## SPEC CPU®2017 Floating Point Speed Result

### Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen10 Plus
(2.20 GHz, Intel Xeon Platinum 8352S)

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

### Hardware

<table>
<thead>
<tr>
<th>Thread</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>251</td>
<td>251</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>147</td>
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<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>204</td>
<td>204</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>155</td>
<td>155</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>83.0</td>
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</tr>
<tr>
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<td>193</td>
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<tr>
<td>638.imagick_s</td>
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<td>379</td>
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</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>276</td>
<td>276</td>
</tr>
</tbody>
</table>

### Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
Kernel 4.18.0-240.el8.x86_64

**Compiler:**  
C/C++: Version 2021.1 of Intel oneAPI DPC++/C++  
Compiler Build 20201113 for Linux  
Fortran: Version 2021.1 of Intel Fortran Compiler  
Classic Build 20201112 for Linux  
C/C++: Version 2021.1 of Intel C/C++ Compiler  
Classic Build 20201112 for Linux

**Parallel:** Yes

**Firmware:** HPE BIOS Version U46 v1.42 05/26/2021 released May-2021

**File System:** xfs

**System State:** Run level 3 (multi-user)

**Base Pointers:** 64-bit

**Peak Pointers:** 64-bit

**Other:** jemalloc memory allocator V5.0.1

**Power Management:** BIOS set to prefer performance at the cost of additional power usage

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**Test Date:** Jun-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Jun-2021

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**CPU Name:** Intel Xeon Platinum 8352S  
**Max MHz:** 3400  
**Nominal:** 2200  
**Enabled:** 64 cores, 2 chips  
**Orderable:** 1, 2 chip(s)  
**Cache L1:** 32 KB I + 48 KB D on chip per core  
**L2:** 1.25 MB I+D on chip per core  
**L3:** 48 MB I+D on chip per chip  
**Other:** None  
**Memory:** 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R)  
**Storage:** 1 x 800 GB SAS SSD, RAID 0  
**Other:** None
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<td>210</td>
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### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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<td>730</td>
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<td>736</td>
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<td>251</td>
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<td>619.ibm_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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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
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
```bash
sync; echo 3 > /proc/sys/vm/drop_caches
```

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:
```
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
NA: 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.
jemalloc, a general purpose malloc implementation built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

(Continued on next page)
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SPECspeed®2017_fp_base = 210
SPECspeed®2017_fp_peak = 212

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<th>Test Date:</th>
<th>Jun-2021</th>
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<td>Hardware Availability:</td>
<td>Jun-2021</td>
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<tr>
<td>HPE</td>
<td>Tested by:</td>
<td>HPE</td>
</tr>
<tr>
<td></td>
<td>Software Availability:</td>
<td>Jun-2021</td>
</tr>
</tbody>
</table>

General Notes (Continued)


Submitted_by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 21 10:25:54 EDT 2021
Submission: cpu2017-20210621-27563.sub

Platform Notes

The system ROM used for this result contains Intel microcode version 0xd0002a0 for the Intel Xeon Platinum 8352S processor

BIOS Configuration:
Workload Profile set to General Peak Frequency Compute
Intel Hyper-Threaded set to Disabled
Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
Advanced Memory Protection set to Advanced ECC
Last Level Cache (LLC) Prefetch set to Enabled
Last Level Cache (LLC) Dead Line Allocation set to Disabled
Enhanced Processor Performance set to Enabled
Workload Profile set to Custom
   Energy/Performance Bias set to Balanced Power
   DCU Stream Prefetcher set to Disabled
   Adjacent Sector Prefetch set to Disabled
   Minimum Processor Idle Power Package C-State set to No Package State
   Numa Group Size Optimization set to Flat

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55b5589ef0e16aca64d
running on localhost.localdomain Thu Jun 17 13:35:53 2021

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) Platinum 8352S CPU @ 2.20GHz
  2 "physical id"s (chips)
  64 "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 : 32
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

(Continued on next page)
Platform Notes (Continued)

From `lscpu` from `util-linux 2.32.1`:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8352S CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2296.480
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmrperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrm pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd
mba ibrs ibpg stibp ibrs enhanced tpr_shadow vmni flexpriority ept vpid ept_ad
fs签字 tsc_adjust bmi1 hle avx2 smep bmi2 ersed crq mda xenvcpid cm qrd_t_a avx512f avx512dq
rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw
avx512vl xsaveopt xsaves x Cobra xgetbv1 xsavecr qmem qcm_occup_llc qcm_mbb_total
qmm_mbb_local split_lock_detect wbnoinvd dtherm ida arat pin pts avx512vbmim ump pku
ospke avx512_vbmi2 gfnv vaes vpcmulqdq avx512_vnni avx512_bitalg tme
avx512_vpopcntdq la57 rdpid md_clear pconfi g flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 49152 KB

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 22 23 24 25 26 27
    28 29 30 31

(Continued on next page)
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**Test Sponsor:** HPE
**Tested by:** HPE
**Test Date:** Jun-2021
**Hardware Availability:** Jun-2021
**Software Availability:** Jun-2021

### Platform Notes (Continued)

- **node 0 size:** 972702 MB
- **node 0 free:** 1025089 MB
- **node 1 cpus:** 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
  57 58 59 60 61 62 63
- **node 1 size:** 972193 MB
- **node 1 free:** 1030881 MB
- **node distances:**
  - **node 0:** 10 20
  - **node 1:** 20 10

From `/proc/meminfo`
- **MemTotal:** 2113488852 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

