SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

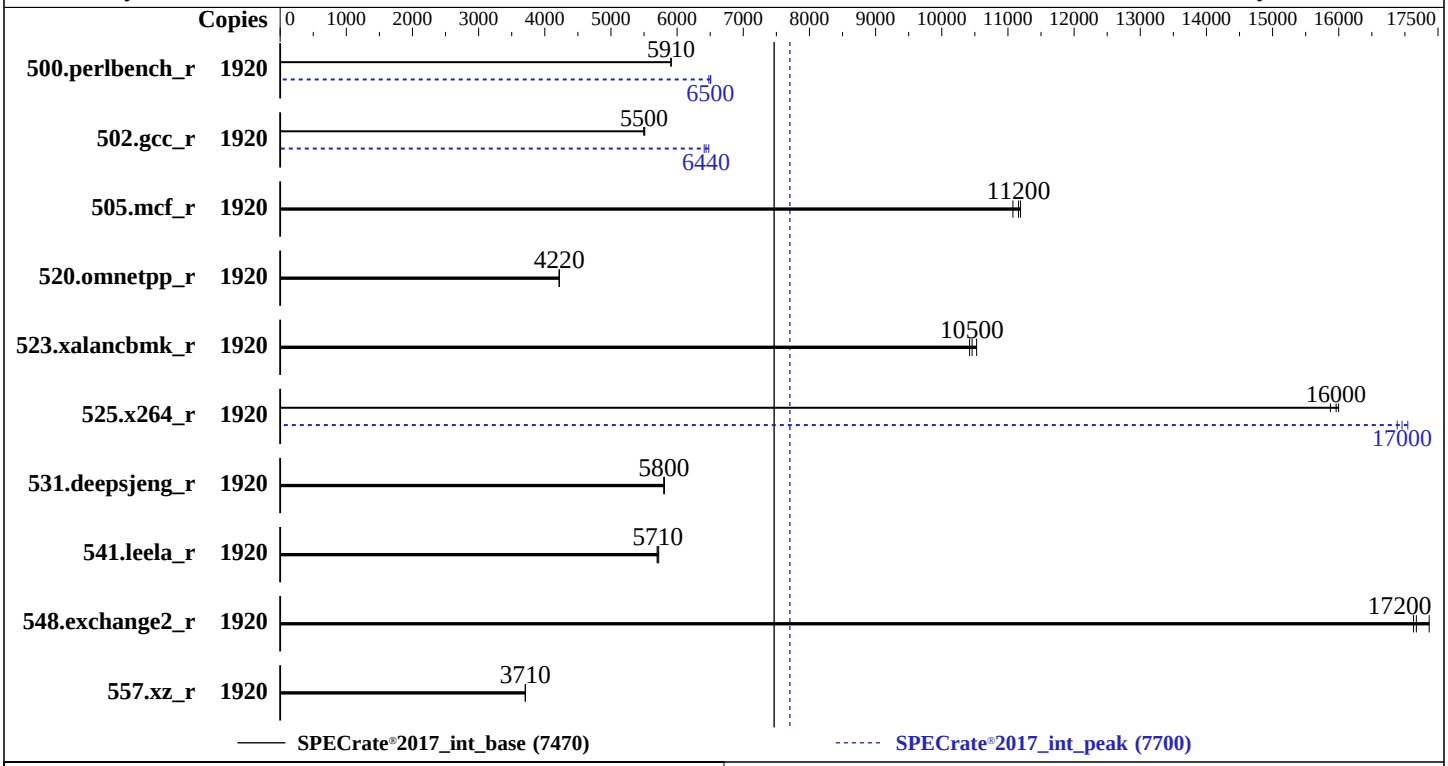
HPE Compute Scale-up Server 3200
(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017_int_base = 7470

SPECrate®2017_int_peak = 7700

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

Test Date: Feb-2025
Hardware Availability: Sep-2023
Software Availability: Jan-2025



Hardware

CPU Name:	Intel Xeon Platinum 8490H
Max MHz:	3500
Nominal:	1900
Enabled:	960 cores, 16 chips, 2 threads/core
Orderable:	4, 8, 16 chip(s)
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	112.5 MB I+D on chip per chip
Other:	None
Memory:	8 TB (128 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	1 x 1.5 TB NVMe SSD
Other:	CPU Cooling: Air

Software

OS:	SUSE Linux Enterprise Server 15 SP6 Kernel 6.4.0-150600.23.33-default
Compiler:	C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	HPE Firmware Bundle Version 1.55.40 01/27/2025 released Jan-2025
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

