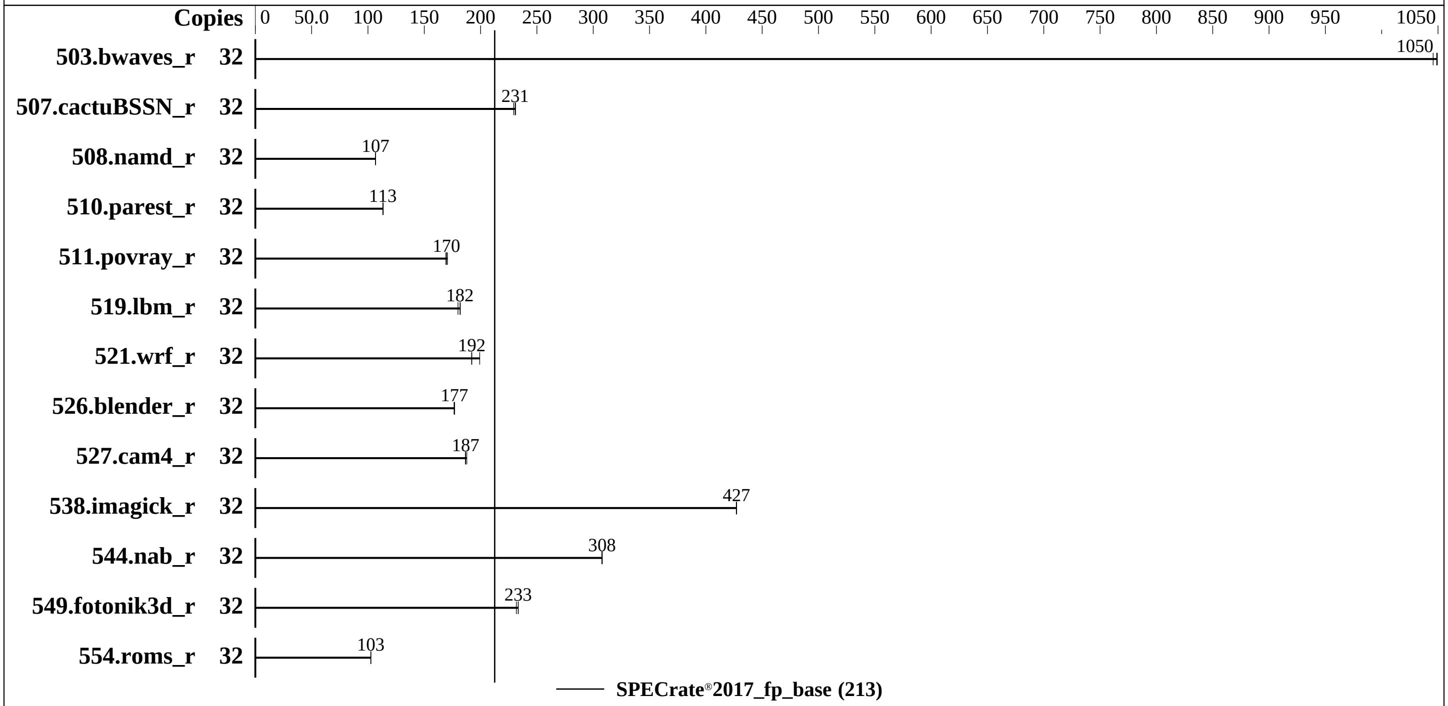
SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL380 Gen10 Plus
(3.6 GHz, Intel Xeon Gold 6334)

SPECrate®2017_fp_base = 213

SPECrate®2017_fp_peak = Not Run

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



Hardware

CPU Name:	Intel Xeon Gold 6334
Max MHz:	3700
Nominal:	3600
Enabled:	16 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:	18 MB I+D on chip per chip
Other:	None
Memory:	512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
Storage:	1 x 800 GB SAS SSD, RAID 0
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;
Parallel:	No
Firmware:	HPE BIOS Version v1.76 04/20/2023 released May-2023
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	32	**306**	**1050**	306	1050	307	1050							
507.cactuBSSN_r	32	**176**	**231**	175	231	177	229							
508.namd_r	32	285	107	285	107	**285**	**107**							
510.parest_r	32	**739**	**113**	737	114	739	113							
511.povray_r	32	438	171	442	169	**440**	**170**							
519.lbm_r	32	**186**	**182**	187	180	185	182							
521.wrf_r	32	360	199	**373**	**192**	373	192							
526.blender_r	32	276	176	**276**	**177**	275	177							
527.cam4_r	32	300	186	**300**	**187**	298	188							
538.imagick_r	32	**186**	**427**	186	427	186	427							
544.nab_r	32	175	308	**175**	**308**	175	308							
549.fotonik3d_r	32	538	232	534	233	**534**	**233**							
554.roms_r	32	496	103	**496**	**103**	496	102							

SPECrate®2017_fp_base = 213

SPECrate®2017_fp_peak = Not Run

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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
```

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"
```

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.
```

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General Notes (Continued)

