SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise

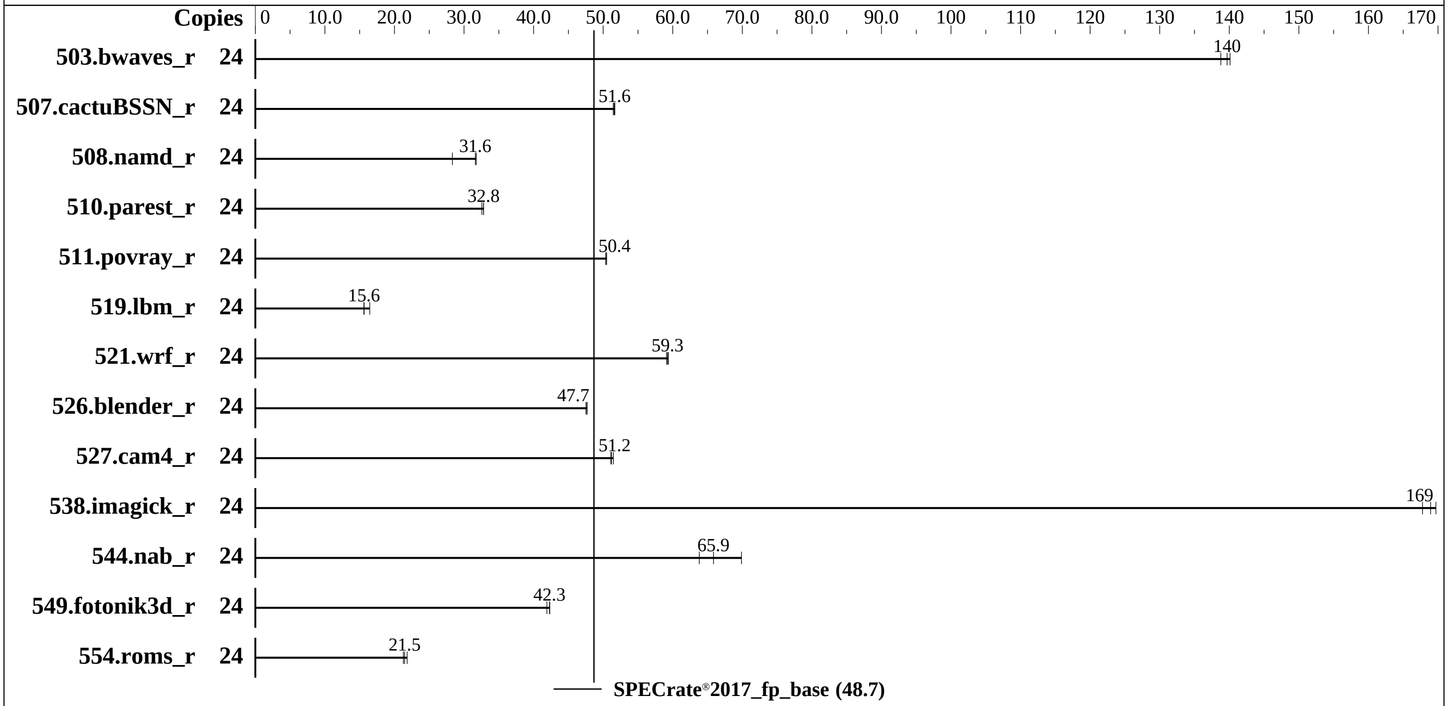
(Test Sponsor: HPE)

ProLiant DL380p Gen8
(2.10 GHz, Intel Xeon E5-2620 v2)

SPECrate®2017_fp_base = 48.7

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 3		**Test Date:**	May-2023
Test Sponsor:	HPE	**Hardware Availability:**	May-2019
Tested by:	HPE	**Software Availability:**	Dec-2022



Hardware

CPU Name:	Intel Xeon E5-2620 v2
Max MHz:	2600
Nominal:	2100
Enabled:	12 cores, 2 chips, 2 threads/core
Orderable:	1, 2 chip(s)
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	256 KB I+D on chip per core
L3:	15 MB I+D on chip per chip
Other:	None
Memory:	128 GB (8 x 16 GB 2Rx4 PC3-14900R-13, ECC, running at 1600)
Storage:	4 x 600 GB SAS 10K HDD, RAID 10
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 P70 05/24/2019 released May-2019
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 set to prefer performance at the cost of additional power usage

