SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380a Gen11
(2.10 GHz, Intel Xeon Platinum 8468)

$SPECrate®2017\_fp\_base = 903$
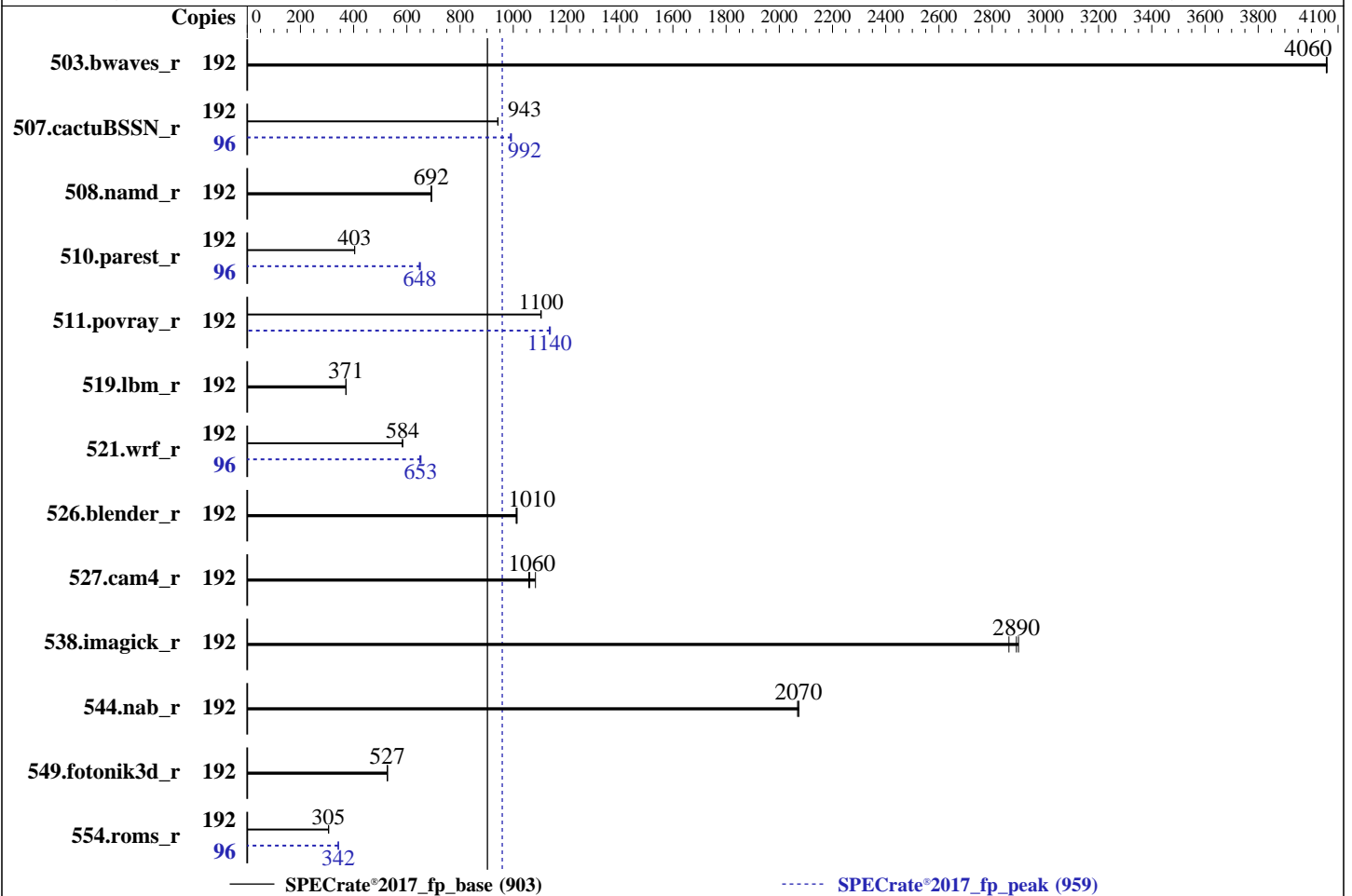
$SPECrate®2017\_fp\_peak = 959$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Benchmark	Copies	base	peak
503.bwaves_r	192	4060	
507.cactuBSSN_r	192	943	
	96		992
508.namd_r	192	692	
510.parest_r	192	403	
	96		648
511.povray_r	192	1100	
	192		1140
519.lbm_r	192	371	
521.wrf_r	192	584	
	96		653
526.blender_r	192	1010	
527.cam4_r	192	1060	
538.imagick_r	192	2890	
544.nab_r	192	2070	
549.fotonik3d_r	192	527	
554.roms_r	192	305	
	96		342

SPECrate®2017_fp_base (903)   SPECrate®2017_fp_peak (959)

