SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECspeed®2017\_fp\_base = 189$

ProLiant DL320 Gen11
(2.00 GHz, Intel Xeon Gold 6414U)

$SPECspeed®2017\_fp\_peak = 189$

CPU2017 License: 3	**Test Date:**	Feb-2023
Test Sponsor: HPE	**Hardware Availability:**	Jan-2023
Tested by: HPE	**Software Availability:**	May-2022

Threads

- **603.bwaves_s** 32 — 565 / 566
- **607.cactuBSSN_s** 32 — 230
- **619.lbm_s** 32 — 147
- **621.wrf_s** 32 — 173
- **627.cam4_s** 32 — 102
- **628.pop2_s** 32 — 86.4
- **638.imagick_s** 32 — 356
- **644.nab_s** 32 — 275
- **649.fotonik3d_s** 32 — 98.5
- **654.roms_s** 32 — 211

—— **SPECspeed®2017_fp_base (189)**   ------ **SPECspeed®2017_fp_peak (189)**

Hardware

CPU Name: Intel Xeon Gold 6414U
 Max MHz: 3400
 Nominal: 2000
Enabled: 32 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 60 MB I+D on chip per chip
 Other: None
Memory: 512 GB (8 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
 5.14.0-70.13.1.el9_0.x86_64
Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: HPE BIOS Version v1.22 01/18/2023 released Jan-2023
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

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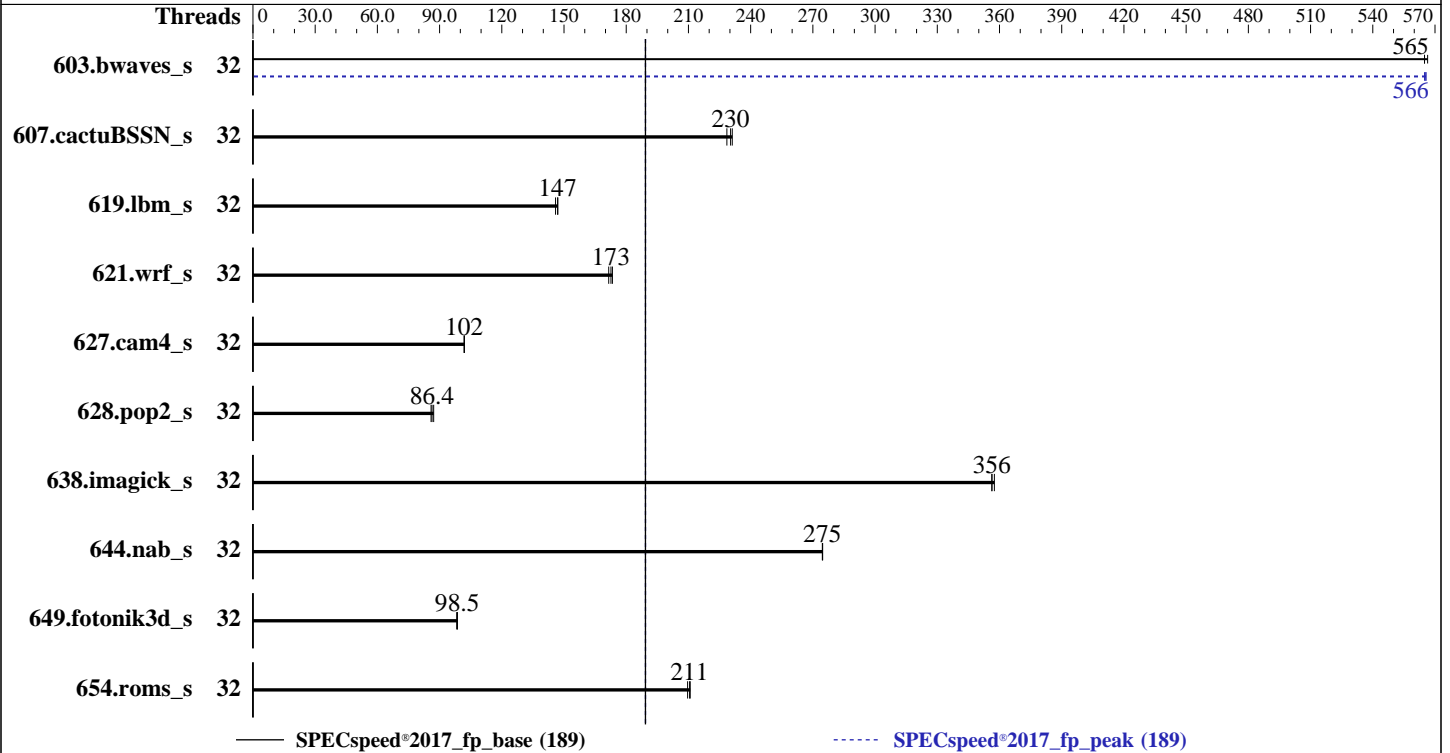(Test Sponsor: HPE)

