SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

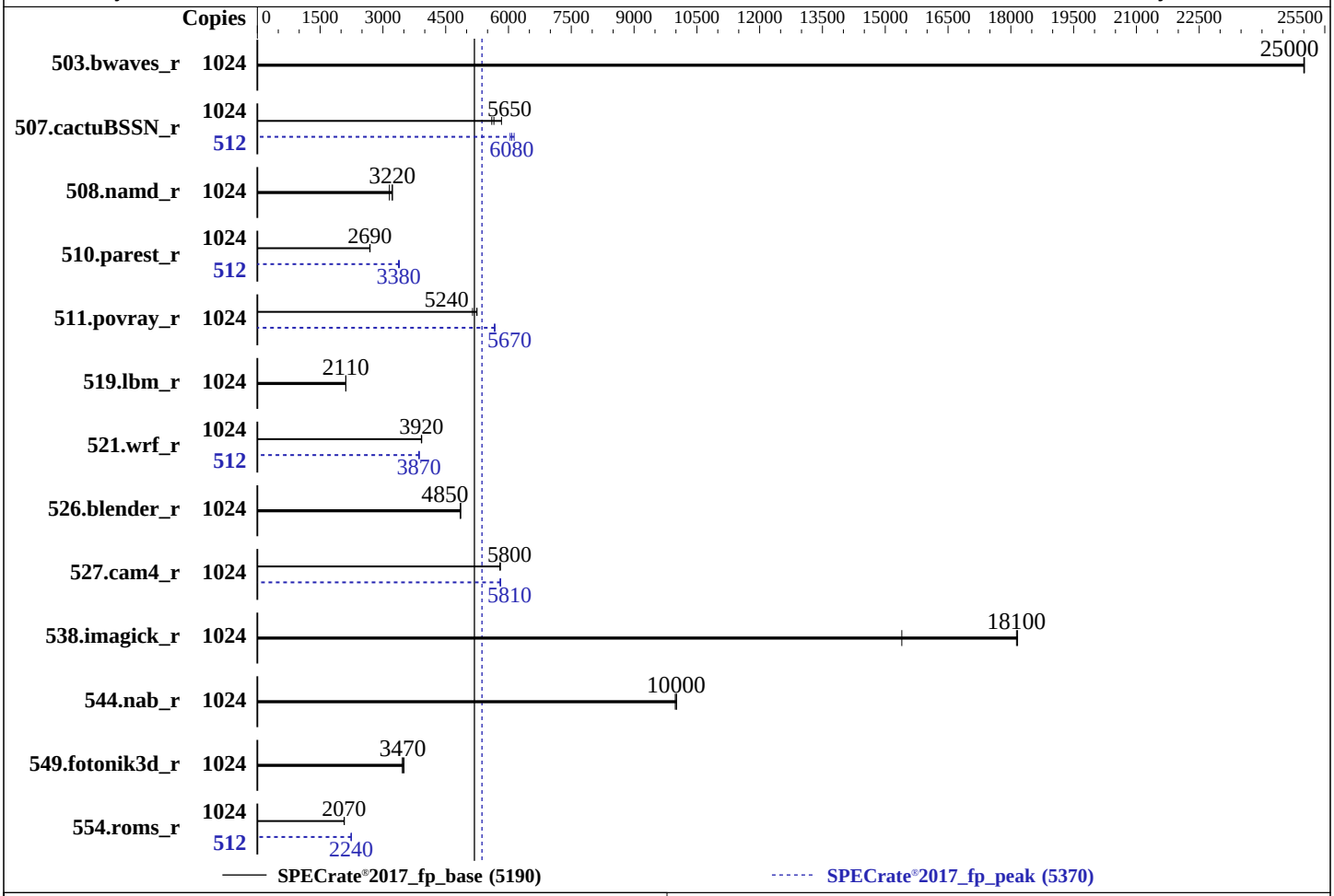
HPE Compute Scale-up Server 3200
(2.10 GHz, Intel Xeon Platinum 8454H)

