## SPEC CPU®2017 Integer Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
Synergy 480 Gen10 Plus  
(3.00 GHz, Intel Xeon Gold 6354)

<table>
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<th>Threads</th>
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### Hardware
- **CPU Name**: Intel Xeon Gold 6354  
- **Max MHz**: 3600  
- **Nominal**: 3000  
- **Enabled**: 36 cores, 2 chips, 2 threads/core  
- **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**: 39 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  
- **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;  
- **Parallel**: Yes  
- **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 and OS set to prefer performance at the cost of additional power usage

---

**CPU2017 License**: 3  
**Test Sponsor**: HPE  
**Tested by**: HPE  
**Test Date**: Dec-2021  
**Hardware Availability**: Nov-2021  
**Software Availability**: Dec-2020
Hewlett Packard Enterprise
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CPU2017 License: 3
Test Sponsor: HPE
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Results Table

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<td>24.1</td>
<td></td>
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</table>

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
Filesysten page cache synced and cleared with:
  sync; echo 3> /proc/sys/vm/drop_caches
  Tuned-adm profile was set to throughput-performance using "tuned-adm profile throughput-performance"
  Cpupower Frequency was set to performance using "cpupower frequency-set -g performance"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
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.

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

**General Notes (Continued)**

jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

Submitted by: "Bucek, James" <james.bucek@hpe.com>  
Submitted: Wed Jan 12 10:02:51 EST 2022  
Submission: cpu2017-20220103-30716.sub

**Platform Notes**

**BIOS Configuration:**  
Workload Profile set to General Peak Frequency Compute  
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 982a61ec0915b55891ef0e16aca64d4  
running on localhost.localdomain Tue Dec 21 06:40:33 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) Gold 6354 CPU @ 3.00GHz  
    2 "physical id"s (chips)  
    72 "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 : 18  
  siblings : 36  
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17  
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

From lscpu from util-linux 2.32.1:  
  Architecture: x86_64

(Continued on next page)
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**Test Sponsor:** HPE

### Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
Stepping: 6
CPU MHz: 1769.843
CPU max MHz: 3600.0000
CPU min MHz: 800.0000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39936K
NUMA node0 CPU(s): 0-17,36-53
NUMA node1 CPU(s): 18-35,54-71

Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_time arch_perfmon pbebs 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 pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat _13 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsalbase tsc_adjust bmi1 hle avx2 smep bmi2 3msk invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cw sha ni avx512bw avx512vl xsaveopt xsavec xsaveopt xgetbv1 xsaveas cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock_detect wbinvd dtherm ida arat pln pts hwp hwp_act_window hwp_pkg_req avx512bvmi umip pku ospke avx512_vbmi2 gfn vaes vpc1mulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lid arch_capabilities

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 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53

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

Test Date: Dec-2021
Hardware Availability: Nov-2021
Software Availability: Dec-2020

Platform Notes (Continued)

node 0 size: 974658 MB
node 0 free: 1031059 MB
node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 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 64 65 66 67 68 69 70 71
node 1 size: 971138 MB
node 1 free: 1031262 MB
node distances:
node
  0:  10  20
  1:  20  10

From /proc/meminfo
  MemTotal:       2113486628 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

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

(Continued on next page)
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Copyright 2017-2022 Standard Performance Evaluation Corporation

SPECspeed®2017_int_base = 12.1
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

Bypass disabled via prctl and seccomp
Mitigation: usercopy/swapsgs barriers and __user pointer sanitation

CVE-2017-5753 (Spectre variant 1):

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 Dec 21 06:37
SPEC is set to: /home/cpu2017

Filesystem           Type Size  Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs   670G  112G  558G  17% /home

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)

Compiler Version Notes
==============================================================================
C       | 600.perlbench_s(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.

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

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### SPECspeed®2017_int_peak = 12.4

**Base Compiler Invocation**

- C benchmarks:
  - icx

- C++ benchmarks:
  - icpx

- Fortran benchmarks:
  - ifort

### Base Portability Flags

- 600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
- 602.gcc_s: -DSPEC_LP64
- 605.mcf_s: -DSPEC_LP64
- 620.omnetpp_s: -DSPEC_LP64
- 623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
- 625.x264_s: -DSPEC_LP64
- 631.deepsjeng_s: -DSPEC_LP64
- 641.leela_s: -DSPEC_LP64
- 648.exchange2_s: -DSPEC_LP64
- 657.xz_s: -DSPEC_LP64

### Base Optimization Flags

#### C benchmarks:

- -DSPEC_OPENMP
- -std=c11
- -m64
- -fopenmp
- -Wl,-z,muldefs
- -xCORE-AVX512
- -O3
- -ffast-math
- -flto
- -mfpmath=sse
- -funroll-loops
- -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries
- -L/usr/local/jemalloc64-5.0.1/lib
- -ljemalloc

#### C++ benchmarks:

- -DSPEC_OPENMP
- -m64
- -Wl,-z,muldefs
- -xCORE-AVX512
- -O3
- -ffast-math
- -flto
- -mfpmath=sse
- -funroll-loops
- -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries
- -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin/
- -lqkmalloc

#### Fortran benchmarks:

- -m64
- -xCORE-AVX512
- -O3
- -ipo
- -no-prec-div
- -qopt-mem-layout-trans=4
- -nostandard-realloc-lhs
- -align array32byte
- -auto
- -mbranches-within-32B-boundaries
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Software Availability: Dec-2020

Peak Compiler Invocation

C benchmarks (except as noted below):
icx
600.perlbench_s: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -DSPEC_OPENMP -fiopenmp -std=c11 -m64 -Wl,-z,muldefs
-xCORE-AVX512 -flto -O3 -ffast-math
-qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 480 Gen10 Plus
(3.00 GHz, Intel Xeon Gold 6354)

SPECspeed®2017_int_base = 12.1
SPECspeed®2017_int_peak = 12.4

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

Test Date: Dec-2021
Hardware Availability: Nov-2021
Software Availability: Dec-2020

Peak Optimization Flags (Continued)

C++ benchmarks:

620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes
641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: 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-revG.html

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