Results Table

	Base							Peak						
Benchmark	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
503.bwaves_r	24	1718	140	**1723**	**140**	1734	139							
507.cactuBSSN_r	24	591	51.4	588	51.7	**589**	**51.6**							
508.namd_r	24	**721**	**31.6**	805	28.3	718	31.8							
510.parest_r	24	1913	32.8	1928	32.6	**1913**	**32.8**							
511.povray_r	24	1113	50.4	**1112**	**50.4**	1110	50.5							
519.lbm_r	24	**1618**	**15.6**	1538	16.4	1620	15.6							
521.wrf_r	24	909	59.1	**907**	**59.3**	906	59.4							
526.blender_r	24	766	47.7	**766**	**47.7**	769	47.5							
527.cam4_r	24	821	51.1	816	51.5	**820**	**51.2**							
538.imagick_r	24	356	168	**353**	**169**	352	170							
544.nab_r	24	633	63.8	578	69.9	**613**	**65.9**							
549.fotonik3d_r	24	2232	41.9	**2212**	**42.3**	2210	42.3							
554.roms_r	24	**1776**	**21.5**	1747	21.8	1792	21.3							

SPECrate®2017_fp_base = 48.7

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.
This benchmark result is intended to provide perspective on
past performance using the historical hardware
and/or software described on this result page.
The system as described on this result page was formerly
generally available. At the time of this publication, it may
not be shipping, and/or may not be supported, and/or may fail
to meet other tests of General Availability described in the
SPEC OSG Policy document, http://www.spec.org/osg/policy.html
This measured result may not be representative of the result
that would be measured were this benchmark run with hardware
and software available as of the publication date.

This benchmark run is conducted using the latest binaries based
on IC23 and to suffice the minimum software requirement, the
Operating System used is RHEL9.0
```

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 8480+ CPU + 512GB RAM
 memory using Red Hat Enterprise Linux 9.0
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
```

Platform Notes

```
The system ROM used for this result contains Intel microcode version 0x42e for
the Intel Xeon E5-2620 v2 processor.
BIOS Configuration:
 HP Power Profile set to Custom
 Energy/Performance Bias set to Maximum Performance
 Thermal Configuration set to Maximum Cooling
 Collaborative Power Control set to Disabled
 Processor Power and Utilization Monitoring set to Disabled

The reported date by sysinfo is incorrect due to computer clock being not set correctly.
The correct test date is: May-2023.

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Fri Apr  8 04:16:35 2022

 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
```

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Platform Notes (Continued)

```
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
   04:16:35 up 22:46,  2 users,  load average: 0.08, 0.02, 0.01
  USER     TTY      LOGIN@   IDLE   JCPU   PCPU WHAT
  root     pts/0    Thu05   22:44m  0.00s  0.00s -bash
  root     pts/1    04:14   11.00s  2.57s  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) 515316
  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) 515316
  virtual memory              (kbytes, -v) unlimited
  file locks                          (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 30
 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
 sshd: root [priv]
 sshd: root@pts/1
 -bash
 -bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=24 -c
   HPE-ic2023.0-lin-core-avx-rate-20221201.cfg --define smt-on --define cores=12 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=24 --configfile
   HPE-ic2023.0-lin-core-avx-rate-20221201.cfg --define smt-on --define cores=12 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
```

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Platform Notes (Continued)

```
    rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
    $SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
  specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017

 ------------------------------------------------------------
 6. /proc/cpuinfo
     model name      : Intel(R) Xeon(R) CPU E5-2620 v2 @ 2.10GHz
     vendor_id       : GenuineIntel
     cpu family      : 6
     model           : 62
     stepping        : 4
     microcode       : 0x42e
     bugs            : cpu_meltdown spectre_v1 spectre_v2 spec_store_bypass l1tf mds swapgs itlb_multihit
     cpu cores       : 6
     siblings        : 12
     2 physical ids (chips)
     24 processors (hardware threads)
     physical id 0: core ids 0-5
     physical id 1: core ids 0-5
     physical id 0: apicids 0-11
     physical id 1: apicids 32-43
   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, 48 bits virtual
   Byte Order:                      Little Endian
   CPU(s):                          24
   On-line CPU(s) list:             0-23
   Vendor ID:                       GenuineIntel
   BIOS Vendor ID:                  Intel
   Model name:                      Intel(R) Xeon(R) CPU E5-2620 v2 @ 2.10GHz
   BIOS Model name:                 Intel(R) Xeon(R) CPU E5-2620 v2 @ 2.10GHz
   CPU family:                      6
   Model:                           62
   Thread(s) per core:              2
   Core(s) per socket:              6
   Socket(s):                       2
   Stepping:                        4
   BogoMIPS:                        4190.01
   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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
                                    cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
                                    cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic popcnt tsc_deadline_timer aes
                                    xsave avx f16c rdrand lahf_lm cpuid_fault epb pti intel_ppin ssbd ibrs
                                    ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase smep erms
                                    xsaveopt dtherm ida arat pln pts md_clear flush_l1d
   Virtualization:                  VT-x
   L1d cache:                       384 KiB (12 instances)
   L1i cache:                       384 KiB (12 instances)
   L2 cache:                        3 MiB (12 instances)
   L3 cache:                        30 MiB (2 instances)
   NUMA node(s):                    2
```