```
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
```

Platform Notes

```
The system ROM used for this result contains Intel microcode version 0xd000390 for
the Intel Xeon Gold 6334 processor.
BIOS Configuration:
 Workload Profile set to General Throughput Compute
 Memory Patrol Scrubbing is 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
 Enhanced Processor Performance Profile set to Aggressive
 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: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Thu May 18 17:15:43 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
 ------------------------------------------------------------
```

(Continued on next page)

Platform Notes (Continued)

```
------------------------------------------------------------
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
   17:15:43 up 2 min,  2 users,  load average: 0.01, 0.02, 0.00
  USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1      17:14    1:27   0.00s  0.00s -bash
  root     pts/0     17:14    6.00s  1.02s  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) 2062508
  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) 2062508
  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@pts/0
 -bash
 -bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=32 -c
   ic2023.0-lin-core-avx512-rate-20221201.cfg --define smt-on --define cores=16 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=32 --configfile
   ic2023.0-lin-core-avx512-rate-20221201.cfg --define smt-on --define cores=16 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
   rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.003/templogs/preenv.fprate.003.0.log --lognum 003.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz
    vendor_id       : GenuineIntel
```

(Continued on next page)

Platform Notes (Continued)

```
    cpu family      : 6
    model           : 106
    stepping        : 6
    microcode       : 0xd000390
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 8
    siblings        : 16
    2 physical ids (chips)
    32 processors (hardware threads)
    physical id 0: core ids 0-7
    physical id 1: core ids 0-7
    physical id 0: apicids 0-15
    physical id 1: apicids 64-79
  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
  On-line CPU(s) list:             0-31
  Vendor ID:                       GenuineIntel
  BIOS Vendor ID:                  Intel(R) Corporation
  Model name:                      Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz
  BIOS Model name:                 Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz
  CPU family:                      6
  Model:                           106
  Thread(s) per core:              2
  Core(s) per socket:              8
  Socket(s):                       2
  Stepping:                        6
  CPU max MHz:                     3700.0000
  CPU min MHz:                     800.0000
  BogoMIPS:                        7200.00
  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 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 invpcid_single 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 wbnoinvd dtherm ida arat pln
                                   pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
                                   avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsrm md_clear
                                   pconfig flush_l1d arch_capabilities
  Virtualization:                  VT-x
  L1d cache:                       768 KiB (16 instances)
  L1i cache:                       512 KiB (16 instances)
  L2 cache:                        20 MiB (16 instances)
  L3 cache:                        36 MiB (2 instances)
  NUMA node(s):                    4
```

(Continued on next page)

Platform Notes (Continued)

```
  NUMA node0 CPU(s):               0-3,16-19
  NUMA node1 CPU(s):               4-7,20-23
  NUMA node2 CPU(s):               8-11,24-27
  NUMA node3 CPU(s):               12-15,28-31
  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:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
     L1d       48K     768K   12 Data            1    64        1             64
     L1i       32K     512K    8 Instruction     1    64        1             64
     L2       1.3M      20M   20 Unified         2  1024        1             64
     L3        18M      36M   12 Unified         3 24576        1             64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0-3,16-19
  node 0 size: 128648 MB
  node 0 free: 128309 MB
  node 1 cpus: 4-7,20-23
  node 1 size: 129022 MB
  node 1 free: 128617 MB
  node 2 cpus: 8-11,24-27
  node 2 size: 128985 MB
  node 2 free: 128638 MB
  node 3 cpus: 12-15,28-31
  node 3 size: 129011 MB
  node 3 free: 128660 MB
  node distances:
  node   0   1   2   3
    0:  10  20  30  30
    1:  20  10  30  30
    2:  30  30  10  20
    3:  30  30  20  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       528043296 kB

------------------------------------------------------------
10. who -r
  run-level 3 May 18 17:13

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

(Continued on next page)

Platform Notes (Continued)

```
  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=(hd1,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:
    current policy: frequency should be within 3.70 GHz and 3.70 GHz.
                    The governor "performance" may decide which speed to use
                    within this range.
    boost state support:
      Supported: yes
      Active: yes

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

------------------------------------------------------------
16. sysctl
  kernel.numa_balancing              1
  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
```

(Continued on next page)

Platform Notes (Continued)

```
  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   670G   30G  641G   5% /home

 ------------------------------------------------------------
 21. /sys/devices/virtual/dmi/id
     Vendor:         HPE
     Product:        ProLiant DL380 Gen10 Plus
     Product Family: ProLiant
     Serial:         CN70110BZJ

 ------------------------------------------------------------
 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:
     16x Hynix HMA84GR7DJR4N-XN 32 GB 2 rank 3200


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       HPE
    BIOS Version:      U46
    BIOS Date:         04/20/2023
    BIOS Revision:     1.76
    Firmware Revision: 2.40
```

Compiler Version Notes

```
==============================================================================================================
C               | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
--------------------------------------------------------------------------------------------------------------
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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Compiler Version Notes (Continued)

```
==============================================================================
C++             | 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
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          | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
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         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
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      | 521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

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Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
`ifx icx`

Benchmarks using both C and C++:
`icpx icx`

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

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
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

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

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Base Optimization Flags (Continued)

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 -Wno-implicit-int -nostandard-realloc-lhs -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using both C and C++:
`-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using Fortran, C, and C++:
`-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int -nostandard-realloc-lhs -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-ICX-revJ.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-ICX-revJ.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

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

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