Hardware

CPU Name: Intel Xeon Platinum 8468
Max MHz: 3800
Nominal: 2100
Enabled: 96 cores, 2 chips, 2 threads/core
Orderable: 1, 2 chip(s)
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 105 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 1.6 TB NVMe 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;
Parallel: No
Firmware: HPE BIOS Version v1.22 01/18/2023 released Jan-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

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

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Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio

Benchmark	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	**475**	**4060**	475	4060	474	4060	192	**475**	**4060**	475	4060	474	4060
507.cactuBSSN_r	192	**258**	**943**	258	941	258	943	96	123	990	**123**	**992**	122	993
508.namd_r	192	**264**	**692**	264	692	263	693	192	**264**	**692**	264	692	263	693
510.parest_r	192	**1245**	**403**	1245	403	1243	404	96	386	651	388	647	**388**	**648**
511.povray_r	192	**406**	**1100**	406	1100	406	1100	192	395	1140	**394**	**1140**	393	1140
519.lbm_r	192	545	371	**545**	**371**	545	371	192	545	371	**545**	**371**	545	371
521.wrf_r	192	**737**	**584**	736	584	738	583	96	332	648	**330**	**653**	329	653
526.blender_r	192	**289**	**1010**	289	1010	288	1010	192	**289**	**1010**	289	1010	288	1010
527.cam4_r	192	317	1060	310	1080	**316**	**1060**	192	317	1060	310	1080	**316**	**1060**
538.imagick_r	192	165	2900	**165**	**2890**	167	2860	192	165	2900	**165**	**2890**	167	2860
544.nab_r	192	156	2070	**156**	**2070**	156	2070	192	156	2070	**156**	**2070**	156	2070
549.fotonik3d_r	192	1419	527	**1421**	**527**	1421	526	192	1419	527	**1421**	**527**	1421	526
554.roms_r	192	995	306	**999**	**305**	999	305	96	446	342	445	343	**446**	**342**

SPECrate®2017_fp_base =	**903**
SPECrate®2017_fp_peak =	**959**

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>
    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:
    LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
    MALLOC_CONF = "retain:true"

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General Notes

```
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
The system ROM used for this result contains Intel microcode version 0x2b000161 for
the Intel Xeon Platinum 8468 Processor
BIOS Configuration:
 Workload Profile set to General Throughput Compute
 Thermal Configuration set to Maximum Cooling
 Enhanced Processor Performance Profile set to Aggressive
 Last Level Cache (LLC) Dead Line Allocation set to Disabled
 Memory Patrol Scrubbing set to Disabled
 Workload Profile set to Custom
  DCU Stream Prefetcher set to Disabled
  Adjacent Sector Prefetch set to Disabled
  Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State
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 Thu Apr  7 05:42:46 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
 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
```

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Platform Notes (Continued)

```
  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
     05:42:46 up 12 min,  2 users,  load average: 0.00, 0.49, 0.88
    USER      TTY         LOGIN@   IDLE   JCPU   PCPU WHAT
    root      tty1        05:37    5:34   0.00s  0.00s -bash
    root      pts/0       05:38    6.00s  0.88s  0.01s -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) 2062686
    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) 2062686
    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/0
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
     --define invoke_with_interleave --define drop_caches --tune base,peak -o all fprate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
     --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
     --runmode rate --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.015/templogs/preenv.fprate.015.0.log --lognum 015.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017


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

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Platform Notes (Continued)

```
  6. /proc/cpuinfo
     model name        : Intel(R) Xeon(R) Platinum 8468
     vendor_id         : GenuineIntel
     cpu family        : 6
     model             : 143
     stepping          : 8
     microcode         : 0x2b000161
     bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs
     cpu cores         : 48
     siblings          : 96
     2 physical ids (chips)
     192 processors (hardware threads)
     physical id 0: core ids 0-47
     physical id 1: core ids 0-47
     physical id 0: apicids 0-95
     physical id 1: apicids 128-223
  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):                  192
   On-line CPU(s) list:     0-191
   Vendor ID:               GenuineIntel
   BIOS Vendor ID:          Intel(R) Corporation
   Model name:              Intel(R) Xeon(R) Platinum 8468
   BIOS Model name:         Intel(R) Xeon(R) Platinum 8468
   CPU family:              6
   Model:                   143
   Thread(s) per core:      2
   Core(s) per socket:      48
   Socket(s):               2
   Stepping:                8
   BogoMIPS:                4200.00
   Flags:                   fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                            clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                            lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
                            nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor
                            ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1
                            sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
                            lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cat_l2 cdp_l3
                            invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                            vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2
                            erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                            clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
                            xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                            split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                            avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq
                            avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect
                            cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
                            arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities
   Virtualization:          VT-x
   L1d cache:               4.5 MiB (96 instances)
   L1i cache:               3 MiB (96 instances)
```

(Continued on next page)

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Platform Notes (Continued)