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	1920	**517**	**5910**	517	5910	517	5910	1920	472	6480	470	6510	**470**	**6500**
502.gcc_r	1920	495	5500	493	5510	**494**	**5500**	1920	**422**	**6440**	420	6480	424	6410
505.mcf_r	1920	280	11100	277	11200	**278**	**11200**	1920	280	11100	277	11200	**278**	**11200**
520.omnetpp_r	1920	597	4220	597	4220	**597**	**4220**	1920	597	4220	597	4220	**597**	**4220**
523.xalancbmk_r	1920	193	10500	**194**	**10500**	195	10400	1920	193	10500	**194**	**10500**	195	10400
525.x264_r	1920	210	16000	212	15900	**211**	**16000**	1920	**198**	**17000**	199	16900	197	17000
531.deepsjeng_r	1920	379	5800	379	5810	**379**	**5800**	1920	379	5800	379	5810	**379**	**5800**
541.leela_r	1920	556	5720	558	5700	**557**	**5710**	1920	556	5720	558	5700	**557**	**5710**
548.exchange2_r	1920	294	17100	**293**	**17200**	290	17400	1920	294	17100	**293**	**17200**	290	17400
557.xz_r	1920	560	3700	559	3710	**560**	**3710**	1920	560	3700	559	3710	**560**	**3710**

SPECrate®2017_int_base = 7470

SPECrate®2017_int_peak = 7700

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/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
```

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General Notes (Continued)

```
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

```
BIOS Configuration:
 Workload Profile set to Custom
 Energy/Performance Bias set to Maximum Performance
 Energy Efficient Turbo set to Disabled
 Advanced Memory Protection set to Advanced ECC Support
 SR-IOV set to Disabled
 Intel Virtualization Technology (Intel VT, VT-x) set to Disabled
 Adjacent Sector Prefetch set to Disabled
 DCU Stream Prefetcher set to Disabled
 Last Level Cache (LLC) Dead Line Allocation set to Disabled
 Enhanced Processor Performance Profile set to Aggressive
 Memory Patrol Scrubbing set to Disabled

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on sph-187 Thu Feb 20 11:46:40 2025

 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 254 (254.21+suse.135.geddf52fb14)
 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
 ------------------------------------------------------------

 ------------------------------------------------------------
 1. uname -a
   Linux sph-187 6.4.0-150600.23.33-default #1 SMP PREEMPT_DYNAMIC Thu Jan  9 14:10:22 UTC 2025 (ba46628)
   x86_64 x86_64 x86_64 GNU/Linux

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

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Platform Notes (Continued)

```
2. w
   11:46:41 up 8 min,  1 user,  load average: 0.64, 6.02, 4.01
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  test     ttyS0    -                11:43    3:21   0.05s  0.07s login -- test
  test     pts/0    -                11:43    9.00s  1.75s  0.01s sudo su

------------------------------------------------------------
3. Username
  From environment variable $USER:  root
  From the command 'logname':       test

------------------------------------------------------------
4. ulimit -a
  core file size          (blocks, -c) 0
  data seg size           (kbytes, -d) unlimited
  scheduling priority             (-e) 0
  file size               (blocks, -f) unlimited
  pending signals                 (-i) 32506843
  max locked memory       (kbytes, -l) 8192
  max memory size         (kbytes, -m) unlimited
  open files                      (-n) 40000
  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) 32506843
  virtual memory          (kbytes, -v) unlimited
  file locks                      (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize=41
 login -- test
 -bash
 sudo su
 sudo su
 su
 bash
 bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=1920 -c
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=960 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak -o all intrate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=1920 --configfile
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=960 --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/CPU2017.004/templogs/preenv.intrate.004.0.log --lognum 004.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8490H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 6
    microcode       : 0x2b000620
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb bhi
```

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Platform Notes (Continued)