SPECrate®2017_fp_base = 5190

SPECrate®2017_fp_peak = 5370

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

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



Hardware

CPU Name:	Intel Xeon Platinum 8454H
Max MHz:	3400
Nominal:	2100
Enabled:	512 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:	82.5 MB I+D on chip per chip
Other:	None
Memory:	16 TB (256 x 64 GB 2Rx4 PC5-4800B-R, running at 4400)
Storage:	1 x 6.4 TB NVMe SSD
Other:	CPU Cooling: Air

Software

OS:	SUSE Linux Enterprise Server 15 SP6 Kernel 6.4.0-150600.23.38-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:	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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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	1024	**411**	**25000**	411	25000	411	25000	1024	**411**	**25000**	411	25000	411	25000
507.cactuBSSN_r	1024	222	5830	231	5600	**229**	**5650**	512	**107**	**6080**	107	6040	106	6130
508.namd_r	1024	308	3150	**302**	**3220**	302	3230	1024	308	3150	**302**	**3220**	302	3230
510.parest_r	1024	995	2690	**995**	**2690**	998	2690	512	397	3370	**396**	**3380**	395	3390
511.povray_r	1024	456	5250	465	5140	**456**	**5240**	1024	422	5660	421	5680	**422**	**5670**
519.lbm_r	1024	**511**	**2110**	510	2120	511	2110	1024	**511**	**2110**	510	2120	511	2110
521.wrf_r	1024	**585**	**3920**	584	3930	585	3920	512	**297**	**3870**	296	3870	298	3850
526.blender_r	1024	321	4850	322	4850	**321**	**4850**	1024	321	4850	322	4850	**321**	**4850**
527.cam4_r	1024	**309**	**5800**	309	5800	309	5790	1024	308	5810	**308**	**5810**	309	5800
538.imagick_r	1024	140	18200	165	15400	**140**	**18100**	1024	140	18200	165	15400	**140**	**18100**
544.nab_r	1024	172	10000	**172**	**10000**	173	9980	1024	172	10000	**172**	**10000**	173	9980
549.fotonik3d_r	1024	1152	3460	1139	3500	**1148**	**3470**	1024	1152	3460	1139	3500	**1148**	**3470**
554.roms_r	1024	**785**	**2070**	785	2070	783	2080	512	364	2240	362	2250	**363**	**2240**

SPECrate®2017_fp_base = 5190

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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>
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
```

General Notes

```
 Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
 memory using Red Hat Enterprise Linux 8.4
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
```

(Continued on next page)

General Notes (Continued)

```
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (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

```
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-275 Sat Mar  1 20:12:34 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 (254.23+suse.141.g9376e684d0)
 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
```

(Continued on next page)

Platform Notes (Continued)

```
  Linux sph-275 6.4.0-150600.23.38-default #1 SMP PREEMPT_DYNAMIC Thu Feb  6 08:53:28 UTC 2025 (cb92f8c)
  x86_64 x86_64 x86_64 GNU/Linux

------------------------------------------------------------
2. w
   20:12:35 up  7:13,  1 user,  load average: 549.21, 893.18, 957.18
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  test     ttyS0    -                13:02    7:09m  0.09s  0.07s login -- test
  test     pts/0    -                13:02    7:06m  1.64s  0.06s 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) 65026817
  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) 65026817
  virtual memory          (kbytes, -v) unlimited
  file locks                      (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize=42
 login -- test
 -bash
 sudo su
 sudo su
 su
 bash
 bash
 bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=1024 -c
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=512 --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=1024 --configfile
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=512 --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/CPU2017.017/templogs/preenv.fprate.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 8454H
    vendor_id       : GenuineIntel
```

(Continued on next page)

