SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECrate^®2017\_fp\_base = 866$

ProLiant DL380 Gen11
(2.70 GHz, Intel Xeon Max 9462)

$SPECrate^®2017\_fp\_peak = 877$

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

Benchmark	Copies	Result (base)	Result (peak)
503.bwaves_r	128	4100	
507.cactuBSSN_r	128 / 64	1020	1150
508.namd_r	128	450	
510.parest_r	128 / 64	481	487
511.povray_r	128	715	737
519.lbm_r	128	549	
521.wrf_r	128	918	
526.blender_r	128	666	
527.cam4_r	128	770	
538.imagick_r	128	1920	
544.nab_r	128	1360	
549.fotonik3d_r	128	735	
554.roms_r	128	486	

SPECrate®2017_fp_base (866)   SPECrate®2017_fp_peak (877)

Hardware

CPU Name: Intel Xeon Max 9462
Max MHz: 3500
Nominal: 2700
Enabled: 64 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: 75 MB I+D on chip per chip
Other: None
Memory: 640 GB (16 x 32 GB 2Rx8 PC5-4800B-R + 2 x 64 GB HBM)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux release 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 v1.34 04/13/2023 released Apr-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

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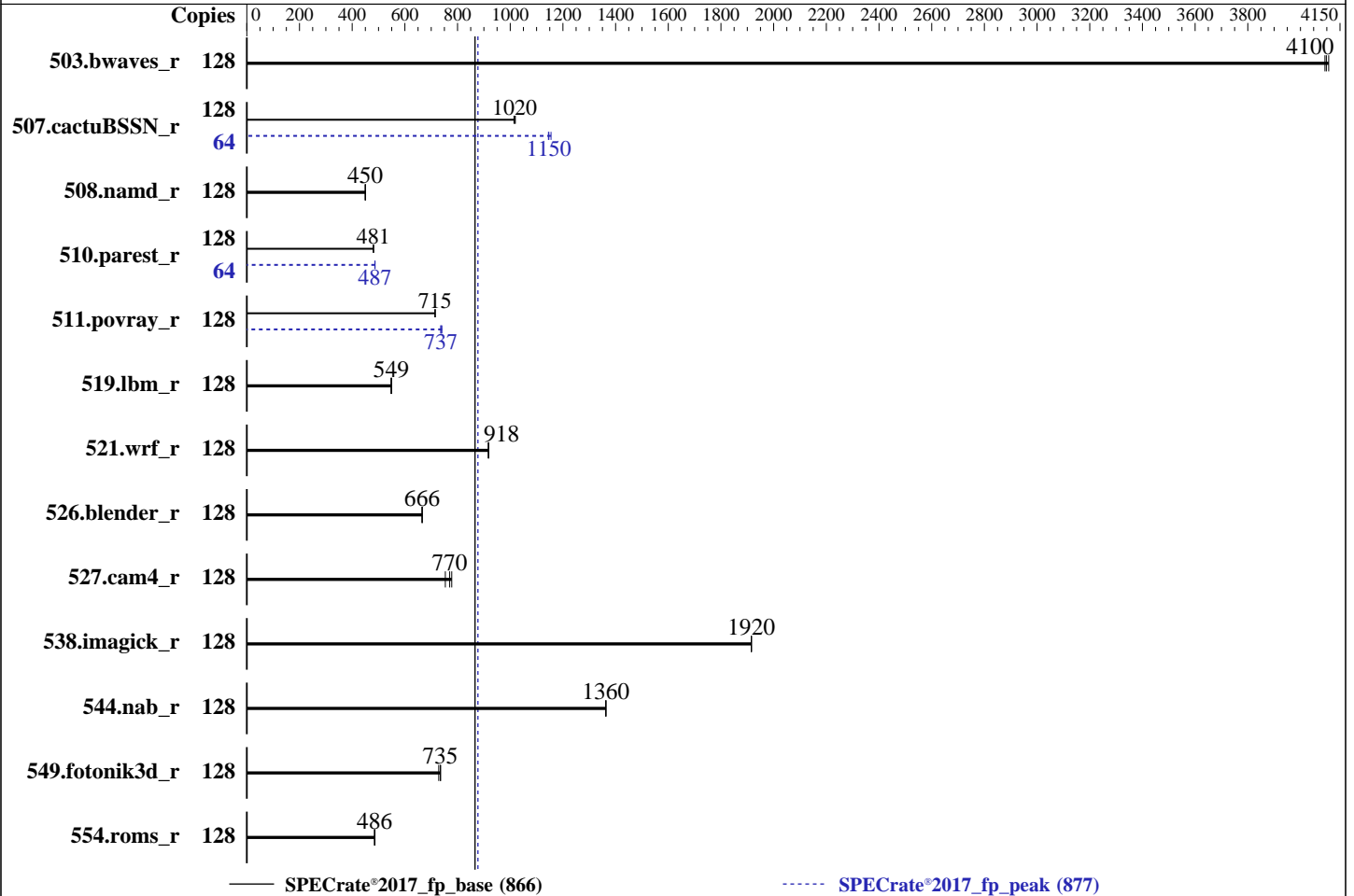(Test Sponsor: HPE)

