SPEC CPU®2017 Integer Rate Result

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Dell Inc.

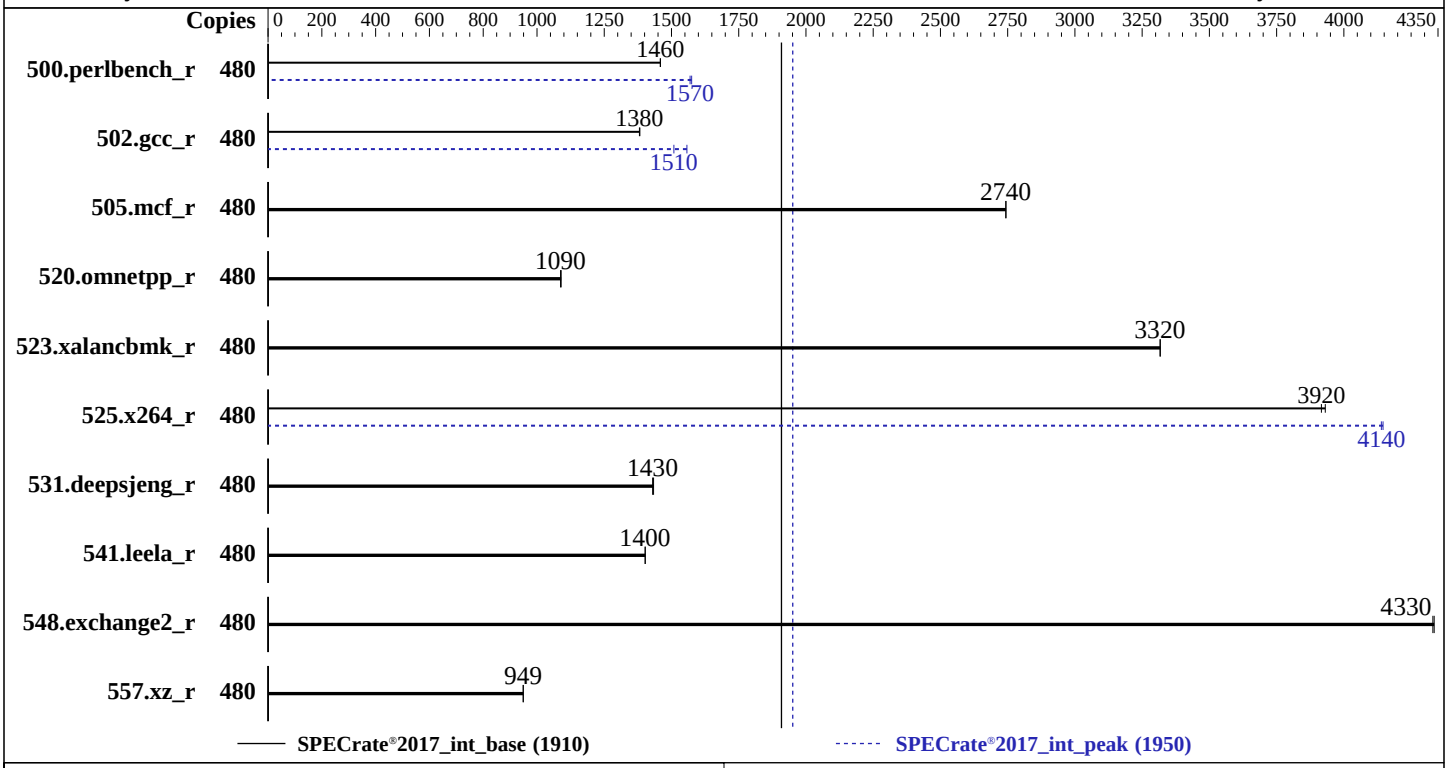
PowerEdge R960 (Intel Xeon Platinum 8490H)

SPECrate®2017_int_base = 1910

SPECrate®2017_int_peak = 1950

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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



Hardware

CPU Name:	Intel Xeon Platinum 8490H
Max MHz:	3500
Nominal:	1900
Enabled:	240 cores, 4 chips, 2 threads/core
Orderable:	2,4 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 (32 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	230 GB on tmpfs
Other:	None

Software

OS:	Red Hat Enterprise Linux 9.0 (Plow) 5.14.0-70.13.1.el9_0.x86_64
Compiler:	C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	Version 1.4.3 released May-2023
File System:	tmpfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other:	jemalloc memory allocator V5.0.1
Power Management:	BIOS and OS set to prefer performance at the cost of additional power usage.

