA Cluster Disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C1E Disabled
C States set to Autonomous
Uncore Frequency set to Dynamic

(Continued on next page)
Dell Inc.
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SPEC CPU2017 Floating Point Speed Result
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SPECspeed2017_fp_peak = 141
SPECspeed2017_fp_base = 139

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Platform Notes (Continued)

Memory Patrol Scrub Disabled
Energy Efficiency Policy set to Performance
CPU Interconnect Bus Link Power Management Disabled
PCI ASPM L1 Link Power Management Disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b091c0f
running on linux-92x1 Wed Oct 25 20:36:42 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) Gold 6126 CPU @ 2.60GHz
  4 "physical id"s (chips)
  48 "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 3 4 5 6 8 9 10 11 12 13
physical 1: cores 0 1 3 4 5 6 8 9 10 11 12 13
physical 2: cores 0 1 3 4 5 6 8 9 10 11 12 13
physical 3: cores 0 1 3 4 5 6 8 9 10 11 12 13
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 1
Core(s) per socket: 12
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6126 CPU @ 2.60GHz
Stepping: 4
CPU MHz: 2593.917
BogoMIPS: 5187.83
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
```

(Continued on next page)
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Platform Notes (Continued)

NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47

Flags: fpu vme de pse tsc msr pae mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpes1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerfpupi 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 abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
ermr invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsaves vec xgetbv1 cqm_1lc cqm_occup_llc

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

/proc/cpuinfo cache data
    cache size : 19712 KB

From /proc/meminfo
    MemTotal: 791224416 kB
    HugePages_Total: 0
    Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
    SUSE Linux Enterprise Server 12 SP2

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Dell Inc.
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SPECspeed2017_fp_base = 139
SPECspeed2017_fp_peak = 141

Platform Notes (Continued)

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  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-92x1 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 Oct 25 15:26

SPEC is set to: /home/cpu2017
  Filesystem    Type  Size  Used Avail Use% Mounted on
  /dev/sda4      xfs   796G   17G  779G   3% /home

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. 1.1.7 08/10/2017
  Memory:
    48x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th></th>
<th>619.lbm_s(base)</th>
<th>638.imagick_s(base, peak)</th>
<th>644.nab_s(base, peak)</th>
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</thead>
<tbody>
<tr>
<td>ICC</td>
<td>18.0.0 20170811</td>
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</tr>
<tr>
<td>Copyright</td>
<td>1985-2017 Intel Corporation. All rights reserved.</td>
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SPEC CPU2017 Floating Point Speed Result

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PowerEdge R940
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SPECspeed2017_fp_base = 139
SPECspeed2017_fp_peak = 141

Compiler Version Notes (Continued)

---

CC  619.lbm_s(peak)
---

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

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.

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## Dell Inc. PowerEdge R940 (Intel Xeon Gold 6126, 2.60 GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

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

### Compiler Version Notes (Continued)

```plaintext
copyright (Icc) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```plaintext
CC 621.wrf_s (peak) 628.pop2_s (peak)
```

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

```plaintext
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`
- `638.imagick_s: -DSPEC_LP64`
- `644.nab_s: -DSPEC_LP64`
- `649.fotonik3d_s: -DSPEC_LP64`
- `654.roms_s: -DSPEC_LP64`
Dell Inc.
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<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
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<tr>
<td>SPECspeed2017_fp_peak</td>
<td>141</td>
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</tbody>
</table>

CPU2017 License: 55
Test Sponsor: Dell Inc.
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### Base Optimization Flags

C benchmarks:
- -xCORE-AVX512
- -ipo
- -O3
- -no-prec-div
- -qopt-prefetch
- -ffinite-math-only
- -qopt-mem-layout-trans=3
- -qopenmp
- -DSPEC_OPENMP

Fortran benchmarks:
- -DSPEC_OPENMP
- -xCORE-AVX512
- -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-AVX512
- -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-AVX512
- -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

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Dell Inc.  
PowerEdge R940  
(Intel Xeon Gold 6126, 2.60 GHz)

Peak Compiler Invocation (Continued)

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:  
-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=3 -DSPEC_SUPPRESS_OPENMP -qopenmp  
-DSPEC_OPENMP

638.imagick_s:  
-xCORE-AVX512 -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-AVX512 -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-AVX512  
-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-AVX512 -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-AVX512 -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

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
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml