SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

$SPECrate®2017\_int\_base = 940$

ProLiant DL560 Gen11
(2.00 GHz, Intel Xeon Platinum 8450H)

$SPECrate®2017\_int\_peak = 962$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Apr-2023

Hardware Availability: May-2023

Software Availability: Dec-2022

Benchmark	Copies	base	peak
500.perlbench_r	224	675	734
502.gcc_r	224	794	877
505.mcf_r	224	1510	
520.omnetpp_r	224	675	
523.xalancbmk_r	224	1870	
525.x264_r	224	1740	1830
531.deepsjeng_r	224	631	
541.leela_r	224	602	
548.exchange2_r	224	1800	
557.xz_r	224	440	

SPECrate®2017_int_base (940)   SPECrate®2017_int_peak (962)

Hardware

CPU Name: Intel Xeon Platinum 8450H
Max MHz: 3500
Nominal: 2000
Enabled: 112 cores, 4 chips, 2 threads/core
Orderable: 1, 2, 4 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: 1 TB (32 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB SATA 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 v1.30 03/01/2023 released Mar-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-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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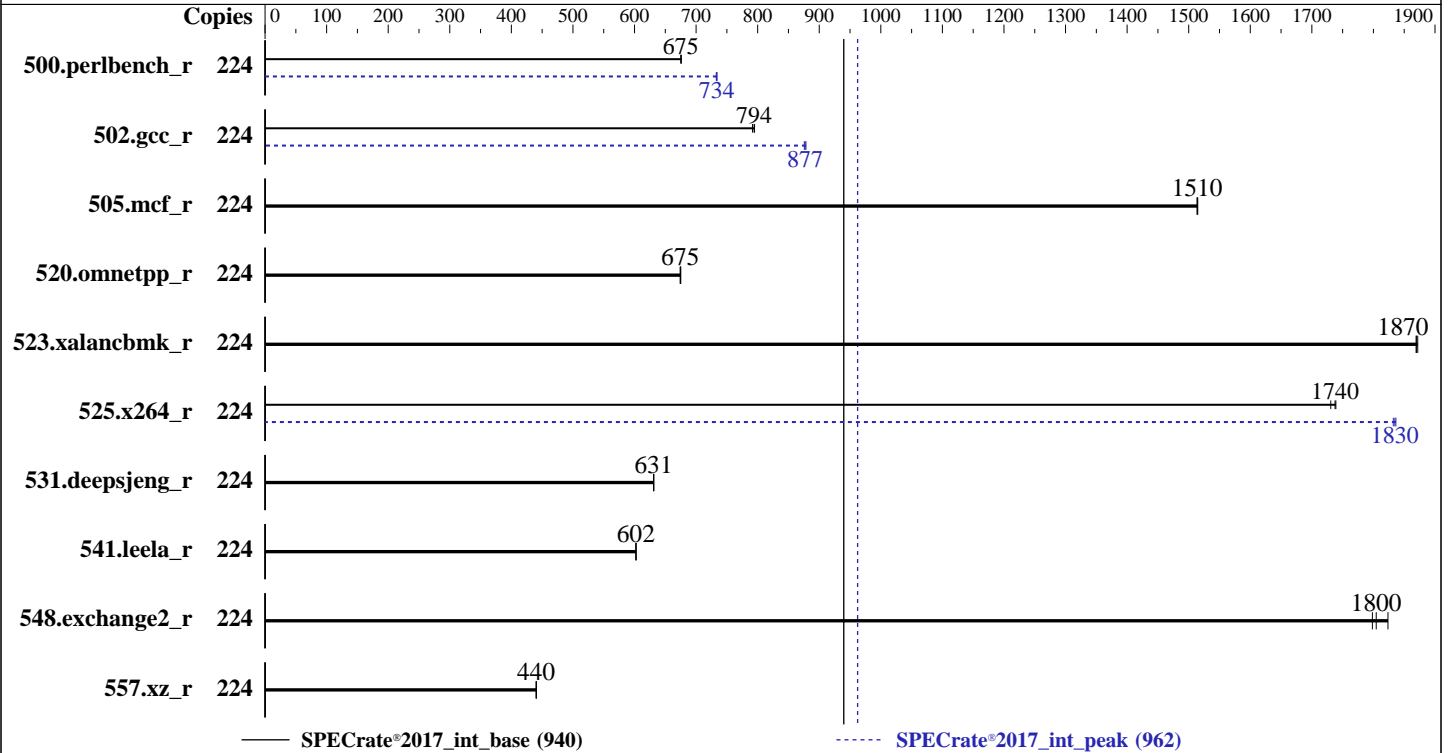(Test Sponsor: HPE)