(Continued on next page)

Platform Notes (Continued)

```
  NUMA node0 CPU(s):               0-5,12-17
  NUMA node1 CPU(s):               6-11,18-23
  Vulnerability Itlb multihit:     KVM: Mitigation: VMX disabled
  Vulnerability L1tf:              Mitigation; PTE Inversion; VMX conditional cache flushes, SMT vulnerable
  Vulnerability Mds:               Mitigation; Clear CPU buffers; SMT vulnerable
  Vulnerability Meltdown:          Mitigation; PTI
  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; Retpolines, IBPB conditional, IBRS_FW, STIBP 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       32K     384K    8 Data            1    64        1             64
     L1i       32K     384K    8 Instruction     1    64        1             64
     L2       256K       3M    8 Unified         2   512        1             64
     L3        15M      30M   20 Unified         3 12288        1             64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0-5,12-17
  node 0 size: 64369 MB
  node 0 free: 59625 MB
  node 1 cpus: 6-11,18-23
  node 1 size: 64496 MB
  node 1 free: 60164 MB
  node distances:
  node   0   1
    0:  10  20
    1:  20  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       131958536 kB

------------------------------------------------------------
10. who -r
  run-level 3 Apr 7 05:30

------------------------------------------------------------
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 microcode nis-domainname rhsmcertd rsyslog
                  selinux-autorelabel-mark sshd sssd systemd-network-generator tuned upower
  enabled-runtime systemd-remount-fs
  disabled        canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
                  chrony-wait console-getty cpupower debug-shell hwloc-dump-hwdata ipsec 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
```

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Platform Notes (Continued)

```
------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,msdos1)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
  root=UUID=8be8cad1-97d3-4e02-adc6-0e82fc3a4309
  ro
  resume=UUID=08c99414-d9fd-468e-82df-2889991b47bb

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

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

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Platform Notes (Continued)

```
 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/sda5      xfs   484G   21G  464G   5% /home

 ------------------------------------------------------------
 21. /sys/devices/virtual/dmi/id
     Vendor:         HP
     Product:        ProLiant DL380p Gen8
     Product Family: ProLiant
     Serial:         2M23460331

 ------------------------------------------------------------
 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 HP 712383-081 16 GB 2 rank 1866, configured at 1600


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       HP
    BIOS Version:      P70
    BIOS Date:         05/24/2019
    Firmware Revision: 2.79
```

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 2023.1.0 Build 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++             | 508.namd_r(base) 510.parest_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.1.0 Build 20230320
Copyright (C) 1985-2023 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 2023.1.0 Build 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.1.0 Build 20230320
```

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2023 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 2023.1.0 Build 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.1.0 Build 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.1.0 Build 20230320
Copyright (C) 1985-2023 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 2023.1.0 Build 20230320
Copyright (C) 1985-2023 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 2023.1.0 Build 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.1.0 Build 20230320
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

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 -xAVX -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int
-ljemalloc -L/home/cpu2017/je5.0.1-64/
```

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xAVX -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/home/cpu2017/je5.0.1-64/
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xAVX -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/home/cpu2017/je5.0.1-64/
```

Benchmarks using both Fortran and C:
```
-w -m64 -std=c11 -Wl,-z,muldefs -xAVX -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/home/cpu2017/je5.0.1-64/
```

Benchmarks using both C and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xAVX -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc
-L/home/cpu2017/je5.0.1-64/
```

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xAVX -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/home/cpu2017/je5.0.1-64/
```

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-revA.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.2023-06-06.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.0-revA.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.2023-06-06.xml

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

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