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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	128	**313**	**4100**	314	4090	313	4110	128	**313**	**4100**	314	4090	313	4110
507.cactuBSSN_r	128	160	1010	159	1020	**159**	**1020**	64	**70.7**	**1150**	70.2	1150	70.8	1150
508.namd_r	128	270	451	**270**	**450**	270	450	128	270	451	**270**	**450**	270	450
510.parest_r	128	**697**	**481**	697	481	697	481	64	344	487	**344**	**487**	344	486
511.povray_r	128	**418**	**715**	418	715	418	715	128	**406**	**737**	404	741	406	736
519.lbm_r	128	246	549	246	548	**246**	**549**	128	246	549	246	548	**246**	**549**
521.wrf_r	128	312	918	313	916	**312**	**918**	128	312	918	313	916	**312**	**918**
526.blender_r	128	**293**	**666**	293	665	293	666	128	**293**	**666**	293	665	293	666
527.cam4_r	128	297	754	**291**	**770**	288	778	128	297	754	**291**	**770**	288	778
538.imagick_r	128	166	1910	**166**	**1920**	166	1920	128	166	1910	**166**	**1920**	166	1920
544.nab_r	128	158	1360	158	1360	**158**	**1360**	128	158	1360	158	1360	**158**	**1360**
549.fotonik3d_r	128	678	736	685	729	**679**	**735**	128	678	736	685	729	**679**	**735**
554.roms_r	128	418	486	**419**	**486**	420	484	128	418	486	**419**	**486**	420	484

SPECrate®2017_fp_base =	**866**
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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>
   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)
```

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General Notes (Continued)

```
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 0x2b0004a1 for
the Intel Xeon Max 9462 processor.
BIOS Configuration:
 Workload Profile set to General Throughput Compute
 Memory Patrol Scrubbing set to Disabled
 Last Level Cache (LLC) Dead Line Allocation set to Disabled
 Enhanced Processor Performance Profile set to Aggressive
 Thermal Configuration set to Maximum Cooling
 Workload Profile set to Custom
   Adjacent Sector Prefetch set to Disabled
   DCU Stream Prefetcher set to Disabled
   Intel UPI Link Power Management set to Enabled