Platform Notes (Continued)

```
     cpu family      : 6
     model           : 143
     stepping        : 8
     microcode       : 0x2b000620
     bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb bhi
     cpu cores       : 32
     siblings        : 64
     16 physical ids (chips)
     1024 processors (hardware threads)
     physical id 0: core ids 0-31
     physical id 1: core ids 0-31
     physical id 2: core ids 0-31
     physical id 3: core ids 0-31
     physical id 4: core ids 0-31
     physical id 5: core ids 0-31
     physical id 6: core ids 0-31
     physical id 7: core ids 0-31
     physical id 8: core ids 0-31
     physical id 9: core ids 0-31
     physical id 10: core ids 0-31
     physical id 11: core ids 0-31
     physical id 12: core ids 0-31
     physical id 13: core ids 0-31
     physical id 14: core ids 0-31
     physical id 15: core ids 0-31
     physical id 0: apicids 0-63
     physical id 1: apicids 128-191
     physical id 2: apicids 256-319
     physical id 3: apicids 384-447
     physical id 4: apicids 512-575
     physical id 5: apicids 640-703
     physical id 6: apicids 768-831
     physical id 7: apicids 896-959
     physical id 8: apicids 1024-1087
     physical id 9: apicids 1152-1215
     physical id 10: apicids 1280-1343
     physical id 11: apicids 1408-1471
     physical id 12: apicids 1536-1599
     physical id 13: apicids 1664-1727
     physical id 14: apicids 1792-1855
     physical id 15: apicids 1920-1983
   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):                               1024
   On-line CPU(s) list:                  0-1023
   Vendor ID:                            GenuineIntel
   Model name:                           Intel(R) Xeon(R) Platinum 8454H
   CPU family:                           6
   Model:                                143
   Thread(s) per core:                   2
   Core(s) per socket:                   32
```

(Continued on next page)

Platform Notes (Continued)

```
  Socket(s):                          16
  Stepping:                           8
  CPU(s) scaling MHz:                 24%
  CPU max MHz:                        3400.0000
  CPU min MHz:                        800.0000
  BogoMIPS:                           4200.02
  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:                          24 MiB (512 instances)
  L1i cache:                          16 MiB (512 instances)
  L2 cache:                           1 GiB (512 instances)
  L3 cache:                           1.3 GiB (16 instances)
  NUMA node(s):                       16
  NUMA node0 CPU(s):                  0-31,512-543
  NUMA node1 CPU(s):                  32-63,544-575
  NUMA node2 CPU(s):                  64-95,576-607
  NUMA node3 CPU(s):                  96-127,608-639
  NUMA node4 CPU(s):                  128-159,640-671
  NUMA node5 CPU(s):                  160-191,672-703
  NUMA node6 CPU(s):                  192-223,704-735
  NUMA node7 CPU(s):                  224-255,736-767
  NUMA node8 CPU(s):                  256-287,768-799
  NUMA node9 CPU(s):                  288-319,800-831
  NUMA node10 CPU(s):                 320-351,832-863
  NUMA node11 CPU(s):                 352-383,864-895
  NUMA node12 CPU(s):                 384-415,896-927
  NUMA node13 CPU(s):                 416-447,928-959
  NUMA node14 CPU(s):                 448-479,960-991
  NUMA node15 CPU(s):                 480-511,992-1023
  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
```

