SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML30 Gen11
(3.30 GHz, Intel Xeon E-2456)

$SPECrate®2017\_fp\_base = 97.8$
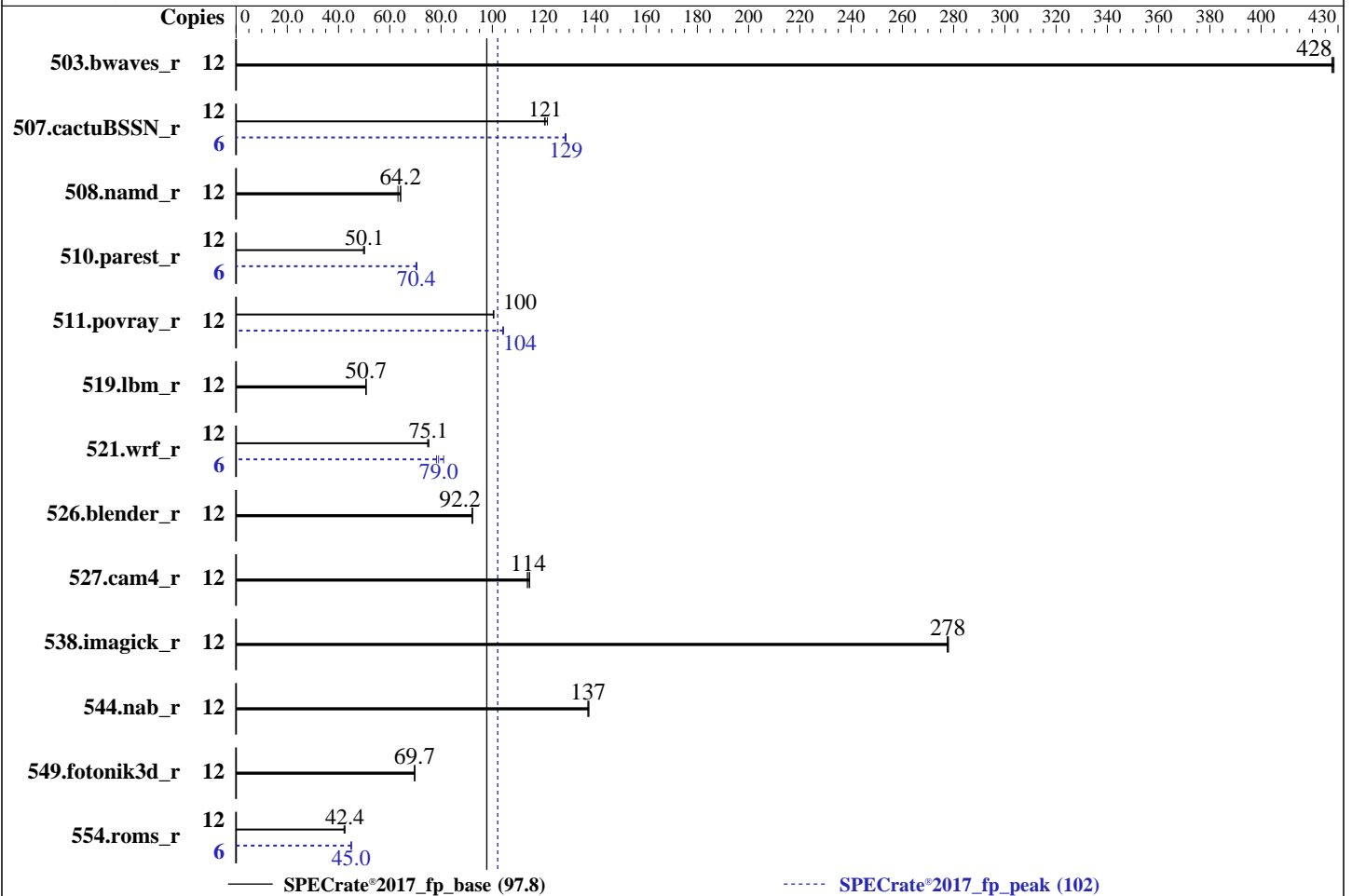
$SPECrate®2017\_fp\_peak = 102$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Feb-2024

Hardware Availability: Dec-2023

Software Availability: Dec-2023

SPECrate®2017_fp_base (97.8)   SPECrate®2017_fp_peak (102)

