SPEC CPU®2017 Floating Point Rate Result

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Inspur Electronic Information Industry Co., Ltd. (IEI)

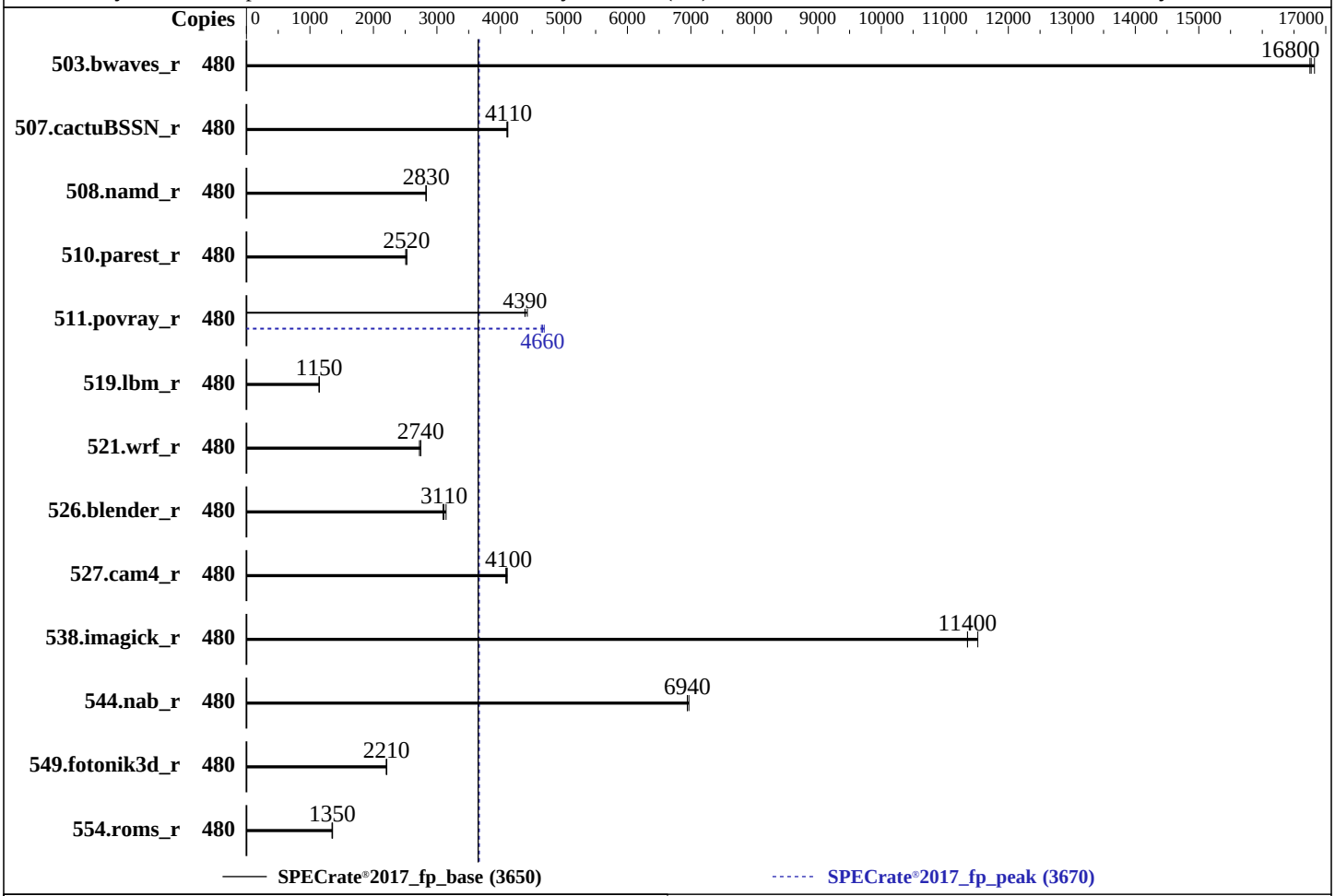
TS860G7 (Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base = 3650

SPECrate®2017_fp_peak = 3670

CPU2017 License: 3358
Test Sponsor: Inspur Electronic Information Industry Co., Ltd. (IEI)
Tested by: Inspur Electronic Information Industry Co., Ltd. (IEI)

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



Hardware

CPU Name:	Intel Xeon Platinum 8490H
Max MHz:	3500
Nominal:	1900
Enabled:	480 cores, 8 chips
Orderable:	2,4,8 chips
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:	2 TB (64 x 32 GB 2Rx4 PC5-4800B-R)
Storage:	1 x 3.2 TB NVME SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux 9.0 (Plow) 5.14.0-70.22.1.el9_0.x86_64
Compiler:	C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	Version 05.00.00 released Apr-2023
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	jemalloc memory allocator V5.0.1
Power Management:	BIOS and OS set to prefer performance at the cost of additional power usage.

