## SPEC CPU®2017 Floating Point Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
Synergy 480 Gen10 Plus  
(2.80 GHz, Intel Xeon Gold 6342)

### SPECrate®2017_fp_base = 361  
SPECrate®2017_fp_peak = 377

<table>
<thead>
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<th>CPU2017 License:</th>
<th>3</th>
<th>Test Date:</th>
<th>Jan-2022</th>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
<td>Hardware Availability:</td>
<td>Nov-2021</td>
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<td>Tested by:</td>
<td>HPE</td>
<td>Software Availability:</td>
<td>Dec-2020</td>
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</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6342  
- **Max MHz:** 3500  
- **Nominal:** 2800  
- **Enabled:** 48 cores, 2 chips, 2 threads/core  
- **Orderable:** 1, 2 chip(s)  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **Cache L2:** 1.25 MB I+D on chip per core  
- **Cache L3:** 36 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

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
- **Kernel:** 4.18.0-240.el8.x86_64  
- **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;  
- **Parallel:** No  
- **Firmware:** HPE BIOS Version I44 v1.54 11/03/2021 released Nov-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  

(Continued on next page)
## Results Table

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</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"
- 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
  ```

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

- `LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
- `MALLOC_CONF = "retain:true"`
Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 480 Gen10 Plus
(2.80 GHz, Intel Xeon Gold 6342)

**SPEC CPU®2017 Floating Point Rate Result**
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

---

**General Notes**

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Red Hat Enterprise Linux 8.1
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

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

Submitted_by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jan 17 23:53:15 EST 2022
Submission: cpu2017-20220117-30783.sub

---

**Platform Notes**

BIOS Configuration:
Workload Profile set to General Throughput Compute
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
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
DCU Stream Prefetcher set to Disabled
XPT Remote Prefetcher set to Enabled
Energy/Performance Bias set to Balanced Performance

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec091b55891ef0e6accafc64d
running on localhost.localdomain Fri Jan 14 02:32:33 2022

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 6342 CPU @ 2.80GHz
  2 "physical id"s (chips)
  96 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following

(Continued on next page)
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Platform Notes (Continued)

excerpts from /proc/cpuinfo might not be reliable. Use with caution.

cpu cores : 24
siblings : 48
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
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

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):              96
On-line CPU(s) list: 0-95
Thread(s) per core:  2
Core(s) per socket:  24
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Gold 6342 CPU @ 2.80GHz
Stepping:            6
CPU MHz:             2282.630
CPU max MHz:         3500.0000
CPU min MHz:         800.0000
BogoMIPS:            5600.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            36864K
NUMA node0 CPU(s):   0-23,48-71
NUMA node1 CPU(s):   24-47,72-95
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 art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrunc 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_13 invpcid_single ssbd
mba ibrs ibpb ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid ept_ad
fs跬gsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid cmip rdtd_a avx512f avx512d
q rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512vd avx512bw
avx512vl xsaveopt xsaveopt xsave xmxsave xmmsave cmip_llc cmip_occupy_llc cmip_mb_total
cmip_mb_local split_lock_detect wbinvd dtherm ida arat pln pts hwlp_act_window
hwlp_pkg_req avx512vbm ripk kpu ospke avx512_vbm xfnv vaes vpcmulqdq avx512_vnni
avx512_balga tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
arch_capabilities

(Continued on next page)
Platform Notes (Continued)

/proc/cpuinfo cache data
  cache size : 36864 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 48 49 50 51
  52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 0 size: 966664 MB
node 0 free: 1030758 MB
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 72
  73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
node 1 size: 971262 MB
node 1 free: 1031489 MB
node distances:
node   0   1
0:  10  20
1:  20  10

From /proc/meminfo
  MemTotal:    2113481460 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

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

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has 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

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Platform Notes (Continued)

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): Mitigation: Speculative Store
CVE-2018-3639 (Speculative Store Bypass): Bypass disabled via prctl and
Microarchitectural Data Sampling: Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapsgs