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Fri May 26 22:16:39 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. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
 15. cpupower frequency-info
 16. tuned-adm active
 17. sysctl
 18. /sys/kernel/mm/transparent_hugepage
 19. /sys/kernel/mm/transparent_hugepage/khugepaged
 20. OS release
 21. Disk information
 22. /sys/devices/virtual/dmi/id
 23. dmidecode
 24. BIOS
 -----------------------------------------------------------
```

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

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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
             22:16:39 up  8:44,  1 user,  load average: 0.00, 15.75, 64.20
            USER     TTY         LOGIN@   IDLE   JCPU   PCPU WHAT
            root     pts/0    13:58    6:08m  1.32s  0.08s turbostat --quiet

          ----------------------------------------------------------
          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) 2062775
            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) 2062775
            virtual memory              (kbytes, -v) unlimited
            file locks                      (-x) unlimited

          ----------------------------------------------------------
          5. sysinfo process ancestry
           /usr/lib/systemd/systemd --switched-root --system --deserialize 18
           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=128 -c
             ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --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=128 --configfile
             ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --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/CPU2017.006/templogs/preenv.fprate.006.0.log --lognum 006.0 --from_runcpu 2
           specperl $SPEC/bin/sysinfo
          $SPEC = /home/cpu2017

          ----------------------------------------------------------
          6. /proc/cpuinfo
              model name     : Intel (R) Xeon (R) CPU Max 9462
              vendor_id      : GenuineIntel
              cpu family     : 6
              model          : 143
```

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Platform Notes (Continued)

```
    stepping        : 8
    microcode       : 0x2c0001d1
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 32
    siblings        : 64
    2 physical ids (chips)
    128 processors (hardware threads)
    physical id 0: core ids 0-31
    physical id 1: core ids 0-31
    physical id 0: apicids 0-63
    physical id 1: apicids 128-191
  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):                 128
    On-line CPU(s) list:    0-127
    Vendor ID:              GenuineIntel
    BIOS Vendor ID:         Intel(R) Corporation
    Model name:             Intel (R) Xeon (R) CPU Max 9462
    BIOS Model name:        Intel (R) Xeon (R) CPU Max 9462
    CPU family:             6
    Model:                  143
    Thread(s) per core:     2
    Core(s) per socket:     32
    Socket(s):              2
    Stepping:               8
    BogoMIPS:               5400.00
    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:              3 MiB (64 instances)
    L1i cache:              2 MiB (64 instances)
    L2 cache:               128 MiB (64 instances)
    L3 cache:               150 MiB (2 instances)
    NUMA node(s):           8
    NUMA node0 CPU(s):      0-7,64-71
    NUMA node1 CPU(s):      8-15,72-79
```

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Platform Notes (Continued)

```
  NUMA node2 CPU(s):            16-23,80-87
  NUMA node3 CPU(s):            24-31,88-95
  NUMA node4 CPU(s):            32-39,96-103
  NUMA node5 CPU(s):            40-47,104-111
  NUMA node6 CPU(s):            48-55,112-119
  NUMA node7 CPU(s):            56-63,120-127
  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       3M  12 Data            1     64        1              64
      L1i      32K       2M   8 Instruction     1     64        1              64
      L2        2M     128M  16 Unified         2   2048        1              64
      L3       75M     150M  15 Unified         3  81920        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: 0-7,64-71
    node 0 size: 64221 MB
    node 0 free: 53047 MB
    node 1 cpus: 8-15,72-79
    node 1 size: 64508 MB
    node 1 free: 57908 MB
    node 2 cpus: 16-23,80-87
    node 2 size: 64508 MB
    node 2 free: 57829 MB
    node 3 cpus: 24-31,88-95
    node 3 size: 64508 MB
    node 3 free: 57828 MB
    node 4 cpus: 32-39,96-103
    node 4 size: 64508 MB
    node 4 free: 57920 MB
    node 5 cpus: 40-47,104-111
    node 5 size: 64508 MB
    node 5 free: 57918 MB
    node 6 cpus: 48-55,112-119
    node 6 size: 64508 MB
    node 6 free: 57915 MB
    node 7 cpus: 56-63,120-127
    node 7 size: 64461 MB
    node 7 free: 57820 MB
    node distances:
    node   0   1   2   3   4   5   6   7
      0:  10  17  17  17  26  26  26  26
      1:  17  10  17  17  26  26  26  26
      2:  17  17  10  17  26  26  26  26
      3:  17  17  17  10  26  26  26  26
      4:  26  26  26  26  10  17  17  17
      5:  26  26  26  26  17  10  17  17
      6:  26  26  26  26  17  17  10  17
```