Hardware

CPU Name: Intel Xeon E-2456
 Max MHz: 5100
 Nominal: 3300
Enabled: 6 cores, 1 chip, 2 threads/core
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: 18 MB I+D on chip per chip
 Other: None
Memory: 64 GB (2 x 32 GB 2Rx8 PC5-5600B-E, running at 4400), orderable using HPE part# P64339-B21;
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
 Kernel 5.14.21-150400.22-default
Compiler: C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: HPE BIOS Version v1.44 01/04/2024 released Jan-2024
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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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CPU2017 License: 3	**Test Date:**	Feb-2024
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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	12	281	428	281	428	**281**	**428**	12	281	428	281	428	**281**	**428**
507.cactuBSSN_r	12	**126**	**121**	125	122	126	120	6	59.2	128	**59.0**	**129**	59.0	129
508.namd_r	12	**178**	**64.2**	180	63.2	177	64.3	12	**178**	**64.2**	180	63.2	177	64.3
510.parest_r	12	627	50.1	**627**	**50.1**	631	49.7	6	**223**	**70.4**	222	70.6	223	70.3
511.povray_r	12	**279**	**100**	279	101	279	100	12	**269**	**104**	269	104	269	104
519.lbm_r	12	249	50.8	**249**	**50.7**	250	50.7	12	249	50.8	**249**	**50.7**	250	50.7
521.wrf_r	12	358	75.2	**358**	**75.1**	359	74.8	6	166	81.0	**170**	**79.0**	172	78.2
526.blender_r	12	199	92.1	198	92.3	**198**	**92.2**	12	199	92.1	198	92.3	**198**	**92.2**
527.cam4_r	12	**184**	**114**	185	114	183	115	12	**184**	**114**	185	114	183	115
538.imagick_r	12	108	278	107	278	**107**	**278**	12	108	278	107	278	**107**	**278**
544.nab_r	12	147	138	147	137	**147**	**137**	12	147	138	147	137	**147**	**137**
549.fotonik3d_r	12	**671**	**69.7**	671	69.7	671	69.7	12	**671**	**69.7**	671	69.7	671	69.7
554.roms_r	12	449	42.4	452	42.1	**449**	**42.4**	6	212	44.9	**212**	**45.0**	212	45.0
SPECrate®2017_fp_base =		**97.8**										
SPECrate®2017_fp_peak =		**102**										

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
tuned-adm profile was set to throughput-performance using "tuned-adm profile throughput-performance"

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 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.

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CPU2017 License: 3		**Test Date:**	Feb-2024
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2023
Tested by:	HPE	**Software Availability:**	Dec-2023

General Notes (Continued)

```
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 0x121 for
the Intel Xeon E-2456 processor.
BIOS Configuration:
 Workload Profile set to General Throughput Compute
 Thermal Configuration set to Maximum Cooling
 Enhanced Processor Performance Profile set to Enabled

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost Sat Feb  3 11:11:17 2024

 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 249 (249.11+suse.124.g2bc0b2c447)
 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 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
   x86_64 x86_64 x86_64 GNU/Linux

 -----------------------------------------------------------
 2. w
    11:11:17 up  4:15,  0 users,  load average: 8.49, 11.45, 11.99
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
```

(Continued on next page)

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Platform Notes (Continued)

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


      ----------------------------------------------------------
      4. ulimit -a
        core file size          (blocks, -c) unlimited
        data seg size           (kbytes, -d) unlimited
        scheduling priority             (-e) 0
        file size               (blocks, -f) unlimited
        pending signals                 (-i) 256726
        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) 256726
        virtual memory          (kbytes, -v) unlimited
        file locks                      (-x) unlimited


      ----------------------------------------------------------
      5. sysinfo process ancestry
       /usr/lib/systemd/systemd --switched-root --system --deserialize 29
       sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
       sshd: root@notty
       bash -c cd $SPEC/ && $SPEC/fprateTP.sh
       runcpu --nobuild --action validate --define default-platform-flags --define numcopies=12 -c
         ic2023.2.3-lin-core-avx2-rate-20231121.cfg --define smt-on --define cores=6 --define physicalfirst
         --define no-numa --tune base,peak -o all --define drop_caches fprate
       runcpu --nobuild --action validate --define default-platform-flags --define numcopies=12 --configfile
         ic2023.2.3-lin-core-avx2-rate-20231121.cfg --define smt-on --define cores=6 --define physicalfirst
         --define no-numa --tune base,peak --output_format all --define drop_caches --nopower --runmode rate --tune
         base:peak --size refrate fprate --nopreenv --note-preenv --logfile
         $SPEC/tmp/CPU2017.001/templogs/preenv.fprate.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) E E-2456
          vendor_id       : GenuineIntel
          cpu family      : 6
          model           : 183
          stepping        : 1
          microcode       : 0x121
          bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
          cpu cores       : 6
          siblings        : 12
          1 physical ids (chips)
          12 processors (hardware threads)
          physical id 0: core ids 0-5
          physical id 0: apicids 0-11
        Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
        virtualized systems.  Use the above data carefully.