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Platform Notes (Continued)

```
  Vulnerability Tsx async abort:        Not affected

From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
     L1d       48K      24M   12 Data            1    64        1             64
     L1i       32K      16M    8 Instruction     1    64        1             64
     L2         2M       1G   16 Unified         2  2048        1             64
     L3      82.5M     1.3G   15 Unified         3 90112        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: 0-31,512-543
  node 0 size: 1015351 MB
  node 0 free: 984674 MB
  node 1 cpus: 32-63,544-575
  node 1 size: 1016234 MB
  node 1 free: 990947 MB
  node 2 cpus: 64-95,576-607
  node 2 size: 1016234 MB
  node 2 free: 990604 MB
  node 3 cpus: 96-127,608-639
  node 3 size: 1016234 MB
  node 3 free: 990680 MB
  node 4 cpus: 128-159,640-671
  node 4 size: 1016234 MB
  node 4 free: 990668 MB
  node 5 cpus: 160-191,672-703
  node 5 size: 1016234 MB
  node 5 free: 990887 MB
  node 6 cpus: 192-223,704-735
  node 6 size: 1016196 MB
  node 6 free: 990332 MB
  node 7 cpus: 224-255,736-767
  node 7 size: 1016234 MB
  node 7 free: 990623 MB
  node 8 cpus: 256-287,768-799
  node 8 size: 1016234 MB
  node 8 free: 991015 MB
  node 9 cpus: 288-319,800-831
  node 9 size: 1016234 MB
  node 9 free: 991007 MB
  node 10 cpus: 320-351,832-863
  node 10 size: 1016234 MB
  node 10 free: 990715 MB
  node 11 cpus: 352-383,864-895
  node 11 size: 1016234 MB
  node 11 free: 990648 MB
  node 12 cpus: 384-415,896-927
  node 12 size: 1016234 MB
  node 12 free: 990918 MB
  node 13 cpus: 416-447,928-959
  node 13 size: 1016234 MB
  node 13 free: 990968 MB
  node 14 cpus: 448-479,960-991
  node 14 size: 1016234 MB
  node 14 free: 990699 MB
  node 15 cpus: 480-511,992-1023
  node 15 size: 1014139 MB
```

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Platform Notes (Continued)

```
  node 15 free: 988501 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
    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:       16646898172 kB

------------------------------------------------------------
10. who -r
  run-level 3 Mar 1 13:01

------------------------------------------------------------
11. Systemd service manager version: systemd 254 (254.23+suse.141.g9376e684d0)
  Default Target  Status
  multi-user      degraded

------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
    UNIT                          LOAD   ACTIVE SUB    DESCRIPTION
  * dcdchkgracefulshutdown.service loaded failed failed Check if previous system shutdown was graceful
  * 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
```

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Platform Notes (Continued)

```
------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-6.4.0-150600.23.38-default
  root=UUID=3f2deed0-2789-4a6c-ba7e-4dc1feba6765
  rd.auto=1
  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
  pci=norom
  crashkernel=2G,high
  watchdog_thresh=60
  workqueue.watchdog_thresh=120

------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 240:
    current policy: frequency should be within 800 MHz and 3.40 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
```

(Continued on next page)

Platform Notes (Continued)

```
  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             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/sdb2      xfs   5.9T  395G  5.5T   7% /

------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        Compute Scale-up Server 3200
    Product Family: 1590PID03030201
    Serial:         5UF424K4VF-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:
    88x Hynix HMCG94AEBRA123N 64 GB 2 rank 4800, configured at 4400
    100x Micron MTC40F2046S1RC48BA1 MHCC 64 GB 2 rank 4800, configured at 4400
    68x Micron MTC40F2046S1RC48BA1 MHFF 64 GB 2 rank 4800, configured at 4400


------------------------------------------------------------
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               | 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 2024.1.0 Build 20240308
Copyright (C) 1985-2024 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 2024.1.0 Build 20240308
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--------------------------------------------------------------------------------------------------------------

==============================================================================================================
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 2024.1.0 Build 20240308
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Copyright (C) 1985-2024 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 2024.1.0 Build 20240308
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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.
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.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
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 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
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--------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

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Base Compiler Invocation (Continued)

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -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

(Continued on next page)

Base Optimization Flags (Continued)

C++ benchmarks (continued):
-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

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

(Continued on next page)

Peak Compiler Invocation (Continued)

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

549.fotonik3d_r: basepeak = yes

554.roms_r: -w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)

Peak Optimization Flags (Continued)

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++:

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-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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