SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)
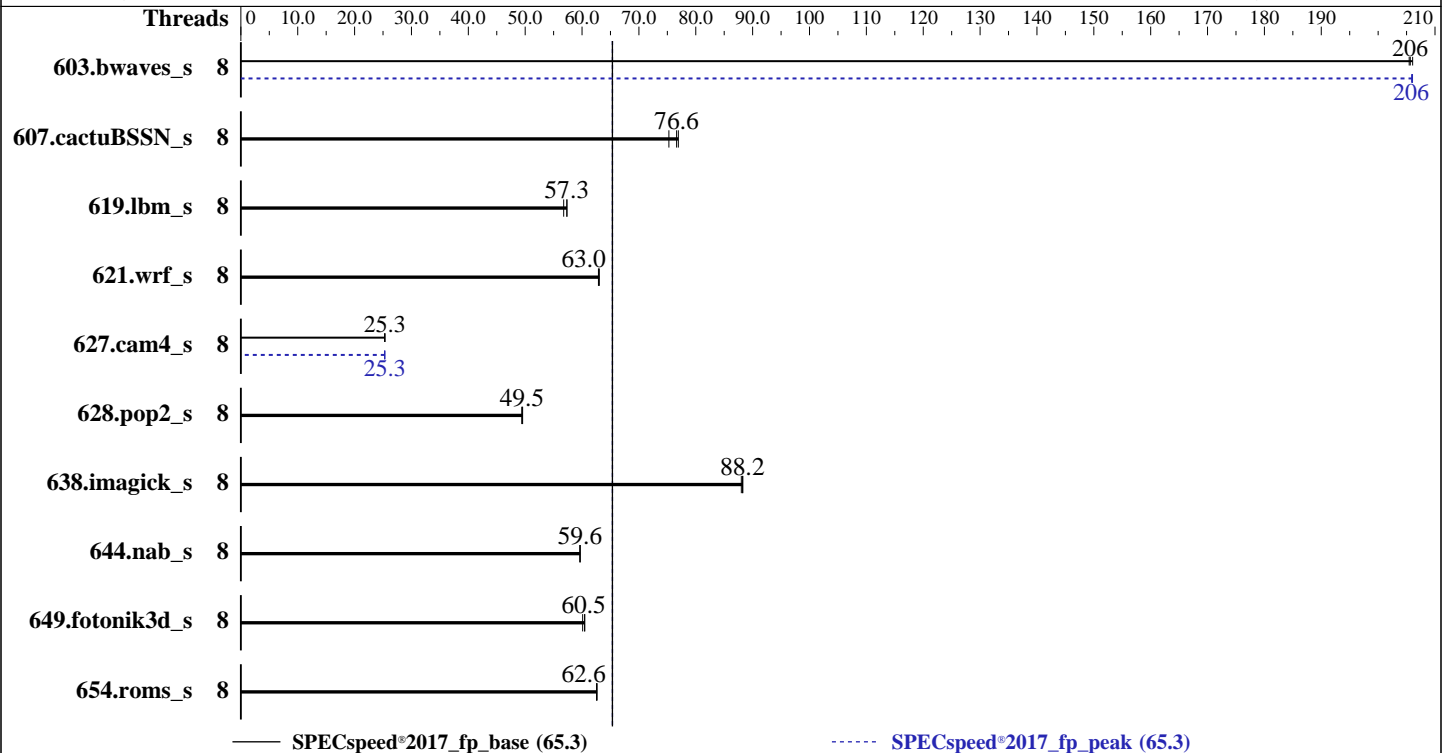
ProLiant DL320 Gen11
(1.80 GHz, Intel Xeon Bronze 3408U)

$SPECspeed®2017\_fp\_base = 65.3$

$SPECspeed®2017\_fp\_peak = 65.3$

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

Test Date: Jun-2023
Hardware Availability: May-2023
Software Availability: Dec-2022

Threads		
603.bwaves_s	8	206 / 206
607.cactuBSSN_s	8	76.6
619.lbm_s	8	57.3
621.wrf_s	8	63.0
627.cam4_s	8	25.3 / 25.3
628.pop2_s	8	49.5
638.imagick_s	8	88.2
644.nab_s	8	59.6
649.fotonik3d_s	8	60.5
654.roms_s	8	62.6

SPECspeed®2017_fp_base (65.3)   SPECspeed®2017_fp_peak (65.3)

Hardware

CPU Name: Intel Xeon Bronze 3408U
 Max MHz: 1900
 Nominal: 1800
Enabled: 8 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: 22.5 MB I+D on chip per chip
 Other: None
Memory: 256 GB (8 x 32 GB 2Rx8 PC5-4800B-R, running at 4000)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
Kernel 5.14.0-70.13.1.el9_0.x86_64
Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
C/C++: Version 2023.0 of Intel C/C++ Compiler for Linux
Parallel: Yes
Firmware: HPE BIOS Version v1.40 05/18/2023 released May-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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Results Table

Benchmark	Base						Peak					
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	8	**287**	**206**	286	206	287	205	8	**286**	**206**	286	206	287	206
607.cactuBSSN_s	8	221	75.3	217	76.9	**218**	**76.6**	8	221	75.3	217	76.9	**218**	**76.6**
619.lbm_s	8	92.3	56.8	**91.4**	**57.3**	91.3	57.3	8	92.3	56.8	**91.4**	**57.3**	91.3	57.3
621.wrf_s	8	210	63.0	210	62.9	**210**	**63.0**	8	210	63.0	210	62.9	**210**	**63.0**
627.cam4_s	8	**350**	**25.3**	350	25.3	351	25.3	8	350	25.3	350	25.3	**350**	**25.3**
628.pop2_s	8	**240**	**49.5**	240	49.6	240	49.4	8	**240**	**49.5**	240	49.6	240	49.4
638.imagick_s	8	164	88.0	163	88.3	**164**	**88.2**	8	164	88.0	163	88.3	**164**	**88.2**
644.nab_s	8	293	59.6	**293**	**59.6**	293	59.7	8	293	59.6	**293**	**59.6**	293	59.7
649.fotonik3d_s	8	151	60.5	152	60.1	**151**	**60.5**	8	151	60.5	152	60.1	**151**	**60.5**
654.roms_s	8	252	62.6	251	62.6	**252**	**62.6**	8	252	62.6	251	62.6	**252**	**62.6**
SPECspeed®2017_fp_base =		**65.3**										
SPECspeed®2017_fp_peak =		**65.3**										

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

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Platform Notes

```
The system ROM used for this result contains Intel microcode version 0x2b0004a1 for
the Intel Xeon Bronze 3408U processor.
BIOS Configuration:
 Workload Profile set to General Peak Frequency Compute
 Thermal Configuration set to Maximum Cooling
 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 Tue Jun 27 19:53:22 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
 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
    19:53:22 up 3 min,  0 users,  load average: 0.00, 0.00, 0.00
   USER     TTY       LOGIN@   IDLE   JCPU   PCPU WHAT

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

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Platform Notes (Continued)

```
 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) 1029844
   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) 1029844
   virtual memory              (kbytes, -v) unlimited
   file locks                       (-x) unlimited

  -------------------------------------------------------------
 5. sysinfo process ancestry
  /usr/lib/systemd/systemd --switched-root --system --deserialize 28
  sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
  sshd: root [priv]
  sshd: root@notty
  bash -c cd $SPEC/ && $SPEC/fpspeed.sh
  runcpu --nobuild --action validate --define default-platform-flags -c
    ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=8 --tune base,peak -o all --define
    drop_caches fpspeed
  runcpu --nobuild --action validate --define default-platform-flags --configfile
    ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=8 --tune base,peak --output_format all
    --define drop_caches --nopower --runmode speed --tune base:peak --size refspeed fpspeed --nopreenv
    --note-preenv --logfile $SPEC/tmp/CPU2017.001/templogs/preenv.fpspeed.001.0.log --lognum 001.0
    --from_runcpu 2
  specperl $SPEC/bin/sysinfo
 $SPEC = /home/CPU2017