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Platform Notes (Continued)

```
     7:  26  26  26  26  17  17  17  10


   -------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       528111120 kB


   -------------------------------------------------------------
10. who -r
   run-level 3 May 26 13:32


   -------------------------------------------------------------
11. Systemd service manager version: systemd 250 (250-6.el9_0)
   Default Target  Status
   multi-user      degraded


   -------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
     UNIT          LOAD   ACTIVE SUB    DESCRIPTION
   * sep5.service loaded failed failed systemd script to load sep5 driver at boot time


   -------------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE            UNIT FILES
   enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd crond
                    dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode
                    nis-domainname rhsmcertd rsyslog selinux-autorelabel-mark sep5 sshd sssd
                    systemd-network-generator tuned udisks2 upower
   enabled-runtime  systemd-remount-fs
   disabled         blk-availability canberra-system-bootup canberra-system-shutdown
                    canberra-system-shutdown-reboot chrony-wait chronyd 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


   -------------------------------------------------------------
14. 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


   -------------------------------------------------------------
15. cpupower frequency-info
   analyzing CPU 0:
     Unable to determine current policy
     boost state support:
       Supported: yes
       Active: yes


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


   -------------------------------------------------------------
17. sysctl
   kernel.numa_balancing              1
   kernel.randomize_va_space          2
```

(Continued on next page)

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Platform Notes (Continued)

```
    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


    ---------------------------------------------------------------
18. /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


    ---------------------------------------------------------------
19. /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


    ---------------------------------------------------------------
20. 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)


    ---------------------------------------------------------------
21. Disk information
SPEC is set to: /home/cpu2017
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   372G   90G  283G  24% /home


    ---------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL380 Gen11
    Product Family: ProLiant
    Serial:         CNX21000G8


    ---------------------------------------------------------------
23. 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
```

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Platform Notes (Continued)

```
   "DMTF SMBIOS" standard.
  Memory:
    1x Hynix HMCG88AEBRA168N 32 GB 2 rank 4800
    15x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800


  --------------------------------------------------------------
  24. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       HPE
    BIOS Version:      1.34
    BIOS Date:         04/13/2023
    BIOS Revision:     1.34
    Firmware Revision: 1.10
```

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
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, 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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----------------------------------------------------------------------------------------------


==============================================================================================
```

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SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380 Gen11
(2.70 GHz, Intel Xeon Max 9462)

SPECrate®2017_fp_base = 866

SPECrate®2017_fp_peak = 877

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

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

Compiler Version Notes (Continued)

```
Fortran, C    | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
-------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 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`

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

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380 Gen11
(2.70 GHz, Intel Xeon Max 9462)

SPECrate®2017_fp_base = 866

SPECrate®2017_fp_peak = 877

CPU2017 License: 3		**Test Date:**	May-2023
Test Sponsor: HPE		**Hardware Availability:**	Jun-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

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL380 Gen11
(2.70 GHz, Intel Xeon Max 9462)

SPECrate®2017_fp_base = 866

SPECrate®2017_fp_peak = 877

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

Test Date: May-2023
Hardware Availability: Jun-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`

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SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
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ProLiant DL380 Gen11
(2.70 GHz, Intel Xeon Max 9462)

SPECrate®2017_fp_base = 866

SPECrate®2017_fp_peak = 877

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

Peak Optimization Flags (Continued)

549.fotonik3d_r: `basepeak = yes`

554.roms_r: `basepeak = yes`

Benchmarks using both Fortran and C:

521.wrf_r: `basepeak = yes`

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-rev2.1.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-rev2.1.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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