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	224	**528**	**675**	528	676	528	675	224	486	734	487	733	**486**	**734**
502.gcc_r	224	**399**	**794**	399	795	401	792	224	361	878	362	876	**362**	**877**
505.mcf_r	224	239	1510	**239**	**1510**	239	1510	224	239	1510	**239**	**1510**	239	1510
520.omnetpp_r	224	**436**	**675**	436	674	435	675	224	**436**	**675**	436	674	435	675
523.xalancbmk_r	224	127	1870	126	1870	**127**	**1870**	224	127	1870	126	1870	**127**	**1870**
525.x264_r	224	227	1730	226	1740	**226**	**1740**	224	214	1830	214	1840	**214**	**1830**
531.deepsjeng_r	224	407	631	407	631	**407**	**631**	224	407	631	407	631	**407**	**631**
541.leela_r	224	616	602	**616**	**602**	616	602	224	616	602	**616**	**602**	616	602
548.exchange2_r	224	326	1800	**325**	**1800**	322	1820	224	326	1800	**325**	**1800**	322	1820
557.xz_r	224	549	441	**549**	**440**	549	440	224	549	441	**549**	**440**	549	440
SPECrate®2017_int_base =		**940**												
SPECrate®2017_int_peak =		**962**												

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

```
SPEC has ruled that the compiler used for this result was performing a compilation
that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s
benchmarks using a priori knowledge of the SPEC code and dataset to perform a
transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4
https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer
publish results using this optimization.

This result is left in the SPEC results database for historical reference.
```

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 Accelerator-Performance using "tuned-adm profile accelerator-performance"
  perf-bias for all the CPUs is set using "cpupower set -b 0"
```

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Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"
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.
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 0x2b0001b0 for
the Intel Xeon Platinum 8450H 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
  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: Apr-2023

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Thu Apr  7 05:36:00 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
```

(Continued on next page)

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Hardware Availability: May-2023
Software Availability: Dec-2022

Platform Notes (Continued)

```
   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.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
      05:36:00 up 6 min,  2 users,  load average: 0.04, 0.56, 0.39
     USER      TTY          LOGIN@   IDLE   JCPU   PCPU WHAT
     root      tty1         05:33    2:53   0.00s  0.00s -bash
     root      pts/0        05:33    8.00s  1.01s  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) 4126531
     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) 4126531
     virtual memory              (kbytes, -v) unlimited
     file locks                       (-x) unlimited

   ------------------------------------------------------------
   5. sysinfo process ancestry
    /usr/lib/systemd/systemd --switched-root --system --deserialize 28
    sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
    sshd: root [priv]
    sshd: root@pts/0
    -bash
    -bash
    runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 -c
      ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
      --define invoke_with_interleave --define drop_caches --tune base,peak -o all intrate
```

(Continued on next page)

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Platform Notes (Continued)

```
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
   --runmode rate --tune base:peak --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.017/templogs/preenv.intrate.017.0.log --lognum 017.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017


 --------------------------------------------------------------
 6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8450H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 6
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 28
    siblings        : 56
    4 physical ids (chips)
    224 processors (hardware threads)
    physical id 0: core ids 0-27
    physical id 1: core ids 0-27
    physical id 2: core ids 0-27
    physical id 3: core ids 0-27
    physical id 0: apicids 0-55
    physical id 1: apicids 128-183
    physical id 2: apicids 256-311
    physical id 3: apicids 384-439
  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):                       224
  On-line CPU(s) list:          0-223
  Vendor ID:                    GenuineIntel
  BIOS Vendor ID:               Intel(R) Corporation
  Model name:                   Intel(R) Xeon(R) Platinum 8450H
  BIOS Model name:              Intel(R) Xeon(R) Platinum 8450H
  CPU family:                   6
  Model:                        143
  Thread(s) per core:           2
  Core(s) per socket:           28
  Socket(s):                    4
  Stepping:                     6
  BogoMIPS:                     4000.00
  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
```