  -------------------------------------------------------------
 6. /proc/cpuinfo
    model name       : Intel(R) Xeon(R) Bronze 3408U
    vendor_id        : GenuineIntel
    cpu family       : 6
    model            : 143
    stepping         : 7
    microcode        : 0x2b0004a1
    bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores        : 8
    siblings         : 8
    1 physical ids (chips)
    8 processors (hardware threads)
    physical id 0: core ids 0-7
    physical id 0: apicids 0,2,4,6,8,10,12,14
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.

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

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CPU2017 License:	3	**Test Date:**	Jun-2023
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Tested by:	HPE	**Software Availability:**	Dec-2022

Platform Notes (Continued)

```
   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):                         8
    On-line CPU(s) list:            0-7
    Vendor ID:                      GenuineIntel
    BIOS Vendor ID:                 Intel(R) Corporation
    Model name:                     Intel(R) Xeon(R) Bronze 3408U
    BIOS Model name:                Intel(R) Xeon(R) Bronze 3408U
    CPU family:                     6
    Model:                          143
    Thread(s) per core:             1
    Core(s) per socket:             8
    Socket(s):                      1
    Stepping:                       7
    BogoMIPS:                       3600.00
    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 flush_l1d arch_capabilities
    Virtualization:                 VT-x
    L1d cache:                      384 KiB (8 instances)
    L1i cache:                      256 KiB (8 instances)
    L2 cache:                       16 MiB (8 instances)
    L3 cache:                       22.5 MiB (1 instance)
    NUMA node(s):                   1
    NUMA node0 CPU(s):              0-7
    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:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE         LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     384K   12 Data           1    64      1               64
      L1i       32K     256K    8 Instruction    1    64      1               64
      L2         2M      16M   16 Unified        2  2048      1               64
      L3      22.5M    22.5M   15 Unified        3 24576      1               64
```

(Continued on next page)

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Platform Notes (Continued)

```
----------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0-7
  node 0 size: 257501 MB
  node 0 free: 256789 MB
  node distances:
  node   0
    0:  10


----------------------------------------------------------
9. /proc/meminfo
   MemTotal:       263681076 kB


----------------------------------------------------------
10. who -r
   run-level 3 Jun 27 19:50


----------------------------------------------------------
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
   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


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

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Platform Notes (Continued)

```
  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


  ----------------------------------------------------------
  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  184G  188G  50% /home


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


  ----------------------------------------------------------
  22. dmidecode
```

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Platform Notes (Continued)

```
   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:
   4x Hynix HMCG88AEBRA168N 32 GB 2 rank 4800, configured at 4000
   4x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800, configured at 4000


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       HPE
   BIOS Version:      1.40
   BIOS Date:         05/18/2023
   BIOS Revision:     1.40
   Firmware Revision: 1.20
```

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 2023.0.0 Build 20221201
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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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 2023.0.0 Build 20221201
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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

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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 -xsapphirerapids -Ofast -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`
`-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Fortran benchmarks:
`-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids -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 -xsapphirerapids -Ofast -ffast-math`

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SPEC CPU®2017 Floating Point Speed Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL320 Gen11
(1.80 GHz, Intel Xeon Bronze 3408U)

SPECspeed®2017_fp_base = 65.3

SPECspeed®2017_fp_peak = 65.3

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

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-mprefer-vector-width=512 -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`

(Continued on next page)

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Hewlett Packard Enterprise
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ProLiant DL320 Gen11
(1.80 GHz, Intel Xeon Bronze 3408U)

SPECspeed®2017_fp_base = 65.3

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

Peak Optimization Flags (Continued)

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids
-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: -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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-rev2.1.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SPR-rev2.1.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.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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