SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

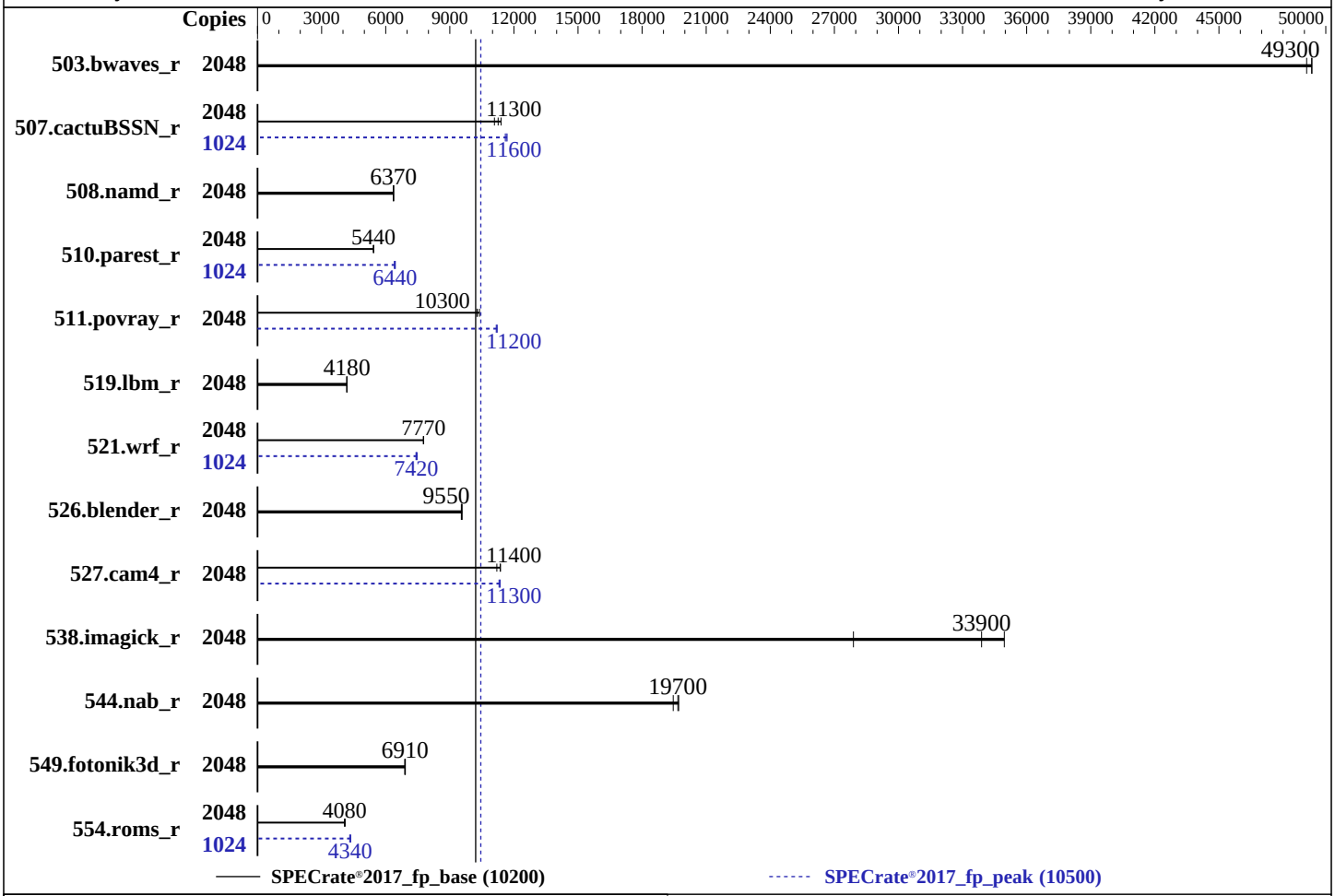
HPE Compute Scale-up Server 3200
(2.10 GHz, Intel Xeon Platinum 8454H)

SPECrate®2017_fp_base = 10200

SPECrate®2017_fp_peak = 10500

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

Test Date: Feb-2025
Hardware Availability: Apr-2025
Software Availability: Feb-2025