```
  L2 cache:                      192 MiB (96 instances)
  L3 cache:                      210 MiB (2 instances)
  NUMA node(s):                  8
  NUMA node0 CPU(s):             0-11,96-107
  NUMA node1 CPU(s):             12-23,108-119
  NUMA node2 CPU(s):             24-35,120-131
  NUMA node3 CPU(s):             36-47,132-143
  NUMA node4 CPU(s):             48-59,144-155
  NUMA node5 CPU(s):             60-71,156-167
  NUMA node6 CPU(s):             72-83,168-179
  NUMA node7 CPU(s):             84-95,180-191
  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     4.5M   12 Data            1      64       1             64
    L1i      32K       3M    8 Instruction     1      64       1             64
    L2        2M     192M   16 Unified         2    2048       1             64
    L3      105M     210M   15 Unified         3 114688       1             64

  ----------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0-11,96-107
  node 0 size: 64219 MB
  node 0 free: 63351 MB
  node 1 cpus: 12-23,108-119
  node 1 size: 64506 MB
  node 1 free: 64155 MB
  node 2 cpus: 24-35,120-131
  node 2 size: 64506 MB
  node 2 free: 64191 MB
  node 3 cpus: 36-47,132-143
  node 3 size: 64470 MB
  node 3 free: 64163 MB
  node 4 cpus: 48-59,144-155
  node 4 size: 64506 MB
  node 4 free: 64096 MB
  node 5 cpus: 60-71,156-167
  node 5 size: 64506 MB
  node 5 free: 64068 MB
  node 6 cpus: 72-83,168-179
  node 6 size: 64506 MB
  node 6 free: 64172 MB
  node 7 cpus: 84-95,180-191
  node 7 size: 64486 MB
  node 7 free: 64170 MB
  node distances:
  node   0    1    2    3    4    5    6    7
    0:  10   20   30   30   30   30   30   30
    1:  20   10   30   30   30   30   30   30
```

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Platform Notes (Continued)

```
    2:  30  30  10  20  30  30  30  30
    3:  30  30  20  10  30  30  30  30
    4:  30  30  30  30  10  20  30  30
    5:  30  30  30  30  20  10  30  30
    6:  30  30  30  30  30  30  10  20
    7:  30  30  30  30  30  30  20  10


  -------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       528088472 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 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


  -------------------------------------------------------------
  16. sysctl
    kernel.numa_balancing            1
    kernel.randomize_va_space        2
    vm.compaction_proactiveness      20
    vm.dirty_background_bytes        0
```

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Platform Notes (Continued)

```
    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   1.4T  151G  1.3T  11% /home


    ------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL380a Gen11
    Product Family: ProLiant
    Serial:         CNX22602MZ


    ------------------------------------------------------------
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:
```

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

Platform Notes (Continued)

```
       7x Hynix HMCG88AEBRA168N 32 GB 2 rank 4800
       6x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800
       3x Hynix HMCG88MEBRA115N 32 GB 2 rank 4800


      --------------------------------------------------------------
    23. BIOS
    (This section combines info from /sys/devices and dmidecode.)
       BIOS Vendor:       HPE
       BIOS Version:      1.22
       BIOS Date:         01/18/2023
       BIOS Revision:     1.22
       Firmware Revision: 1.30
```

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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
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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, 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        | 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 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
Fortran, C     | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
```

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380a Gen11
(2.10 GHz, Intel Xeon Platinum 8468)

$SPECrate®2017\_fp\_base = 903$

$SPECrate®2017\_fp\_peak = 959$

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

Compiler Version Notes (Continued)

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

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`

SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380a Gen11
(2.10 GHz, Intel Xeon Platinum 8468)

SPECrate®2017_fp_base = 903

SPECrate®2017_fp_peak = 959

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

Base Optimization Flags

C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xsapphirerapids -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 -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -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 -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:
```
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

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

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SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380a Gen11
(2.10 GHz, Intel Xeon Platinum 8468)

SPECrate®2017_fp_base = 903

SPECrate®2017_fp_peak = 959

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Peak Compiler Invocation (Continued)

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
```

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

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)

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SPEC CPU®2017 Floating Point Rate Result

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CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: Mar-2023

Software Availability: Dec-2022

Peak Optimization Flags (Continued)

549.fotonik3d_r: basepeak = yes

554.roms_r: -w -m64 -Wl,-z,muldefs -xsapphirerapids -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:

521.wrf_r: -w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int
-mprefer-vector-width=512 -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(pass 1)
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int
-mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-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-SPR-rev1.2.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-SPR-rev1.2.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

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

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

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