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	480	286	16800	**287**	**16800**	287	16800	480	286	16800	**287**	**16800**	287	16800
507.cactuBSSN_r	480	148	4100	**148**	**4110**	148	4120	480	148	4100	**148**	**4110**	148	4120
508.namd_r	480	161	2830	161	2830	**161**	**2830**	480	161	2830	161	2830	**161**	**2830**
510.parest_r	480	501	2510	497	2530	**498**	**2520**	480	501	2510	497	2530	**498**	**2520**
511.povray_r	480	253	4420	**255**	**4390**	256	4390	480	239	4690	241	4650	**240**	**4660**
519.lbm_r	480	442	1150	441	1150	**442**	**1150**	480	442	1150	441	1150	**442**	**1150**
521.wrf_r	480	392	2750	**392**	**2740**	395	2720	480	392	2750	**392**	**2740**	395	2720
526.blender_r	480	236	3100	**235**	**3110**	233	3140	480	236	3100	**235**	**3110**	233	3140
527.cam4_r	480	**205**	**4100**	205	4090	204	4110	480	**205**	**4100**	205	4090	204	4110
538.imagick_r	480	105	11400	**105**	**11400**	104	11500	480	105	11400	**105**	**11400**	104	11500
544.nab_r	480	116	6940	116	6970	**116**	**6940**	480	116	6940	116	6970	**116**	**6940**
549.fotonik3d_r	480	849	2200	846	2210	**848**	**2210**	480	849	2200	846	2210	**848**	**2210**
554.roms_r	480	**563**	**1350**	563	1360	566	1350	480	**563**	**1350**	563	1360	566	1350

SPECrate®2017_fp_base = 3650

SPECrate®2017_fp_peak = 3670

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/19cpu2017/lib/intel64:/home/19cpu2017/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
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>

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
```

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General Notes (Continued)

```
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
BIOS configuration:
ENERGY_PERF_BIAS_CFG mode set to Performance
Hardware Prefetch set to Disable
VT Support set to Disable
Sub NUMA Cluster (SNC) set to SNC4
Intel Hyper Threading Technology set to Disabled

Sysinfo program /home/19cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sun May  7 03:34:31 2023

SUT (System Under Test) info as seen by some common utilities.

------------------------------------------------------------
Table of contents
------------------------------------------------------------
 1. uname -a
 2. w
 3. Username
 4. ulimit -a
 5. sysinfo process ancestry
 6. /proc/cpuinfo
 7. lscpu
 8. numactl --hardware
 9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9_0)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. tuned-adm active
17. sysctl
18. /sys/kernel/mm/transparent_hugepage
19. /sys/kernel/mm/transparent_hugepage/khugepaged
20. OS release
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. BIOS
------------------------------------------------------------

------------------------------------------------------------
1. uname -a
  Linux localhost.localdomain 5.14.0-70.22.1.el9_0.x86_64 #1 SMP PREEMPT Tue Aug 2 10:02:12 EDT 2022 x86_64
  x86_64 x86_64 GNU/Linux