Hardware

CPU Name:	Intel Xeon Platinum 8454H
Max MHz:	3400
Nominal:	2100
Enabled:	1024 cores, 32 chips, 2 threads/core
Orderable:	4, 8, 16, 32 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:	32 TB (512 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	2048	418	49100	**416**	**49300**	416	49400	2048	418	49100	**416**	**49300**	416	49400
507.cactuBSSN_r	2048	227	11400	**230**	**11300**	234	11100	1024	**111**	**11600**	112	11600	111	11700
508.namd_r	2048	306	6350	305	6370	**306**	**6370**	2048	306	6350	305	6370	**306**	**6370**
510.parest_r	2048	**985**	**5440**	985	5440	988	5420	1024	419	6400	415	6450	**416**	**6440**
511.povray_r	2048	**465**	**10300**	460	10400	465	10300	2048	**427**	**11200**	428	11200	427	11200
519.lbm_r	2048	**516**	**4180**	517	4180	516	4190	2048	**516**	**4180**	517	4180	516	4190
521.wrf_r	2048	591	7760	**590**	**7770**	590	7780	1024	309	7420	**309**	**7420**	307	7480
526.blender_r	2048	**326**	**9550**	326	9580	327	9540	2048	**326**	**9550**	326	9580	327	9540
527.cam4_r	2048	320	11200	**315**	**11400**	315	11400	2048	317	11300	**316**	**11300**	315	11400
538.imagick_r	2048	146	35000	183	27900	**150**	**33900**	2048	146	35000	183	27900	**150**	**33900**
544.nab_r	2048	177	19500	**175**	**19700**	175	19700	2048	177	19500	**175**	**19700**	175	19700
549.fotonik3d_r	2048	**1155**	**6910**	1153	6920	1158	6890	2048	**1155**	**6910**	1153	6920	1158	6890
554.roms_r	2048	**798**	**4080**	793	4100	800	4070	1024	377	4310	**375**	**4340**	373	4360

SPECrate®2017_fp_base = 10200

SPECrate®2017_fp_peak = 10500

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 Fri Feb 28 21:47:23 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
```

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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
   21:47:23 up  9:44,  1 user,  load average: 2.61, 2.66, 3.77
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  test     ttyS0    -                12:10    9:36m  0.21s  0.66s login -- test
  test     pts/0    -                12:10   11.00s  2.31s  0.15s 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) 130060678
  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) 130060678
  virtual memory          (kbytes, -v) unlimited
  file locks                      (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize=43
 login -- test
 -bash
 sudo su
 sudo su
 su
 bash
 bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=2048 -c
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=1024 --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=2048 --configfile
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=1024 --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/CPU2017.013/templogs/preenv.fprate.013.0.log --lognum 013.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8454H
    vendor_id       : GenuineIntel
    cpu family      : 6
```

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Platform Notes (Continued)

```
model           : 143
stepping        : 8
microcode       : 0x2b000620
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb bhi
cpu cores       : 32
siblings        : 64
32 physical ids (chips)
2048 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 16: core ids 0-31
physical id 17: core ids 0-31
physical id 18: core ids 0-31
physical id 19: core ids 0-31
physical id 20: core ids 0-31
physical id 21: core ids 0-31
physical id 22: core ids 0-31
physical id 23: core ids 0-31
physical id 24: core ids 0-31
physical id 25: core ids 0-31
physical id 26: core ids 0-31
physical id 27: core ids 0-31
physical id 28: core ids 0-31
physical id 29: core ids 0-31
physical id 30: core ids 0-31
physical id 31: 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
physical id 16: apicids 2048-2111
physical id 17: apicids 2176-2239
physical id 18: apicids 2304-2367
physical id 19: apicids 2432-2495
```

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Platform Notes (Continued)

```
     physical id 20: apicids 2560-2623
     physical id 21: apicids 2688-2751
     physical id 22: apicids 2816-2879
     physical id 23: apicids 2944-3007
     physical id 24: apicids 3072-3135
     physical id 25: apicids 3200-3263
     physical id 26: apicids 3328-3391
     physical id 27: apicids 3456-3519
     physical id 28: apicids 3584-3647
     physical id 29: apicids 3712-3775
     physical id 30: apicids 3840-3903
     physical id 31: apicids 3968-4031
   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):                               2048
   On-line CPU(s) list:                  0-2047
   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
   Socket(s):                            32
   Stepping:                             8
   CPU(s) scaling MHz:                   24%
   CPU max MHz:                          3400.0000
   CPU min MHz:                          800.0000
   BogoMIPS:                             4200.03
   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:                            48 MiB (1024 instances)
   L1i cache:                            32 MiB (1024 instances)
   L2 cache:                             2 GiB (1024 instances)
   L3 cache:                             2.6 GiB (32 instances)
```