```
     cpu cores       : 60
     siblings        : 120
     16 physical ids (chips)
     1920 processors (hardware threads)
     physical id 0: core ids 0-59
     physical id 1: core ids 0-59
     physical id 2: core ids 0-59
     physical id 3: core ids 0-59
     physical id 4: core ids 0-59
     physical id 5: core ids 0-59
     physical id 6: core ids 0-59
     physical id 7: core ids 0-59
     physical id 8: core ids 0-59
     physical id 9: core ids 0-59
     physical id 10: core ids 0-59
     physical id 11: core ids 0-59
     physical id 12: core ids 0-59
     physical id 13: core ids 0-59
     physical id 14: core ids 0-59
     physical id 15: core ids 0-59
     physical id 0: apicids 0-119
     physical id 1: apicids 128-247
     physical id 2: apicids 256-375
     physical id 3: apicids 384-503
     physical id 4: apicids 512-631
     physical id 5: apicids 640-759
     physical id 6: apicids 768-887
     physical id 7: apicids 896-1015
     physical id 8: apicids 1024-1143
     physical id 9: apicids 1152-1271
     physical id 10: apicids 1280-1399
     physical id 11: apicids 1408-1527
     physical id 12: apicids 1536-1655
     physical id 13: apicids 1664-1783
     physical id 14: apicids 1792-1911
     physical id 15: apicids 1920-2039
   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 2.39.3:
   Architecture:                         x86_64
   CPU op-mode(s):                       32-bit, 64-bit
   Address sizes:                        52 bits physical, 57 bits virtual
   Byte Order:                           Little Endian
   CPU(s):                               1920
   On-line CPU(s) list:                  0-1919
   Vendor ID:                            GenuineIntel
   Model name:                           Intel(R) Xeon(R) Platinum 8490H
   CPU family:                           6
   Model:                                143
   Thread(s) per core:                   2
   Core(s) per socket:                   60
   Socket(s):                            16
   Stepping:                             6
   CPU(s) scaling MHz:                   24%
   CPU max MHz:                          3500.0000
   CPU min MHz:                          800.0000
```

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Platform Notes (Continued)

```
   BogoMIPS:                            3800.01
   Flags:                               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
                                        pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx
                                        pdpe1gb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl
                                        xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor
                                        ds_cpl 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
                                        intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase
                                        tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm 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
                                        user_shstk avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
                                        hwp_act_window hwp_pkg_req 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
                                        ibt amx_bf16 avx512_fp16 amx_tile amx_int8 flush_l1d
                                        arch_capabilities
   L1d cache:                           45 MiB (960 instances)
   L1i cache:                           30 MiB (960 instances)
   L2 cache:                            1.9 GiB (960 instances)
   L3 cache:                            1.8 GiB (16 instances)
   NUMA node(s):                        16
   NUMA node0 CPU(s):                   0-59,960-1019
   NUMA node1 CPU(s):                   60-119,1020-1079
   NUMA node2 CPU(s):                   120-179,1080-1139
   NUMA node3 CPU(s):                   180-239,1140-1199
   NUMA node4 CPU(s):                   240-299,1200-1259
   NUMA node5 CPU(s):                   300-359,1260-1319
   NUMA node6 CPU(s):                   360-419,1320-1379
   NUMA node7 CPU(s):                   420-479,1380-1439
   NUMA node8 CPU(s):                   480-539,1440-1499
   NUMA node9 CPU(s):                   540-599,1500-1559
   NUMA node10 CPU(s):                  600-659,1560-1619
   NUMA node11 CPU(s):                  660-719,1620-1679
   NUMA node12 CPU(s):                  720-779,1680-1739
   NUMA node13 CPU(s):                  780-839,1740-1799
   NUMA node14 CPU(s):                  840-899,1800-1859
   NUMA node15 CPU(s):                  900-959,1860-1919
   Vulnerability Gather data sampling:  Not affected
   Vulnerability Itlb multihit:         Not affected
   Vulnerability L1tf:                  Not affected
   Vulnerability Mds:                   Not affected
   Vulnerability Meltdown:              Not affected
   Vulnerability Mmio stale data:       Not affected
   Vulnerability Reg file data sampling: Not affected
   Vulnerability Retbleed:              Not affected
   Vulnerability Spec rstack overflow:  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 / Automatic IBRS; IBPB conditional; RSB filling;
                                        PBRSB-eIBRS SW sequence; BHI BHI_DIS_S
   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      45M   12 Data            1     64        1             64
```

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Platform Notes (Continued)

