## SPEC CPU® 2017 Floating Point Speed Result

**Hewlett Packard Enterprise**
*(Test Sponsor: HPE)*

**ProLiant DL360 Gen10**
*(2.10 GHz, Intel Xeon Silver 4116)*

### SPECspeed® 2017_fp_base = 76.4

### SPECspeed® 2017_fp_peak = Not Run

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed® 2017_fp_base (76.4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s 24</td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s 24</td>
<td>98.0</td>
</tr>
<tr>
<td>619.lbm_s 24</td>
<td>36.1</td>
</tr>
<tr>
<td>621.wrf_s 24</td>
<td>57.0</td>
</tr>
<tr>
<td>627.cam4_s 24</td>
<td>48.7</td>
</tr>
<tr>
<td>628.pop2_s 24</td>
<td>51.7</td>
</tr>
<tr>
<td>638.imagick_s 24</td>
<td>60.1</td>
</tr>
<tr>
<td>644.nab_s 24</td>
<td>107</td>
</tr>
<tr>
<td>649.fotonik3d_s 24</td>
<td>69.8</td>
</tr>
<tr>
<td>654.roms_s 24</td>
<td>80.7</td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Silver 4116  
**Max MHz:** 3000  
**Nominal:** 2100  
**Enabled:** 24 cores, 2 chips  
**Orderable:** 1, 2 chip(s)  
**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:** 192 GB (24 x 8 GB 2Rx8 PC4-2666V-R, running at 2400)  
**Storage:** 1 x 600 GB SATA SSD, RAID 0  
**Other:** None

### Software

**OS:** Red Hat Enterprise Linux Server release 7.3 (Maipo)  
**Kernel:** 3.10.0-514.el7.x86_64  
**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:** HPE BIOS Version U32 released Oct-2017 (tested with U32 9/29/2017)  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** Not Applicable  
**Other:** None  
**Power Management:** --
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Ratio</th>
<th>Peak Seconds</th>
<th>Ratio</th>
<th>Base Seconds</th>
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<td>69.8</td>
<td>131</td>
<td>69.6</td>
<td>131</td>
<td>69.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
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<td>80.9</td>
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<td></td>
<td></td>
</tr>
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RESULTS

SPECspeed®2017_fp_base = 76.4
SPECspeed®2017_fp_peak = Not Run

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
Transparent Huge Pages enabled by default
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
irqbalance disabled with "systemctl stop irqbalance"
tuned profile set with "tuned-adm profile throughput-performance"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=core,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/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

Platform Notes

BIOS Configuration:
Intel Hyperthreading set to Disabled
Thermal Configuration set to Maximum Cooling
LLC Prefetcher set to Enabled
LLC Dead Line Allocation set to Disabled
Stale A to S set to Disabled
Memory Patrol Scrubbing set to disabled

(Continued on next page)
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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE

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**Platform Notes (Continued)**

Workload Profile set to General Peak Frequency Compute  
Energy/Performance Bias set to Maximum Performance  
Workload Profile set to Custom  
NUMA Group Size Optimization set to Flat  
Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on DL360G10 Thu Oct 12 10:49:32 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:

```plaintext
model name : Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
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:

```plaintext
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
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
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
Stepping: 4
CPU MHz: 2100.000
BogoMIPS: 4205.21
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
```

(Continued on next page)
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Platform Notes (Continued)

/proc/cpuinfo cache data
  cache size : 16896 KB

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

From /proc/meminfo
  MemTotal:  197750684 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.3 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="7.3"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
    ANSI_COLOR="0;31"
    CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
  redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
  system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

uname -a:
  Linux DL360G10 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016 x86_64 x86_64 GNU/Linux
run-level 3 Oct 12 02:28

SPEC is set to: /home/cpu2017
  Filesystem       Type  Size  Used  Avail  Use% Mounted on
  /dev/mapper/rhel_dl360g10-home xfs   504G 37G  467G   8% /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 HPE U32 09/29/2017
  Memory:
    24x UNKNOWN NOT AVAILABLE 8 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)
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**Compiler Version Notes**

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**C**  
| 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base) |
---

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

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**C++, C, Fortran**  
| 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.

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**Fortran**  
| 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.

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**Fortran, C**  
| 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base) |
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**ifort (IFORT) 18.0.0 20170811**  
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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)
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Test Date: Oct-2017
Hardware Availability: Oct-2017
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Base Compiler Invocation (Continued)

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
-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
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**SPECspeed®2017_fp_peak = Not Run**

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**Test Date:** Oct-2017  
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---

### 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++:
- \(-m64 -std=c11\)

---

The flags files that were used to format this result can be browsed at:
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.html](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.html)

You can also download the XML flags sources by saving the following links:
- [http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revD.xml)

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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