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Platform Notes (Continued)

```
   NUMA node(s):                         32
   NUMA node0 CPU(s):                    0-31,1024-1055
   NUMA node1 CPU(s):                    32-63,1056-1087
   NUMA node2 CPU(s):                    64-95,1088-1119
   NUMA node3 CPU(s):                    96-127,1120-1151
   NUMA node4 CPU(s):                    128-159,1152-1183
   NUMA node5 CPU(s):                    160-191,1184-1215
   NUMA node6 CPU(s):                    192-223,1216-1247
   NUMA node7 CPU(s):                    224-255,1248-1279
   NUMA node8 CPU(s):                    256-287,1280-1311
   NUMA node9 CPU(s):                    288-319,1312-1343
   NUMA node10 CPU(s):                   320-351,1344-1375
   NUMA node11 CPU(s):                   352-383,1376-1407
   NUMA node12 CPU(s):                   384-415,1408-1439
   NUMA node13 CPU(s):                   416-447,1440-1471
   NUMA node14 CPU(s):                   448-479,1472-1503
   NUMA node15 CPU(s):                   480-511,1504-1535
   NUMA node16 CPU(s):                   512-543,1536-1567
   NUMA node17 CPU(s):                   544-575,1568-1599
   NUMA node18 CPU(s):                   576-607,1600-1631
   NUMA node19 CPU(s):                   608-639,1632-1663
   NUMA node20 CPU(s):                   640-671,1664-1695
   NUMA node21 CPU(s):                   672-703,1696-1727
   NUMA node22 CPU(s):                   704-735,1728-1759
   NUMA node23 CPU(s):                   736-767,1760-1791
   NUMA node24 CPU(s):                   768-799,1792-1823
   NUMA node25 CPU(s):                   800-831,1824-1855
   NUMA node26 CPU(s):                   832-863,1856-1887
   NUMA node27 CPU(s):                   864-895,1888-1919
   NUMA node28 CPU(s):                   896-927,1920-1951
   NUMA node29 CPU(s):                   928-959,1952-1983
   NUMA node30 CPU(s):                   960-991,1984-2015
   NUMA node31 CPU(s):                   992-1023,2016-2047
   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      48M   12 Data            1    64        1             64
      L1i       32K      32M    8 Instruction     1    64        1             64
      L2         2M       2G   16 Unified         2  2048        1             64
      L3      82.5M     2.6G   15 Unified         3 90112        1             64

 ------------------------------------------------------------
 8. numactl --hardware
 NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 32 nodes (0-31)
```

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Platform Notes (Continued)

```
node 0 cpus: 0-31,1024-1055
node 0 size: 1015095 MB
node 0 free: 1012291 MB
node 1 cpus: 32-63,1056-1087
node 1 size: 1016234 MB
node 1 free: 1014633 MB
node 2 cpus: 64-95,1088-1119
node 2 size: 1016234 MB
node 2 free: 1014123 MB
node 3 cpus: 96-127,1120-1151
node 3 size: 1016234 MB
node 3 free: 1014245 MB
node 4 cpus: 128-159,1152-1183
node 4 size: 1016234 MB
node 4 free: 1014622 MB
node 5 cpus: 160-191,1184-1215
node 5 size: 1016234 MB
node 5 free: 1014698 MB
node 6 cpus: 192-223,1216-1247
node 6 size: 1016234 MB
node 6 free: 1014367 MB
node 7 cpus: 224-255,1248-1279
node 7 size: 1016234 MB
node 7 free: 1014431 MB
node 8 cpus: 256-287,1280-1311
node 8 size: 1016234 MB
node 8 free: 1014404 MB
node 9 cpus: 288-319,1312-1343
node 9 size: 1016234 MB
node 9 free: 1014164 MB
node 10 cpus: 320-351,1344-1375
node 10 size: 1016234 MB
node 10 free: 1014243 MB
node 11 cpus: 352-383,1376-1407
node 11 size: 1016234 MB
node 11 free: 1014232 MB
node 12 cpus: 384-415,1408-1439
node 12 size: 1016234 MB
node 12 free: 1014628 MB
node 13 cpus: 416-447,1440-1471
node 13 size: 1016196 MB
node 13 free: 1014600 MB
node 14 cpus: 448-479,1472-1503
node 14 size: 1016234 MB
node 14 free: 1014336 MB
node 15 cpus: 480-511,1504-1535
node 15 size: 1016234 MB
node 15 free: 1014353 MB
node 16 cpus: 512-543,1536-1567
node 16 size: 1016234 MB
node 16 free: 1014566 MB
node 17 cpus: 544-575,1568-1599
node 17 size: 1016234 MB
node 17 free: 1014693 MB
node 18 cpus: 576-607,1600-1631
node 18 size: 1016234 MB
node 18 free: 1014401 MB
node 19 cpus: 608-639,1632-1663
node 19 size: 1016234 MB
node 19 free: 1014373 MB
```