```
      L1i       32K      30M    8 Instruction     1     64        1             64
      L2         2M     1.9G   16 Unified         2   2048        1             64
      L3     112.5M     1.8G   15 Unified         3 122880        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: 0-59,960-1019
  node 0 size: 506924 MB
  node 0 free: 503179 MB
  node 1 cpus: 60-119,1020-1079
  node 1 size: 508062 MB
  node 1 free: 506926 MB
  node 2 cpus: 120-179,1080-1139
  node 2 size: 508062 MB
  node 2 free: 507100 MB
  node 3 cpus: 180-239,1140-1199
  node 3 size: 508062 MB
  node 3 free: 506958 MB
  node 4 cpus: 240-299,1200-1259
  node 4 size: 508062 MB
  node 4 free: 507657 MB
  node 5 cpus: 300-359,1260-1319
  node 5 size: 508024 MB
  node 5 free: 507613 MB
  node 6 cpus: 360-419,1320-1379
  node 6 size: 508062 MB
  node 6 free: 507665 MB
  node 7 cpus: 420-479,1380-1439
  node 7 size: 508062 MB
  node 7 free: 507652 MB
  node 8 cpus: 480-539,1440-1499
  node 8 size: 508062 MB
  node 8 free: 507379 MB
  node 9 cpus: 540-599,1500-1559
  node 9 size: 508062 MB
  node 9 free: 507519 MB
  node 10 cpus: 600-659,1560-1619
  node 10 size: 508062 MB
  node 10 free: 507290 MB
  node 11 cpus: 660-719,1620-1679
  node 11 size: 508062 MB
  node 11 free: 507388 MB
  node 12 cpus: 720-779,1680-1739
  node 12 size: 508062 MB
  node 12 free: 507575 MB
  node 13 cpus: 780-839,1740-1799
  node 13 size: 508062 MB
  node 13 free: 507438 MB
  node 14 cpus: 840-899,1800-1859
  node 14 size: 508062 MB
  node 14 free: 507547 MB
  node 15 cpus: 900-959,1860-1919
  node 15 size: 506983 MB
  node 15 free: 506479 MB
  node distances:
  node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
    0:  10  16  16  18  40  40  40  40  40  40  40  40  40  40  40  40
    1:  16  10  18  16  40  40  40  40  40  40  40  40  40  40  40  40
```

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Platform Notes (Continued)

```
     2:  16  18  10  16  40  40  40  40  40  40  40  40  40  40  40  40
     3:  18  16  16  10  40  40  40  40  40  40  40  40  40  40  40  40
     4:  40  40  40  40  10  16  16  18  40  40  40  40  40  40  40  40
     5:  40  40  40  40  16  10  18  16  40  40  40  40  40  40  40  40
     6:  40  40  40  40  16  18  10  16  40  40  40  40  40  40  40  40
     7:  40  40  40  40  18  16  16  10  40  40  40  40  40  40  40  40
     8:  40  40  40  40  40  40  40  40  10  16  16  18  40  40  40  40
     9:  40  40  40  40  40  40  40  40  16  10  18  16  40  40  40  40
    10:  40  40  40  40  40  40  40  40  16  18  10  16  40  40  40  40
    11:  40  40  40  40  40  40  40  40  18  16  16  10  40  40  40  40
    12:  40  40  40  40  40  40  40  40  40  40  40  40  10  16  16  18
    13:  40  40  40  40  40  40  40  40  40  40  40  40  16  10  18  16
    14:  40  40  40  40  40  40  40  40  40  40  40  40  16  18  10  16
    15:  40  40  40  40  40  40  40  40  40  40  40  40  18  16  16  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       8321788508 kB

------------------------------------------------------------
10. who -r
  run-level 3 Feb 20 11:42

------------------------------------------------------------
11. Systemd service manager version: systemd 254 (254.21+suse.135.geddf52fb14)
  Default Target  Status
  multi-user      degraded

------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
    UNIT            LOAD   ACTIVE SUB    DESCRIPTION
  * postfix.service loaded failed failed Postfix Mail Transport Agent

------------------------------------------------------------
13. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          YaST2-Firstboot YaST2-Second-Stage apparmor appstream-sync-cache auditd bluetooth chronyd
                   cpuset_cpunodemap cpuset_memory_spread cron dcd dcdchkgracefulshutdown dcdshutdown
                   display-manager getty@ hpe-auto-config hpe_irqbalance issue-generator kbdsettings kdump
                   kdump-early kdump-notify klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
                   smartd sshd systemd-pstore vgauthd vmblock-fuse vmtoolsd vsftpd wicked wickedd-auto4
                   wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
  enabled-runtime  systemd-fsck-root systemd-remount-fs
  disabled         accounts-daemon amavis apache2 apache2@ autofs autoyast-initscripts blk-availability
                   bluetooth-mesh boot-sysctl ca-certificates certmonger chrony-wait clamav-milter clamd
                   clamonacc console-getty cups cups-browsed cxl-monitor debug-shell ebtables
                   exchange-bmc-os-info firewalld fsidd gpm grub2-once haveged ipmi ipmievd irqbalance
                   issue-add-ssh-keys kexec-load lunmask man-db-create mariadb mariadb@ multipathd named
                   ndctl-monitor nfs nfs-blkmap nfs-server nfsserver nmb ostree-remount rpcbind
                   rpmconfigcheck rsyncd rtkit-daemon smartd_generate_opts smb snmpd snmptrapd spamd spampd
                   speech-dispatcherd srp_daemon srp_daemon_port@ sysstat systemd-boot-check-no-failures
                   systemd-confext systemd-network-generator systemd-sysext systemd-time-wait-sync
                   systemd-timesyncd tuned udisks2 update-system-flatpaks upower vncserver@ winbind ypbind
  indirect         serial-getty@ systemd-userdbd tftp wickedd