(Continued on next page)

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Platform Notes (Continued)

```
                          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:              5.3 MiB (112 instances)
  L1i cache:              3.5 MiB (112 instances)
  L2 cache:               224 MiB (112 instances)
  L3 cache:               300 MiB (4 instances)
  NUMA node(s):           16
  NUMA node0 CPU(s):      0-6,112-118
  NUMA node1 CPU(s):      7-13,119-125
  NUMA node2 CPU(s):      14-20,126-132
  NUMA node3 CPU(s):      21-27,133-139
  NUMA node4 CPU(s):      28-34,140-146
  NUMA node5 CPU(s):      35-41,147-153
  NUMA node6 CPU(s):      42-48,154-160
  NUMA node7 CPU(s):      49-55,161-167
  NUMA node8 CPU(s):      56-62,168-174
  NUMA node9 CPU(s):      63-69,175-181
  NUMA node10 CPU(s):     70-76,182-188
  NUMA node11 CPU(s):     77-83,189-195
  NUMA node12 CPU(s):     84-90,196-202
  NUMA node13 CPU(s):     91-97,203-209
  NUMA node14 CPU(s):     98-104,210-216
  NUMA node15 CPU(s):     105-111,217-223
  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     5.3M    12 Data          1    64      1          64
      L1i     32K     3.5M     8 Instruction   1    64      1          64
      L2       2M     224M    16 Unified       2  2048      1          64
      L3      75M     300M    15 Unified       3 81920      1          64

  -----------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 16 nodes (0-15)
    node 0 cpus: 0-6,112-118
    node 0 size: 64095 MB
    node 0 free: 63204 MB
    node 1 cpus: 7-13,119-125
    node 1 size: 64508 MB
    node 1 free: 64082 MB
    node 2 cpus: 14-20,126-132
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 2 size: 64508 MB
   node 2 free: 64288 MB
   node 3 cpus: 21-27,133-139
   node 3 size: 64508 MB
   node 3 free: 64242 MB
   node 4 cpus: 28-34,140-146
   node 4 size: 64508 MB
   node 4 free: 64271 MB
   node 5 cpus: 35-41,147-153
   node 5 size: 64508 MB
   node 5 free: 64284 MB
   node 6 cpus: 42-48,154-160
   node 6 size: 64508 MB
   node 6 free: 64285 MB
   node 7 cpus: 49-55,161-167
   node 7 size: 64508 MB
   node 7 free: 64279 MB
   node 8 cpus: 56-62,168-174
   node 8 size: 64508 MB
   node 8 free: 64114 MB
   node 9 cpus: 63-69,175-181
   node 9 size: 64508 MB
   node 9 free: 64074 MB
   node 10 cpus: 70-76,182-188
   node 10 size: 64508 MB
   node 10 free: 64276 MB
   node 11 cpus: 77-83,189-195
   node 11 size: 64508 MB
   node 11 free: 64263 MB
   node 12 cpus: 84-90,196-202
   node 12 size: 64508 MB
   node 12 free: 64271 MB
   node 13 cpus: 91-97,203-209
   node 13 size: 64508 MB
   node 13 free: 64267 MB
   node 14 cpus: 98-104,210-216
   node 14 size: 64508 MB
   node 14 free: 64299 MB
   node 15 cpus: 105-111,217-223
   node 15 size: 64452 MB
   node 15 free: 64247 MB
   node distances:
   node   0    1    2    3    4    5    6    7    8    9   10   11   12   13   14   15
     0:  10   20   30   30   30   30   30   30   30   30   30   30   30   30   30   30
     1:  20   10   30   30   30   30   30   30   30   30   30   30   30   30   30   30
     2:  30   30   10   20   30   30   30   30   30   30   30   30   30   30   30   30
     3:  30   30   20   10   30   30   30   30   30   30   30   30   30   30   30   30
     4:  30   30   30   30   10   20   30   30   30   30   30   30   30   30   30   30
     5:  30   30   30   30   20   10   30   30   30   30   30   30   30   30   30   30
     6:  30   30   30   30   30   30   10   20   30   30   30   30   30   30   30   30
     7:  30   30   30   30   30   30   20   10   30   30   30   30   30   30   30   30
     8:  30   30   30   30   30   30   30   30   10   20   30   30   30   30   30   30
     9:  30   30   30   30   30   30   30   30   20   10   30   30   30   30   30   30
    10:  30   30   30   30   30   30   30   30   30   30   10   20   30   30   30   30
    11:  30   30   30   30   30   30   30   30   30   30   20   10   30   30   30   30
    12:  30   30   30   30   30   30   30   30   30   30   30   30   10   20   30   30
    13:  30   30   30   30   30   30   30   30   30   30   30   30   20   10   30   30
    14:  30   30   30   30   30   30   30   30   30   30   30   30   30   30   10   20
    15:  30   30   30   30   30   30   30   30   30   30   30   30   30   30   20   10
```