CVE-2017-5715 (Spectre variant 2): barriers and __user pointer
CVE-2020-0543 (Special Register Buffer Data Sampling): Mitigation: Enhanced IBRS, IBPB:
sanitization
CVE-2019-11135 (TSX Asynchronous Abort): conditional, RSB filling
CVE-2018-12207 (iTLB Multihit): Not affected

run-level 3 Jan 14 02:29

SPEC is set to: /home/cpu2017
From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: Synergy 480 Gen10 Plus
Product Family: Synergy
Serial: CN70330Q5F

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: I44
BIOS Date: 11/03/2021
BIOS Revision: 1.54
Firmware Revision: 2.50

(End of data from sysinfo program)
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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C++
| 508.namd_r(base, peak) 510.parest_r(base, 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++, C
| 511.povray_r(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.

C++, C
| 511.povray_r(base) 526.blender_r(base, peak)

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Compiler Version Notes (Continued)

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
-----------------------------------------------------------------------------------
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)
-----------------------------------------------------------------------------------
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, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
-----------------------------------------------------------------------------------
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.
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
Synergy 480 Gen10 Plus  
(2.80 GHz, Intel Xeon Gold 6342)  
SPECrate®2017_fp_base = 361  
SPECrate®2017_fp_peak = 377

CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE  
Test Date: Jan-2022  
Hardware Availability: Nov-2021  
Software Availability: Dec-2020

Base Compiler Invocation

C benchmarks:  
icx

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

Benchmarks using both Fortran and C:  
ifort icx

Benchmarks using both C and C++:  
icpx icx

Benchmarks using Fortran, C, and C++:  
icpx icx 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:  
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-fflat -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)
Hewlett Packard Enterprise

Test Sponsor: HPE

Synergy 480 Gen10 Plus (2.80 GHz, Intel Xeon Gold 6342)

SPEC CPU®2017 Floating Point Rate Result

**SPECrate®2017_fp_base = 361**

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**Base Optimization Flags (Continued)**

**C++ benchmarks:**
- \(-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto\)
- \(-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4\)
- \(-mbranches-within-32B-boundaries -ljemalloc\)
- \(-L/usr/local/jemalloc64-5.0.1/lib\)

**Fortran benchmarks:**
- \(-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div\)
- \(-qopt-prefetch -ffinite-math-only\)
- \(-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4\)
- \(-nostandard-realloc-lhs -align array32byte -auto\)
- \(-mbranches-within-32B-boundaries -ljemalloc\)
- \(-L/usr/local/jemalloc64-5.0.1/lib\)

**Benchmarks using both Fortran and C:**
- \(-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math\)
- \(-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo\)
- \(-no-prec-div -qopt-prefetch -ffinite-math-only\)
- \(-qopt-multiple-gather-scatter-by-shuffles\)
- \(-mbranches-within-32B-boundaries -nostandard-realloc-lhs\)
- \(-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib\)

**Benchmarks using both C and C++:**
- \(-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math\)
- \(-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4\)
- \(-mbranches-within-32B-boundaries -ljemalloc\)
- \(-L/usr/local/jemalloc64-5.0.1/lib\)

**Benchmarks using Fortran, C, and C++:**
- \(-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math\)
- \(-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3\)
- \(-no-prec-div -qopt-prefetch -ffinite-math-only\)
- \(-qopt-multiple-gather-scatter-by-shuffles\)
- \(-mbranches-within-32B-boundaries -nostandard-realloc-lhs\)
- \(-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib\)

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**Peak Compiler Invocation**

**C benchmarks:**
- icx

**C++ benchmarks:**
- icpx

(Continued on next page)
Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
511.povray_r: icpc icc
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes

C++ benchmarks:
508.namd_r: basepeak = yes

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
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Peak Optimization Flags (Continued)

Fortran benchmarks:
503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

549.fotonik3d_r: basepeak = yes
554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:
521.wrf_r: basepeak = yes
527.cam4_r: basepeak = yes

Benchmarks using both C and C++:
511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:
507.cactuBSSN_r: basepeak = yes

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-revE.html
http://www.spec.org/cpu2017(flags/Intel-ic2021-official-linux64_revA.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-revE.xml
http://www.spec.org/cpu2017(flags/Intel-ic2021-official-linux64_revA.xml
### SPEC CPU®2017 Floating Point Rate Result

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

Tested with SPEC CPU®2017 v1.1.8 on 2022-01-13 16:02:32-0500.  
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