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SPECspeed®2017_fp_peak = 189

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	32	104	566	104	565	**104**	**565**	32	**104**	**566**	104	565	104	566
607.cactuBSSN_s	32	**72.4**	**230**	72.9	229	72.1	231	32	**72.4**	**230**	72.9	229	72.1	231
619.lbm_s	32	35.9	146	35.6	147	**35.6**	**147**	32	35.9	146	35.6	147	**35.6**	**147**
621.wrf_s	32	**76.6**	**173**	77.1	172	76.3	173	32	**76.6**	**173**	77.1	172	76.3	173
627.cam4_s	32	87.0	102	87.0	102	**87.0**	**102**	32	87.0	102	87.0	102	**87.0**	**102**
628.pop2_s	32	**137**	**86.4**	136	87.1	138	85.9	32	**137**	**86.4**	136	87.1	138	85.9
638.imagick_s	32	40.3	358	**40.5**	**356**	40.5	356	32	40.3	358	**40.5**	**356**	40.5	356
644.nab_s	32	**63.6**	**275**	63.6	275	63.6	275	32	**63.6**	**275**	63.6	275	63.6	275
649.fotonik3d_s	32	92.8	98.3	92.5	98.5	**92.5**	**98.5**	32	92.8	98.3	92.5	98.5	**92.5**	**98.5**
654.roms_s	32	74.7	211	**74.8**	**211**	75.1	210	32	74.7	211	**74.8**	**211**	75.1	210
SPECspeed®2017_fp_base =	**189**													
SPECspeed®2017_fp_peak =	**189**													

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:
sync; echo 3>        /proc/sys/vm/drop_caches
IRQ balance service was stopped using "systemctl stop irqbalance.service"
tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"
perf-bias for all the CPUs is set using "cpupower set -b 0"
```

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 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
 memory using Red Hat Enterprise Linux 8.4
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)
```

(Continued on next page)

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Tested by:	HPE	**Software Availability:**	May-2022

General Notes (Continued)

```
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
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
The system ROM used for this result contains Intel microcode version 0x2b000161 for
the Intel Xeon Gold 6414U processor.
BIOS Configuration:
 Workload Profile set to General Peak Frequency Compute
 Thermal Configuration set to Maximum Cooling
 Intel Hyper-Threading set to Disabled
 Memory Patrol Scrubbing set to Disabled
 Last Level Cache (LLC) Prefetch set to Enabled
 Last Level Cache (LLC) Dead Line Allocation set to Disabled
 Enhanced Processor Performance Profile set to Aggressive
 Dead Block Predictor set to Enabled
 Workload Profile set to Custom
  Intel DMI Link Frequency set to Gen2 Speed
  Adjacent Sector Prefetch set to Disabled
  Minimum Processor Idle Power Package C-State set to No Package State


 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Wed Feb  1 14:00:52 2023


 SUT (System Under Test) info as seen by some common utilities.


 ------------------------------------------------------------
 Table of contents
 ------------------------------------------------------------
  1. uname -a
  2. w
  3. Username
  4. ulimit -a
  5. sysinfo process ancestry
  6. /proc/cpuinfo
  7. lscpu
  8. numactl --hardware
  9. /proc/meminfo
 10. who -r
 11. Systemd service manager version: systemd 250 (250-6.el9_0)
 12. Services, from systemctl list-unit-files
 13. Linux kernel boot-time arguments, from /proc/cmdline
 14. cpupower frequency-info
```