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

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Platform Notes (Continued)

```
2. w
   03:34:31 up 9 min,  1 user,  load average: 0.00, 0.21, 0.22
  USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1      03:27    6.00s  1.42s  0.02s -bash

------------------------------------------------------------
3. Username
  From environment variable $USER:  root

------------------------------------------------------------
4. ulimit -a
  real-time non-blocking time  (microseconds, -R) unlimited
  core file size              (blocks, -c) 0
  data seg size               (kbytes, -d) unlimited
  scheduling priority                 (-e) 0
  file size                   (blocks, -f) unlimited
  pending signals                     (-i) 8254923
  max locked memory           (kbytes, -l) 64
  max memory size             (kbytes, -m) unlimited
  open files                          (-n) 1024
  pipe size                (512 bytes, -p) 8
  POSIX message queues         (bytes, -q) 819200
  real-time priority                  (-r) 0
  stack size                  (kbytes, -s) unlimited
  cpu time                   (seconds, -t) unlimited
  max user processes                  (-u) 8254923
  virtual memory              (kbytes, -v) unlimited
  file locks                          (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 28
 login -- root
 -bash
 -bash
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=480 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=240 --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=480 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=240 --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/CPU2017.008/templogs/preenv.fprate.008.0.log --lognum 008.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/19cpu2017

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8490H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 6
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 60
    siblings        : 60
    8 physical ids (chips)
    480 processors (hardware threads)
    physical id 0: core ids 0-59
```

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Platform Notes (Continued)

```
     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 0: apicids
     0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
     ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118
     physical id 1: apicids
     128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,1
     80,182,184,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230,23
     2,234,236,238,240,242,244,246
     physical id 2: apicids
     256,258,260,262,264,266,268,270,272,274,276,278,280,282,284,286,288,290,292,294,296,298,300,302,304,306,3
     08,310,312,314,316,318,320,322,324,326,328,330,332,334,336,338,340,342,344,346,348,350,352,354,356,358,36
     0,362,364,366,368,370,372,374
     physical id 3: apicids
     384,386,388,390,392,394,396,398,400,402,404,406,408,410,412,414,416,418,420,422,424,426,428,430,432,434,4
     36,438,440,442,444,446,448,450,452,454,456,458,460,462,464,466,468,470,472,474,476,478,480,482,484,486,48
     8,490,492,494,496,498,500,502
     physical id 4: apicids
     512,514,516,518,520,522,524,526,528,530,532,534,536,538,540,542,544,546,548,550,552,554,556,558,560,562,5
     64,566,568,570,572,574,576,578,580,582,584,586,588,590,592,594,596,598,600,602,604,606,608,610,612,614,61
     6,618,620,622,624,626,628,630
     physical id 5: apicids
     640,642,644,646,648,650,652,654,656,658,660,662,664,666,668,670,672,674,676,678,680,682,684,686,688,690,6
     92,694,696,698,700,702,704,706,708,710,712,714,716,718,720,722,724,726,728,730,732,734,736,738,740,742,74
     4,746,748,750,752,754,756,758
     physical id 6: apicids
     768,770,772,774,776,778,780,782,784,786,788,790,792,794,796,798,800,802,804,806,808,810,812,814,816,818,8
     20,822,824,826,828,830,832,834,836,838,840,842,844,846,848,850,852,854,856,858,860,862,864,866,868,870,87
     2,874,876,878,880,882,884,886
     physical id 7: apicids
     896,898,900,902,904,906,908,910,912,914,916,918,920,922,924,926,928,930,932,934,936,938,940,942,944,946,9
     48,950,952,954,956,958,960,962,964,966,968,970,972,974,976,978,980,982,984,986,988,990,992,994,996,998,10
     00,1002,1004,1006,1008,1010,1012,1014
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems.  Use the above data carefully.

 ------------------------------------------------------------
 7. lscpu

 From lscpu from util-linux 2.37.4:
   Architecture:                    x86_64
   CPU op-mode(s):                  32-bit, 64-bit
   Address sizes:                   52 bits physical, 57 bits virtual
   Byte Order:                      Little Endian
   CPU(s):                          480
   On-line CPU(s) list:             0-479
   Vendor ID:                       GenuineIntel
   BIOS Vendor ID:                  Intel(R) Corporation
   Model name:                      Intel(R) Xeon(R) Platinum 8490H
   BIOS Model name:                 Intel(R) Xeon(R) Platinum 8490H
   CPU family:                      6
   Model:                           143
   Thread(s) per core:              1
   Core(s) per socket:              60
   Socket(s):                       8
```