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Platform Notes (Continued)

```
    -----------------------------------------------------------
    9. /proc/meminfo
       MemTotal:       1056433000 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: accelerator-performance


    -----------------------------------------------------------
    16. sysctl
       kernel.numa_balancing           1
       kernel.randomize_va_space       2
       vm.compaction_proactiveness     20
       vm.dirty_background_bytes       0
       vm.dirty_background_ratio       10
       vm.dirty_bytes                  0
       vm.dirty_expire_centisecs       3000
       vm.dirty_ratio                  40
       vm.dirty_writeback_centisecs    500
       vm.dirtytime_expire_seconds     43200
       vm.extfrag_threshold            500
```

(Continued on next page)

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL560 Gen11
(2.00 GHz, Intel Xeon Platinum 8450H)

$SPECrate^{®}2017\_int\_base = 940$

$SPECrate^{®}2017\_int\_peak = 962$

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

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

Platform Notes (Continued)

```
  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   372G  261G  112G  71% /home


  -------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL560 Gen11
    Product Family: ProLiant
    Serial:         CNX2250G5V


  -------------------------------------------------------------
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:
    3x Samsung M321R4GA3BB0-CQKDG 32 GB 2 rank 4800
    29x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800



  -------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
```

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Hewlett Packard Enterprise

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Test Sponsor: HPE	**Hardware Availability:** May-2023
Tested by: HPE	**Software Availability:** Dec-2022

Platform Notes (Continued)

```
     BIOS Vendor:        HPE
     BIOS Version:       1.30
     BIOS Date:          03/01/2023
     BIOS Revision:      1.30
     Firmware Revision: 1.30
```

Compiler Version Notes

```
==============================================================================
C      | 502.gcc_r(peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C      | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
       | 557.xz_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      | 502.gcc_r(peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C      | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
       | 557.xz_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++    | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
       | 541.leela_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.
------------------------------------------------------------------------------


==============================================================================
Fortran | 548.exchange2_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.
------------------------------------------------------------------------------
```

SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL560 Gen11
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SPECrate®2017_int_base = 940

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

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

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Base Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LP64 -DSPEC_LINUX`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
`-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

C++ benchmarks:
`-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

Fortran benchmarks:
`-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-nostandard-realloc-lhs -align array32byte -auto`
`-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

SPEC CPU®2017 Integer Rate Result

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

Peak Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Peak Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-D_FILE_OFFSET_BITS=64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`
523.xalancbmk_r: `-DSPEC_LP64 -DSPEC_LINUX`
525.x264_r: `-DSPEC_LP64`
531.deepsjeng_r: `-DSPEC_LP64`
541.leela_r: `-DSPEC_LP64`
548.exchange2_r: `-DSPEC_LP64`
557.xz_r: `-DSPEC_LP64`

Peak Optimization Flags

C benchmarks:

500.perlbench_r: `-w -std=c11 -m64 -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`
`-fno-strict-overflow`
`-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

502.gcc_r: `-m32`
`-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/ia32_lin`
`-std=gnu89 -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`
`-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc`

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Test Sponsor: HPE		**Hardware Availability:**	May-2023
Tested by: HPE		**Software Availability:**	Dec-2022

Peak Optimization Flags (Continued)

505.mcf_r: `basepeak = yes`

525.x264_r: `-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast`
`-ffast-math -flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -fno-alias`
`-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin`
`-lqkmalloc`

557.xz_r: `basepeak = yes`

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

523.xalancbmk_r: `basepeak = yes`

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `basepeak = yes`

Fortran benchmarks:

548.exchange2_r: `basepeak = yes`

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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