(Continued on next page)

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Platform Notes (Continued)

```
 15. tuned-adm active
 16. sysctl
 17. /sys/kernel/mm/transparent_hugepage
 18. /sys/kernel/mm/transparent_hugepage/khugepaged
 19. OS release
 20. Disk information
 21. /sys/devices/virtual/dmi/id
 22. dmidecode
 23. BIOS
    ------------------------------------------------------------


    ------------------------------------------------------------
 1. uname -a
   Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
    x86_64 x86_64 GNU/Linux


    ------------------------------------------------------------
 2. w
    14:00:52 up 1 min,  2 users,  load average: 0.83, 0.41, 0.15
    USER      TTY           LOGIN@   IDLE   JCPU    PCPU WHAT
    root      tty1     13:59   57.00s  0.00s  0.00s -bash
    root      pts/0    14:00   11.00s  0.93s  0.00s -bash


    ------------------------------------------------------------
 3. Username
   From environment variable $USER:  root


    ------------------------------------------------------------
 4. ulimit -a
   real-time non-blocking time  (microseconds, -R) unlimited
   core file size              (blocks, -c) 0
   data seg size               (kbytes, -d) unlimited
   scheduling priority              (-e) 0
   file size                   (blocks, -f) unlimited
   pending signals                  (-i) 2062093
   max locked memory           (kbytes, -l) 64
   max memory size             (kbytes, -m) unlimited
   open files                       (-n) 1024
   pipe size            (512 bytes, -p) 8
   POSIX message queues       (bytes, -q) 819200
   real-time priority               (-r) 0
   stack size                  (kbytes, -s) unlimited
   cpu time                  (seconds, -t) unlimited
   max user processes               (-u) 2062093
   virtual memory              (kbytes, -v) unlimited
   file locks                       (-x) unlimited
```

(Continued on next page)

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Software Availability: May-2022

Platform Notes (Continued)

```
   ----------------------------------------------------------------
   5. sysinfo process ancestry
    /usr/lib/systemd/systemd --switched-root --system --deserialize 18
    sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
    sshd: root [priv]
    sshd: root@pts/0
    -bash
    -bash
    runcpu --nobuild --action validate --define default-platform-flags -c
      ic2022.1-lin-core-avx512-speed-20220316.cfg --define cores=32 --tune base,peak -o all --define drop_caches
       fpspeed
    runcpu --nobuild --action validate --define default-platform-flags --configfile
      ic2022.1-lin-core-avx512-speed-20220316.cfg --define cores=32 --tune base,peak --output_format all
     --define drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv
     --note-preenv --logfile $SPEC/tmp/CPU2017.012/templogs/preenv.fpspeed.012.0.log --lognum 012.0
      --from_runcpu 2
    specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017


   ----------------------------------------------------------------
   6. /proc/cpuinfo
      model name       : Intel(R) Xeon(R) Gold 6414U
      vendor_id        : GenuineIntel
      cpu family       : 6
      model            : 143
      stepping         : 6
      microcode        : 0x2b000161
      bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs
      cpu cores        : 32
      siblings         : 32
      1 physical ids (chips)
      32 processors (hardware threads)
      physical id 0: core ids 0-31
      physical id 0: apicids
      0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62
    Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
     virtualized systems.  Use the above data carefully.


   ----------------------------------------------------------------
   7. lscpu

   From lscpu from util-linux 2.37.4:
    Architecture:                 x86_64
    CPU op-mode(s):               32-bit, 64-bit
    Address sizes:                46 bits physical, 57 bits virtual
    Byte Order:                   Little Endian
    CPU(s):                       32
```