```
/sbin/tuned-adm active
  Current active profile: throughput-performance
```

From `/etc/*release*` /`/etc/*version*`
```
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.3 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.3"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
  ANSI_COLOR="0;31"
```
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

```
uname -a:
  Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
  x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2018-12207 (iTLB Multihit):** Not affected
- **CVE-2018-3620 (L1 Terminal Fault):** Not affected
- **Microarchitectural Data Sampling:** Not affected
- **CVE-2017-5754 (Meltdown):** Not affected
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: usercopy/swapgs

(Continued on next page)
Platform Notes (Continued)

barriers and __user pointer sanitization
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 17 09:36

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel00-home xfs 670G 122G 549G 19% /home

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL360 Gen10 Plus
Product Family: ProLiant
Serial: CN701108CK

Additional information from dmidecode 3.2 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.

Memory:
32x Micron 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200

BIOS:
BIOS Vendor: HPE
BIOS Version: U46
BIOS Date: 05/26/2021
BIOS Revision: 1.42
Firmware Revision: 2.50

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C | 619.lbm_s(base, peak) 638.imagick_s(base, peak) |
|   | 644.nab_s(base) |
==============================================================================

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

(Continued on next page)
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Software Availability: Jun-2021

Compiler Version Notes (Continued)

==============================================================================

C               |  644.nab_s(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================

C               |  619.lbm_s(base, peak)  638.imagick_s(base, peak)
              |  644.nab_s(base)

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
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==============================================================================

C++, C, Fortran |  607.cactuBSSN_s(base, peak)

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================

Fortran         |  603.bwaves_s(base, peak)  649.fotonik3d_s(base, peak)
              |  654.roms_s(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
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Compiler Version Notes (Continued)

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

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:
-m64 -std=c11 -xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -03
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc

644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort
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**Tested by:** HPE

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**Peak Portability Flags**

Same as Base Portability Flags

---

**Peak Optimization Flags**

**C benchmarks:**

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
   -flto -mfpmath=sse -funroll-loops -fiopenmp
   -DSPEC_OPENMP -qopt-mem-layout-trans=4
   -fimf-accuracy-bits=14:sqrt
   -mbranches-within-32B-boundaries
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**Fortran benchmarks:**

603.bwaves_s: basepeak = yes

649.fotonik3d_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
   -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
   -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
   -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
   -mbranches-within-32B-boundaries
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

654.roms_s: basepeak = yes

**Benchmarks using both Fortran and C:**

621.wrf_s: basepeak = yes

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

**Benchmarks using Fortran, C, and C++:**

607.cactuBSSN_s: basepeak = yes
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL360 Gen10 Plus  
(2.20 GHz, Intel Xeon Platinum 8352S)  

SPECspeed®2017_fp_base = 210  
SPECspeed®2017_fp_peak = 212

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

Test Date: Jun-2021  
Hardware Availability: Jun-2021  
Software Availability: Jun-2021

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revC.html  

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-ICX-revC.xml  
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.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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