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Platform Notes (Continued)

```
Stepping:                    6
CPU max MHz:                 3500.0000
CPU min MHz:                 800.0000
BogoMIPS:                    3800.00
Flags:                       fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                             clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                             lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
                             nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 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 invpcid_single
                             intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase
                             tsc_adjust bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq
                             rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni
                             avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
                             cqm_mbm_total cqm_mbm_local split_lock_detect avx_vnni avx512_bf16
                             wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp 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 avx512_fp16 amx_tile flush_l1d arch_capabilities
L1d cache:                   22.5 MiB (480 instances)
L1i cache:                   15 MiB (480 instances)
L2 cache:                    960 MiB (480 instances)
L3 cache:                    900 MiB (8 instances)
NUMA node(s):                32
NUMA node0 CPU(s):           0-14
NUMA node1 CPU(s):           15-29
NUMA node2 CPU(s):           30-44
NUMA node3 CPU(s):           45-59
NUMA node4 CPU(s):           60-74
NUMA node5 CPU(s):           75-89
NUMA node6 CPU(s):           90-104
NUMA node7 CPU(s):           105-119
NUMA node8 CPU(s):           120-134
NUMA node9 CPU(s):           135-149
NUMA node10 CPU(s):          150-164
NUMA node11 CPU(s):          165-179
NUMA node12 CPU(s):          180-194
NUMA node13 CPU(s):          195-209
NUMA node14 CPU(s):          210-224
NUMA node15 CPU(s):          225-239
NUMA node16 CPU(s):          240-254
NUMA node17 CPU(s):          255-269
NUMA node18 CPU(s):          270-284
NUMA node19 CPU(s):          285-299
NUMA node20 CPU(s):          300-314
NUMA node21 CPU(s):          315-329
NUMA node22 CPU(s):          330-344
NUMA node23 CPU(s):          345-359
NUMA node24 CPU(s):          360-374
NUMA node25 CPU(s):          375-389
NUMA node26 CPU(s):          390-404
NUMA node27 CPU(s):          405-419
NUMA node28 CPU(s):          420-434
NUMA node29 CPU(s):          435-449
NUMA node30 CPU(s):          450-464
NUMA node31 CPU(s):          465-479
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:          Not affected
```

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Platform Notes (Continued)

```
  Vulnerability Mds:                Not affected
  Vulnerability Meltdown:           Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:         Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:         Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
  Vulnerability Srbds:              Not affected
  Vulnerability Tsx async abort:    Not affected

From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
     L1d       48K    22.5M   12 Data            1     64        1             64
     L1i       32K      15M    8 Instruction     1     64        1             64
     L2         2M     960M   16 Unified         2   2048        1             64
     L3     112.5M     900M   15 Unified         3 122880        1             64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 32 nodes (0-31)
  node 0 cpus: 0-14
  node 0 size: 64066 MB
  node 0 free: 63774 MB
  node 1 cpus: 15-29
  node 1 size: 64508 MB
  node 1 free: 64349 MB
  node 2 cpus: 30-44
  node 2 size: 64508 MB
  node 2 free: 64367 MB
  node 3 cpus: 45-59
  node 3 size: 64508 MB
  node 3 free: 64369 MB
  node 4 cpus: 60-74
  node 4 size: 64508 MB
  node 4 free: 64325 MB
  node 5 cpus: 75-89
  node 5 size: 64508 MB
  node 5 free: 64332 MB
  node 6 cpus: 90-104
  node 6 size: 64508 MB
  node 6 free: 64356 MB
  node 7 cpus: 105-119
  node 7 size: 64508 MB
  node 7 free: 64341 MB
  node 8 cpus: 120-134
  node 8 size: 64508 MB
  node 8 free: 63575 MB
  node 9 cpus: 135-149
  node 9 size: 64472 MB
  node 9 free: 64051 MB
  node 10 cpus: 150-164
  node 10 size: 64508 MB
  node 10 free: 63463 MB
  node 11 cpus: 165-179
  node 11 size: 64508 MB
  node 11 free: 63746 MB
  node 12 cpus: 180-194
  node 12 size: 64508 MB
  node 12 free: 64334 MB
  node 13 cpus: 195-209
  node 13 size: 64508 MB
```