(Continued on next page)

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Platform Notes (Continued)

```
  On-line CPU(s) list:             0-31
  Vendor ID:                       GenuineIntel
  BIOS Vendor ID:                  Intel(R) Corporation
  Model name:                      Intel(R) Xeon(R) Gold 6414U
  BIOS Model name:                 Intel(R) Xeon(R) Gold 6414U
  CPU family:                      6
  Model:                           143
  Thread(s) per core:              1
  Core(s) per socket:              32
  Socket(s):                       1
  Stepping:                        6
  BogoMIPS:                        4000.00
  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 tsc_known_freq pni pclmulqdq dtes64 monitor
                                    ds_cpl vmx smx est tm2 ssse3 sdbg 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 cpuid_fault epb cat_l3 cat_l2 cdp_l3
                                   invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                                   vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2
                                     erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                                   clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
                                       xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                                   split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                                   avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq
                                   avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect
                                   cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
                                       arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities
  Virtualization:                  VT-x
  L1d cache:                       1.5 MiB (32 instances)
  L1i cache:                       1 MiB (32 instances)
  L2 cache:                        64 MiB (32 instances)
  L3 cache:                        60 MiB (1 instance)
  NUMA node(s):                    1
  NUMA node0 CPU(s):               0-31
  Vulnerability Itlb multihit:     Not affected
  Vulnerability L1tf:              Not affected
  Vulnerability Mds:               Not affected
  Vulnerability Meltdown:          Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:        Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
  Vulnerability Srbds:             Not affected
  Vulnerability Tsx async abort:   Not affected

  From lscpu --cache:
```

(Continued on next page)

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Platform Notes (Continued)

```
      NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d      48K     1.5M   12 Data            1     64      1               64
      L1i      32K       1M    8 Instruction     1     64      1               64
      L2        2M      64M   16 Unified         2   2048      1               64
      L3       60M      60M   15 Unified         3  65536      1               64


    -------------------------------------------------------------
    8. numactl --hardware
    NOTE: a numactl 'node' might or might not correspond to a physical chip.
      available: 1 nodes (0)
      node 0 cpus: 0-31
      node 0 size: 515563 MB
      node 0 free: 514490 MB
      node distances:
      node   0
        0:  10


    -------------------------------------------------------------
    9. /proc/meminfo
      MemTotal:       527936692 kB


    -------------------------------------------------------------
    10. who -r
      run-level 3 Feb 1 13:59


    -------------------------------------------------------------
    11. Systemd service manager version: systemd 250 (250-6.el9_0)
      Default Target  Status
      multi-user      running


    -------------------------------------------------------------
    12. Services, from systemctl list-unit-files
      STATE             UNIT FILES
      enabled           NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
                          dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode
                            nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd
                            systemd-network-generator tuned udisks2
      enabled-runtime   systemd-remount-fs
      disabled          blk-availability chrony-wait console-getty cpupower debug-shell kvm_stat
                          man-db-restart-cache-update nftables powertop rdisc rhsm rhsm-facts rpmdb-rebuild
                          serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext
      indirect          sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo


    -------------------------------------------------------------
    13. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
      root=/dev/mapper/rhel-root
```

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Platform Notes (Continued)

```
  ro
  resume=/dev/mapper/rhel-swap
  rd.lvm.lv=rhel/root
  rd.lvm.lv=rhel/swap


  ----------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 0:
    Unable to determine current policy
    boost state support:
      Supported: yes
      Active: yes


  ----------------------------------------------------------
15. tuned-adm active
  Current active profile: throughput-performance


  ----------------------------------------------------------
16. sysctl
  kernel.numa_balancing                0
  kernel.randomize_va_space            2
  vm.compaction_proactiveness         20
  vm.dirty_background_bytes            0
  vm.dirty_background_ratio           10
  vm.dirty_bytes                       0
  vm.dirty_expire_centisecs         3000
  vm.dirty_ratio                      40
  vm.dirty_writeback_centisecs       500
  vm.dirtytime_expire_seconds      43200
  vm.extfrag_threshold               500
  vm.min_unmapped_ratio                1
  vm.nr_hugepages                      0
  vm.nr_hugepages_mempolicy            0
  vm.nr_overcommit_hugepages           0
  vm.swappiness                       10
  vm.watermark_boost_factor        15000
  vm.watermark_scale_factor           10
  vm.zone_reclaim_mode                 0


  ----------------------------------------------------------
17. /sys/kernel/mm/transparent_hugepage
  defrag          always defer defer+madvise [madvise] never
  enabled         [always] madvise never
  hpage_pmd_size  2097152
  shmem_enabled   always within_size advise [never] deny force


  ----------------------------------------------------------
```