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

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Platform Notes (Continued)

```
From lscpu from util-linux 2.37.2:
  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):                    12
  On-line CPU(s) list:       0-11
  Vendor ID:                 GenuineIntel
  Model name:                Intel(R) Xeon(R) E E-2456
  CPU family:                6
  Model:                     183
  Thread(s) per core:        2
  Core(s) per socket:        6
  Socket(s):                 1
  Stepping:                  1
  BogoMIPS:                  6604.80
  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 sse4_1 sse4_2
                             x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm
                             abm 3dnowprefetch cpuid_fault epb invpcid_single ssbd ibrs ibpb stibp
                             ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase
                             tsc_adjust bmi1 avx2 smep bmi2 erms invpcid rdseed adx smap clflushopt
                             clwb intel_pt sha_ni xsaveopt xsavec xgetbv1 xsaves avx_vnni dtherm ida
                             arat pln pts umip pku ospke waitpkg gfni vaes vpclmulqdq tme rdpid movdiri
                             movdir64b fsrm md_clear serialize pconfig arch_lbr flush_l1d
                             arch_capabilities
  Virtualization:            VT-x
  L1d cache:                 288 KiB (6 instances)
  L1i cache:                 192 KiB (6 instances)
  L2 cache:                  12 MiB (6 instances)
  L3 cache:                  18 MiB (1 instance)
  NUMA node(s):              1
  NUMA node0 CPU(s):         0-11
  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 and seccomp
  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     288K  12 Data           1    64       1             64
    L1i      32K     192K   8 Instruction    1    64       1             64
    L2        2M      12M  16 Unified        2  2048       1             64
    L3       18M      18M   9 Unified        3 32768       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: 0-11
  node 0 size: 64203 MB
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 0 free: 53267 MB
   node distances:
   node   0
     0:  10


  ---------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       65744628 kB


  ---------------------------------------------------------------
10. who -r
   run-level 3 Feb 3 06:56


  ---------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
   Default Target  Status
   multi-user      running


  ---------------------------------------------------------------
12. Services, from systemctl list-unit-files
   STATE             UNIT FILES
   enabled           apparmor auditd cron getty@ haveged irqbalance issue-generator kbdsettings lvm2-monitor
                     postfix purge-kernels rollback sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6
                     wickedd-nanny
   enabled-runtime   systemd-remount-fs
   disabled          blk-availability boot-sysctl ca-certificates chrony-wait chronyd console-getty debug-shell
                     grub2-once haveged-switch-root issue-add-ssh-keys kexec-load lunmask rpmconfigcheck
                     serial-getty@ systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                     systemd-time-wait-sync systemd-timesyncd tuned
   indirect          wickedd


  ---------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=425f9de5-b352-4d79-81b6-6bbcce2666d4
   splash=silent
   resume=/dev/disk/by-uuid/6ac3ae64-fc23-4381-ade9-de98d8923cd3
   mitigations=auto
   quiet
   security=apparmor


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

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Platform Notes (Continued)

```
  vm.dirty_bytes                     0
  vm.dirty_expire_centisecs       3000
  vm.dirty_ratio                    20
  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 SUSE Linux Enterprise Server 15 SP4


  ------------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017
  Filesystem      Type  Size  Used Avail Use% Mounted on
  /dev/sda3       xfs   374G   57G  317G  16% /home


  ------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:        HPE
    Product:       ProLiant ML30 Gen11
    Product Family: ProLiant
    Serial:        LXVBT01BVHZ03N


  ------------------------------------------------------------
22. dmidecode
  Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
  The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
  determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
  "DMTF SMBIOS" standard.
  Memory:
    2x Hynix HMCG88AGBEA084N 32 GB 2 rank 5600, configured at 4400
```

(Continued on next page)

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Platform Notes (Continued)

```
   ---------------------------------------------------------
   23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:       HPE
      BIOS Version:      1.44
      BIOS Date:         01/04/2024
      BIOS Revision:     1.44
      Firmware Revision: 1.45
```

Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
```

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Compiler Version Notes (Continued)

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 -xCORE-AVX2 -Ofast -ffast-math`

(Continued on next page)

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant ML30 Gen11
(3.30 GHz, Intel Xeon E-2456)

SPECrate®2017_fp_base = 97.8

SPECrate®2017_fp_peak = 102

CPU2017 License:	3	**Test Date:**	Feb-2024
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2023
Tested by:	HPE	**Software Availability:**	Dec-2023

Base Optimization Flags (Continued)

C benchmarks (continued):
```
-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-AVX2 -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-AVX2 -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
```

Benchmarks using both Fortran and C:
```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -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-AVX2 -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-AVX2 -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
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifx
```

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SPEC CPU®2017 Floating Point Rate Result

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ProLiant ML30 Gen11
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SPECrate®2017_fp_peak = 102

CPU2017 License: 3	**Test Date:** Feb-2024
Test Sponsor: HPE	**Hardware Availability:** Dec-2023
Tested by: HPE	**Software Availability:** Dec-2023

Peak 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`

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast`
`-ffast-math -flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `basepeak = yes`

554.roms_r: `-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math`
`-flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -nostandard-realloc-lhs`
`-align array32byte -auto -ljemalloc`

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Hewlett Packard Enterprise
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ProLiant ML30 Gen11
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CPU2017 License:	3	**Test Date:**	Feb-2024
Test Sponsor:	HPE	**Hardware Availability:**	Dec-2023
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Peak Optimization Flags (Continued)

554.roms_r (continued):
`-L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using both Fortran and C:

521.wrf_r: `-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -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`

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs`
`-fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX2 -flto`
`-Ofast -ffast-math -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:
`-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -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-RPL-rev2.0.html
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-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-RPL-rev2.0.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml

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

Tested with SPEC CPU®2017 v1.1.9 on 2024-02-03 00:41:16-0500.
Report generated on 2024-03-04 13:00:32 by CPU2017 PDF formatter v6716.
Originally published on 2024-02-27.