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Platform Notes (Continued)

```
  node 13 free: 64332 MB
  node 14 cpus: 210-224
  node 14 size: 64508 MB
  node 14 free: 64356 MB
  node 15 cpus: 225-239
  node 15 size: 64508 MB
  node 15 free: 64195 MB
  node 16 cpus: 240-254
  node 16 size: 64508 MB
  node 16 free: 64372 MB
  node 17 cpus: 255-269
  node 17 size: 64508 MB
  node 17 free: 64339 MB
  node 18 cpus: 270-284
  node 18 size: 64508 MB
  node 18 free: 64354 MB
  node 19 cpus: 285-299
  node 19 size: 64508 MB
  node 19 free: 64315 MB
  node 20 cpus: 300-314
  node 20 size: 64508 MB
  node 20 free: 64367 MB
  node 21 cpus: 315-329
  node 21 size: 64508 MB
  node 21 free: 64375 MB
  node 22 cpus: 330-344
  node 22 size: 64508 MB
  node 22 free: 64366 MB
  node 23 cpus: 345-359
  node 23 size: 64508 MB
  node 23 free: 64379 MB
  node 24 cpus: 360-374
  node 24 size: 64508 MB
  node 24 free: 64356 MB
  node 25 cpus: 375-389
  node 25 size: 64508 MB
  node 25 free: 64379 MB
  node 26 cpus: 390-404
  node 26 size: 64508 MB
  node 26 free: 64372 MB
  node 27 cpus: 405-419
  node 27 size: 64508 MB
  node 27 free: 64357 MB
  node 28 cpus: 420-434
  node 28 size: 64508 MB
  node 28 free: 64372 MB
  node 29 cpus: 435-449
  node 29 size: 64508 MB
  node 29 free: 64201 MB
  node 30 cpus: 450-464
  node 30 size: 64508 MB
  node 30 free: 64366 MB
  node 31 cpus: 465-479
  node 31 size: 64479 MB
  node 31 free: 64316 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  12  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
    21  21  21  31  31  31  31
```

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Platform Notes (Continued)

```
 1:  12  10  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
 21  21  21  31  31  31  31
 2:  12  12  10  12  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
 21  21  21  31  31  31  31
 3:  12  12  12  10  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
 21  21  21  31  31  31  31
 4:  21  21  21  21  10  12  12  12  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
 31  31  31  21  21  21  21
 5:  21  21  21  21  12  10  12  12  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
 31  31  31  21  21  21  21
 6:  21  21  21  21  12  12  10  12  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
 31  31  31  21  21  21  21
 7:  21  21  21  21  12  12  12  10  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31
 31  31  31  21  21  21  21
 8:  21  21  21  21  31  31  31  31  10  12  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31
 31  31  31  21  21  21  21
 9:  21  21  21  21  31  31  31  31  12  10  12  12  21  21  21  21  21  21  21  21  31  31  31  31  31
 31  31  31  21  21  21  21
10:  21  21  21  21  31  31  31  31  12  12  10  12  21  21  21  21  21  21  21  21  31  31  31  31  31
31  31  31  21  21  21  21
11:  21  21  21  21  31  31  31  31  12  12  12  10  21  21  21  21  21  21  21  21  31  31  31  31  31
31  31  31  21  21  21  21
12:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  10  12  12  12  31  31  31  31  21  21  21  21  21
21  21  21  31  31  31  31
13:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  12  10  12  12  31  31  31  31  21  21  21  21  21
21  21  21  31  31  31  31
14:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  12  12  10  12  31  31  31  31  21  21  21  21  21
21  21  21  31  31  31  31
15:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  12  12  12  10  31  31  31  31  21  21  21  21  21
21  21  21  31  31  31  31
16:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  10  12  12  12  21  21  21  21  21
21  21  21  31  31  31  31
17:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  12  10  12  12  21  21  21  21  21
21  21  21  31  31  31  31
18:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  12  12  10  12  21  21  21  21  21
21  21  21  31  31  31  31
19:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  12  12  12  10  21  21  21  21  21
21  21  21  31  31  31  31
20:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  10  12  12  12  31
31  31  31  21  21  21  21
21:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  12  10  12  12  31
31  31  31  21  21  21  21
22:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  12  12  10  12  31
31  31  31  21  21  21  21
23:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  12  12  12  10  31
31  31  31  21  21  21  21
24:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  10
12  12  12  21  21  21  21
25:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  12
10  12  12  21  21  21  21
26:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  12
12  10  12  21  21  21  21
27:  21  21  21  21  31  31  31  31  31  31  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  12
12  12  10  21  21  21  21
28:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
21  21  21  10  12  12  12
29:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
21  21  21  12  10  12  12
30:  31  31  31  31  21  21  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
21  21  21  12  12  10  12
```