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Platform Notes (Continued)

```
  18. /sys/kernel/mm/transparent_hugepage/khugepaged
    alloc_sleep_millisecs  60000
    defrag                     1
    max_ptes_none            511
    max_ptes_shared          256
    max_ptes_swap             64
    pages_to_scan           4096
    scan_sleep_millisecs   10000


  ----------------------------------------------------------------
  19. OS release
    From /etc/*-release /etc/*-version
    os-release     Red Hat Enterprise Linux 9.0 (Plow)
    redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
    system-release Red Hat Enterprise Linux release 9.0 (Plow)


  ----------------------------------------------------------------
  20. Disk information
  SPEC is set to: /home/cpu2017
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   372G   72G  300G  20% /home


  ----------------------------------------------------------------
  21. /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL320 Gen11
    Product Family: ProLiant
    Serial:         CNX2210H28


  ----------------------------------------------------------------
  22. dmidecode
    Additional information from dmidecode 3.3 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:
      8x Hynix HMCG94AEBRA103N 64 GB 2 rank 4800



  ----------------------------------------------------------------
  23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       HPE
    BIOS Version:      1.22
    BIOS Date:         01/18/2023
    BIOS Revision:     1.22
    Firmware Revision: 1.20
```

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Compiler Version Notes

```
==============================================================================
C                    | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
                     | 644.nab_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
  2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran              | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                     | 654.roms_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
  2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C           | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                     | 628.pop2_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
  2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL320 Gen11
(2.00 GHz, Intel Xeon Gold 6414U)

SPECspeed®2017_fp_base = 189

SPECspeed®2017_fp_peak = 189

CPU2017 License: 3	**Test Date:** Feb-2023
Test Sponsor: HPE	**Hardware Availability:** Jan-2023
Tested by: HPE	**Software Availability:** May-2022

Base Compiler Invocation

C benchmarks:
`icx`

Fortran benchmarks:
`ifx`

Benchmarks using both Fortran and C:
`ifx icx`

Benchmarks using Fortran, C, and C++:
`icpx icx ifx`

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:
`-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Fortran benchmarks:
`-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp -nostandard-realloc-lhs -align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using both Fortran and C:
`-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`

(Continued on next page)

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Test Date: Feb-2023
Hardware Availability: Jan-2023
Software Availability: May-2022

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

Fortran benchmarks:
```
ifx
```

Benchmarks using both Fortran and C:
```
ifx icx
```

Benchmarks using Fortran, C, and C++:
```
icpx icx ifx
```

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: `basepeak = yes`

Fortran benchmarks:

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL320 Gen11
(2.00 GHz, Intel Xeon Gold 6414U)

SPECspeed®2017_fp_base = 189

SPECspeed®2017_fp_peak = 189

CPU2017 License:	3	**Test Date:**	Feb-2023
Test Sponsor:	HPE	**Hardware Availability:**	Jan-2023
Tested by:	HPE	**Software Availability:**	May-2022

Peak Optimization Flags (Continued)

603.bwaves_s: `-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp -nostandard-realloc-lhs -align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

649.fotonik3d_s: `basepeak = yes`

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`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SPR-rev1.1.html`
`http://www.spec.org/cpu2017/flags/Intel-ic2022-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-SPR-rev1.1.xml`
`http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml`

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

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