Hewlett Packard Enterprise
(Tel Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Gold 6152)

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

<table>
<thead>
<tr>
<th>Threads</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>44</td>
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<tr>
<td>619.lbm_s</td>
<td>44</td>
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<tr>
<td>621.wrf_s</td>
<td>44</td>
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<tr>
<td>627.cam4_s</td>
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<tr>
<td>628.pop2_s</td>
<td>44</td>
</tr>
<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>44</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>44</td>
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| SPECspeed2017_fp_peak = Not Run |

**Hardware**

- **CPU Name:** Intel Xeon Gold 6152
- **Max MHz.:** 3700
- **Nominal:** 2100
- **Enabled:** 44 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:** 30.25 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 1 x 480 GB SATA SSD, RAID 0
- **Other:** None

**Software**

- **OS:** Red Hat Enterprise Linux Server release 7.4 (Maipo)
- **Kernel:** 3.10.0-693.el7.x86_64
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++
- **Fortran:** Version 18.0.0.128 of Intel Fortran
- **Compiler for Linux:**
- **Parallel:** Yes
- **Firmware:** HPE BIOS Version I41 released Nov-2017 (tested with I41 11/14/2017)
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
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Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
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<td>209</td>
<td>83.6</td>
<td>209</td>
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<td>114</td>
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<td>116</td>
<td>137</td>
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<td>136</td>
<td>116</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 111
SPECspeed2017_fp_peak = Not Run

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"
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:/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 Prefetch set to Enabled
    LLC Dead Line Allocation set to Disabled
    Memory Patrol Scrubbing set to Disabled
    Workload Profile set to General Peak Frequency Compute
    Energy/Performance Bias set to Maximum Performance

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

### Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant BL460c Gen10**  
**CPU 2017 License:** 3  
**Hardware Availability:** Nov-2017  
**Test Date:** Dec-2017  
**Software Availability:** Sep-2017  
**Tested by:** HPE

### SPECspeed2017_fp_base = 111

### SPECspeed2017_fp_peak = Not Run

### Platform Notes (Continued)

**Workload Profile set to Custom**

**NUMA Group Size Optimization set to Flat**

Sysinfo program: /home/cpu2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b091c0f

running on BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_R

Wed Dec 6 15:06:08 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) Gold 6152 CPU @ 2.10GHz
  2 "physical id"s (chips)
  44 "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 : 22
siblings : 22
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27 28
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                44
On-line CPU(s) list:   0-43
Thread(s) per core:    1
Core(s) per socket:    22
Socket(s):             2
NUMA node(s):          2
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Gold 6152 CPU @ 2.10GHz
Stepping:              4
CPU MHz:               2100.000
BogoMIPS:              4200.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              30976K
NUMA node0 CPU(s):     0-21
NUMA node1 CPU(s):     22-43
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
```

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

```
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpelnge rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperf perf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 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 epb cat_13 cdp_13 intel_pt
trp_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb
avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cmq_llc cmq_occmap_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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
node 0 size: 97963 MB
node 0 free: 92856 MB
node 1 cpus: 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
node 1 size: 98303 MB
node 1 free: 94802 MB
node distances:
node  0   1
0:  10  21
1:  21  10
```

From `/proc/meminfo`
```
MemTotal:  197747656 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

From `/etc/*release* /etc/*version*`
```
os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.4 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.4"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server
```

```
uname -a:
```

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CPU2017 License: 3
Test Sponsor: HPE
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Test Date: Dec-2017
Hardware Availability: Nov-2017
Software Availability: Sep-2017

Platform Notes (Continued)

Linux BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_R
3.10.0-693.el7.x86_64 #1 SMP Thu Jul 6 19:56:57 EDT 2017 x86_64 x86_64 x86_64
GNU/Linux

run-level 3 Dec 6 12:28

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb4 xfs 442G 55G 388G 13% /

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 141 11/14/2017
Memory:
4x UNKNOWN NOT AVAILABLE
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666

(End of data from sysinfo program)
Regarding the sysinfo display about the memory installed, the correct amount of memory is 192 GB and the dmidecode description should have one line reading as:
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666 MHz

Compiler Version Notes

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

ifort (IFORT) 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
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**Base Optimization Flags**

C benchmarks:
-xCORE-AVX2  -ipo  -03  -no-prec-div  -qopt-prefetch  -ffinite-math-only  
-qopt-mem-layout-trans=3  -qopenmp  -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP  -xCORE-AVX2  -ipo  -03  -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  -03  -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  -03  -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

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

Tested with SPEC CPU2017 v1.0.2 on 2017-12-06 16:06:08-0500.