(Continued on next page)

Platform Notes (Continued)

```
    31:  31  31  31  31  21  21  21  21  21  21  21  21  31  31  31  31  31  31  31  31  21  21  21  21  21
    21  21  21  12  12  12  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       2113300784 kB

------------------------------------------------------------
10. who -r
  run-level 3 May 7 03:25

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

------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
    UNIT                                LOAD   ACTIVE SUB    DESCRIPTION
  * NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online

------------------------------------------------------------
13. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
                   dbus-broker firewalld getty@ kdump lvm2-monitor mdmonitor microcode nis-domainname
                   rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd systemd-network-generator tuned
                   udisks2 upower
  enabled-runtime  systemd-remount-fs
  disabled         blk-availability canberra-system-bootup canberra-system-shutdown
                   canberra-system-shutdown-reboot chrony-wait console-getty cpupower debug-shell irqbalance
                   kvm_stat man-db-restart-cache-update nftables powertop rdisc rhsm rhsm-facts rpmdb-rebuild
                   serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext
  indirect         sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo

------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.22.1.el9_0.x86_64
  root=/dev/mapper/rhel-root
  ro
  resume=/dev/mapper/rhel-swap
  rd.lvm.lv=rhel/root
  rd.lvm.lv=rhel/swap

------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 0:
    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
  Current active profile: throughput-performance

------------------------------------------------------------
17. sysctl
```

(Continued on next page)

Platform Notes (Continued)

```
  kernel.numa_balancing               1
  kernel.randomize_va_space           2
  vm.compaction_proactiveness        20
  vm.dirty_background_bytes           0
  vm.dirty_background_ratio          10
  vm.dirty_bytes                      0
  vm.dirty_expire_centisecs        3000
  vm.dirty_ratio                     40
  vm.dirty_writeback_centisecs      500
  vm.dirtytime_expire_seconds     43200
  vm.extfrag_threshold              500
  vm.min_unmapped_ratio               1
  vm.nr_hugepages                     0
  vm.nr_hugepages_mempolicy           0
  vm.nr_overcommit_hugepages          0
  vm.swappiness                      10
  vm.watermark_boost_factor       15000
  vm.watermark_scale_factor          10
  vm.zone_reclaim_mode                0

------------------------------------------------------------
18. /sys/kernel/mm/transparent_hugepage
  defrag          always defer defer+madvise [madvise] never
  enabled         [always] madvise never
  hpage_pmd_size  2097152
  shmem_enabled   always within_size advise [never] deny force

------------------------------------------------------------
19. /sys/kernel/mm/transparent_hugepage/khugepaged
  alloc_sleep_millisecs   60000
  defrag                      1
  max_ptes_none             511
  max_ptes_shared           256
  max_ptes_swap              64
  pages_to_scan            4096
  scan_sleep_millisecs    10000

------------------------------------------------------------
20. OS release
  From /etc/*-release /etc/*-version
  os-release     Red Hat Enterprise Linux 9.0 (Plow)
  redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
  system-release Red Hat Enterprise Linux release 9.0 (Plow)

------------------------------------------------------------
21. Disk information
SPEC is set to: /home/19cpu2017
  Filesystem            Type  Size  Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs   2.9T  597G  2.3T  21% /home

------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
    Vendor:         IEI
    Product:        TS860G7
    Product Family: Not specified
    Serial:         000000000

------------------------------------------------------------
23. dmidecode
  Additional information from dmidecode 3.3 follows.  WARNING: Use caution when you interpret this section.
```

(Continued on next page)

Platform Notes (Continued)

```
   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:
     64x Samsung M321R4GA3BB6-CQKEG 32 GB 2 rank 4800


 ------------------------------------------------------------
 24. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       American Megatrends International, LLC.
    BIOS Version:      05.00.00
    BIOS Date:         04/07/2023
```

Compiler Version Notes

```
==============================================================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

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

Base Portability Flags

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

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
```

(Continued on next page)

Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: basepeak = yes

(Continued on next page)

Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

521.wrf_r: `basepeak = yes`

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs`
`-fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX2`(pass 1)
`-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse`
`-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int`
`-mprefer-vector-width=512 -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html`
`http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-intel-V3.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml`
`http://www.spec.org/cpu2017/flags/Inspur-Platform-Settings-intel-V3.xml`

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