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Platform Notes (Continued)

```
node 20 cpus: 640-671,1664-1695
node 20 size: 1016234 MB
node 20 free: 1014652 MB
node 21 cpus: 672-703,1696-1727
node 21 size: 1016234 MB
node 21 free: 1014648 MB
node 22 cpus: 704-735,1728-1759
node 22 size: 1016234 MB
node 22 free: 1014393 MB
node 23 cpus: 736-767,1760-1791
node 23 size: 1016234 MB
node 23 free: 1014381 MB
node 24 cpus: 768-799,1792-1823
node 24 size: 1016234 MB
node 24 free: 1014701 MB
node 25 cpus: 800-831,1824-1855
node 25 size: 1016234 MB
node 25 free: 1014729 MB
node 26 cpus: 832-863,1856-1887
node 26 size: 1016234 MB
node 26 free: 1014386 MB
node 27 cpus: 864-895,1888-1919
node 27 size: 1016234 MB
node 27 free: 1014433 MB
node 28 cpus: 896-927,1920-1951
node 28 size: 1016234 MB
node 28 free: 1013414 MB
node 29 cpus: 928-959,1952-1983
node 29 size: 1016234 MB
node 29 free: 1014495 MB
node 30 cpus: 960-991,1984-2015
node 30 size: 1016234 MB
node 30 free: 1014082 MB
node 31 cpus: 992-1023,2016-2047
node 31 size: 1013107 MB
node 31 free: 1010950 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19  20  21  22  23  24
25  26  27  28  29  30  31
  0:  10  16  16  18  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  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  40  40  40  40  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  40  40  40  40  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  40  40  40  40  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  40  40  40  40  40  40  40  40  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  40  40  40  40  40  40  40  40  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  40  40  40  40  40  40  40  40  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  40  40  40  40  40  40  40  40  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  40  40  40  40  40  40  40  40  40
  40  40  40  40  40  40  40
  9:  40  40  40  40  40  40  40  40  16  10  18  16  40  40  40  40  40  40  40  40  40  40  40  40  40
  40  40  40  40  40  40  40
 10:  40  40  40  40  40  40  40  40  16  18  10  16  40  40  40  40  40  40  40  40  40  40  40  40  40
```

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Platform Notes (Continued)

```
    40  40  40  40  40  40  40
    11:  40  40  40  40  40  40  40  40  40  18  16  16  10  40  40  40  40  40  40  40  40  40  40  40  40  40
    40  40  40  40  40  40  40
    12:  40  40  40  40  40  40  40  40  40  40  40  40  10  16  16  18  40  40  40  40  40  40  40  40  40  40
    40  40  40  40  40  40  40
    13:  40  40  40  40  40  40  40  40  40  40  40  40  16  10  18  16  40  40  40  40  40  40  40  40  40  40
    40  40  40  40  40  40  40
    14:  40  40  40  40  40  40  40  40  40  40  40  40  16  18  10  16  40  40  40  40  40  40  40  40  40  40
    40  40  40  40  40  40  40
    15:  40  40  40  40  40  40  40  40  40  40  40  40  18  16  16  10  40  40  40  40  40  40  40  40  40  40
    40  40  40  40  40  40  40
    16:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  10  16  16  18  40  40  40  40  40  40
    40  40  40  40  40  40  40
    17:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  16  10  18  16  40  40  40  40  40  40
    40  40  40  40  40  40  40
    18:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  16  18  10  16  40  40  40  40  40  40
    40  40  40  40  40  40  40
    19:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  18  16  16  10  40  40  40  40  40  40
    40  40  40  40  40  40  40
    20:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  10  16  16  18  40  40
    40  40  40  40  40  40  40
    21:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  16  10  18  16  40  40
    40  40  40  40  40  40  40
    22:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  16  18  10  16  40  40
    40  40  40  40  40  40  40
    23:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  18  16  16  10  40  40
    40  40  40  40  40  40  40
    24:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  10
    16  16  18  40  40  40  40
    25:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  16
    10  18  16  40  40  40  40
    26:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  16
    18  10  16  40  40  40  40
    27:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  18
    16  16  10  40  40  40  40
    28:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40
    40  40  40  10  16  16  18
    29:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40
    40  40  40  16  10  18  16
    30:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40
    40  40  40  16  18  10  16
    31:  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40  40
    40  40  40  18  16  16  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       33295566648 kB

------------------------------------------------------------
10. who -r
  run-level 3 Feb 28 12:08

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

(Continued on next page)

Platform Notes (Continued)

```
   * 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

------------------------------------------------------------
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=3G,high
  watchdog_thresh=60
  workqueue.watchdog_thresh=120

------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 956:
    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

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

(Continued on next page)

Platform Notes (Continued)

```
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
  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   31G  5.8T   1% /

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

(Continued on next page)

Platform Notes (Continued)

```
     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:
     344x 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
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 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.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
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
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
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)
```

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Compiler Version Notes (Continued)

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

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

(Continued on next page)

Base Portability Flags (Continued)

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
-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

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

(Continued on next page)

Peak Optimization Flags (Continued)

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

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

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