------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-6.4.0-150600.23.33-default
  root=UUID=8ce0406a-9f17-47c0-afbc-27e5de11eecb
  rd.auto=1
```

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Platform Notes (Continued)

```
  console=ttyS0,115200n8
  selinux=0
  security=
  splash=silent
  mitigations=auto
  console=ttyS0,115200
  udev.children-max=512
  nmi_watchdog=0
  uv_nmi.action=kdump
  add_efi_memmap
  tsc=nowatchdog
  earlyprintk=ttyS0,115200
  log_buf_len=8M
  numa_balancing=disable
  crashkernel=1G,high
  watchdog_thresh=60
  workqueue.watchdog_thresh=120

------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 1089:
    current policy: frequency should be within 800 MHz and 3.50 GHz.
                    The governor "performance" may decide which speed to use
                    within this range.
    boost state support:
      Supported: yes
      Active: yes

------------------------------------------------------------
16. tuned-adm active
  It seems that tuned daemon is not running, preset profile is not activated.
  Preset profile: throughput-performance

------------------------------------------------------------
17. sysctl
  kernel.numa_balancing               0
  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                     20
  vm.dirty_writeback_centisecs      500
  vm.dirtytime_expire_seconds     43200
  vm.extfrag_threshold              500
  vm.min_unmapped_ratio               1
  vm.nr_hugepages                     0
  vm.nr_hugepages_mempolicy           0
  vm.nr_overcommit_hugepages          0
  vm.swappiness                      60
  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
```

(Continued on next page)

Platform Notes (Continued)

```
  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             SUSE Linux Enterprise Server 15 SP6
  hpe-foundation-release HPE Foundation Software 2.5.4, Build 753.1560.241029T0100.a.sles15sp6hpe-241029T0100

------------------------------------------------------------
21. Disk information
SPEC is set to: /home/cpu2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/nvme1n1p2 xfs   1.5T   33G  1.5T   3% /

------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
    Vendor:          HPE
    Product:         Compute Scale-up Server 3200
    Product Family: 1590PID03030201
    Serial:          5UF2491355-000

------------------------------------------------------------
23. dmidecode
  Additional information from dmidecode 3.6 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:
    128x Samsung M321R8GA0BB0-CQKZH 64 GB 2 rank 4800


------------------------------------------------------------
24. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       HPE
   BIOS Version:      Bundle:1.55.40-20250129_060251 SFW:009.036.009.000.2501270505
   BIOS Date:         01/27/2025
```

Compiler Version Notes

```
==============================================================================================================
C       | 502.gcc_r(peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 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)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
        | 557.xz_r(base, peak)
------------------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------------------

========================================================================================================================
C       | 502.gcc_r(peak)
------------------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 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 2024.1.0 Build 20240308
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------------------------------------------------------------------------------------------------------------------------

========================================================================================================================
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 2024.1.0 Build 20240308
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------------------------------------------------------------------------------------------------------------------------

========================================================================================================================
Fortran | 548.exchange2_r(base, peak)
------------------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

(Continued on next page)

Base Portability Flags (Continued)

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/opt/intel/oneapi/compiler/2024.1/lib -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/opt/intel/oneapi/compiler/2024.1/lib -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/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc

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/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc

502.gcc_r: -m32 -L/opt/intel/oneapi/compiler/2024.1/lib32 -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

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/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

(Continued on next page)

Peak Optimization Flags (Continued)

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-SDSS-rev1.0.html`
`http://www.spec.org/cpu2017/flags/Intel-ic2024-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-SDSS-rev1.0.xml`
`http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml`

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

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