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	480	**524**	**1460**	524	1460			480	**487**	**1570**	485	1570		
502.gcc_r	480	**492**	**1380**	492	1380			480	436	1560	**450**	**1510**		
505.mcf_r	480	283	2740	**283**	**2740**			480	283	2740	**283**	**2740**		
520.omnetpp_r	480	578	1090	**579**	**1090**			480	578	1090	**579**	**1090**		
523.xalancbmk_r	480	153	3320	**153**	**3320**			480	153	3320	**153**	**3320**		
525.x264_r	480	**215**	**3920**	214	3930			480	**203**	**4140**	203	4150		
531.deepsjeng_r	480	384	1430	**385**	**1430**			480	384	1430	**385**	**1430**		
541.leela_r	480	567	1400	**567**	**1400**			480	567	1400	**567**	**1400**		
548.exchange2_r	480	290	4340	**290**	**4330**			480	290	4340	**290**	**4330**		
557.xz_r	480	**547**	**949**	546	949			480	**547**	**949**	546	949		

SPECrate®2017_int_base = **1910**

SPECrate®2017_int_peak = **1950**

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

Compiler Notes

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

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

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

Submit Notes

```
The numactl mechanism was used to bind copies to processors. The config file option 'submit'
was used to generate numactl commands to bind each copy to a specific processor.
For details, please see the config file.
```

Operating System Notes

```
Stack size set to unlimited using "ulimit -s unlimited"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/lib/ia32:/mnt/ram
     disk/cpu2017-1.1.9-ic2023.0/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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>
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

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

Benchmark run from a 230 GB ramdisk created with the cmd: "mount -t tmpfs -o size=230G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
                 ADDDC Setting : Disabled
        DIMM Self Healing on
    Uncorrectable Memory Error : Disabled
       DCU Streamer Prefetcher : Disabled
              Sub NUMA Cluster : 4-way Clustering
                  LLC Prefetch : Disabled
           Dead Line LLC Alloc : Disabled
                Optimizer Mode : Enabled

                System Profile : Custom
          CPU Power Management : Maximum Performance
                           C1E : Disabled
                      C States : Autonomous
           Memory Patrol Scrub : Disabled
      Energy Efficiency Policy : Performance
            PCI ASPM L1 Link
              Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.9-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Mon May  8 09:31:59 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
```

(Continued on next page)

Platform Notes (Continued)

```
 8. numactl --hardware
 9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-6.el9_0)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS
------------------------------------------------------------

------------------------------------------------------------
1. uname -a
  Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
  x86_64 x86_64 GNU/Linux

------------------------------------------------------------
2. w
   09:31:59 up 7 min,  1 user,  load average: 0.27, 0.32, 0.22
  USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1      09:30   31.00s  1.37s  0.00s /bin/bash ./dell-run-speccpu.sh rate --define
  DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=4 --define DL-VERS=v4.5
  --define DL-LQC=1 --output_format html,pdf,txt

------------------------------------------------------------
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) 8252380
  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) 8252380
  virtual memory              (kbytes, -v) unlimited
  file locks                          (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
 login -- root
 -bash
 /bin/bash ./DELL_rate.sh
```

(Continued on next page)

Platform Notes (Continued)

```
 /bin/bash ./dell-run-main.sh rate
 /bin/bash ./dell-run-main.sh rate
 /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1
   --define DL-BIOS-SNC=4 --define DL-VERS=v4.5 --define DL-LQC=1 --output_format html,pdf,txt
 /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1
   --define DL-BIOS-SNC=4 --define DL-VERS=v4.5 --define DL-LQC=1 --output_format html,pdf,txt
 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 --iterations 2 --define
   DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=4 --define DL-VERS=v4.5
   --define DL-LQC=1 --output_format html,pdf,txt intrate
 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 --iterations 2
   --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=4 --define
   DL-VERS=v4.5 --define DL-LQC=1 --output_format html,pdf,txt --nopower --runmode rate --tune base:peak
   --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /mnt/ramdisk/cpu2017-1.1.9-ic2023.0

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8490H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 60
    siblings        : 120
    4 physical ids (chips)
    480 processors (hardware threads)
    physical id 0: core ids 0-59
    physical id 1: core ids 0-59
    physical id 2: core ids 0-59
    physical id 3: core ids 0-59
    physical id 0: apicids 0-119
    physical id 1: apicids 128-247
    physical id 2: apicids 256-375
    physical id 3: apicids 384-503
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.

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

From lscpu from util-linux 2.37.4:
  Architecture:                    x86_64
  CPU op-mode(s):                  32-bit, 64-bit
  Address sizes:                   46 bits physical, 57 bits virtual
  Byte Order:                      Little Endian
  CPU(s):                          480
  On-line CPU(s) list:             0-479
  Vendor ID:                       GenuineIntel
  BIOS Vendor ID:                  Intel
  Model name:                      Intel(R) Xeon(R) Platinum 8490H
  BIOS Model name:                 Intel(R) Xeon(R) Platinum 8490H
  CPU family:                      6
```

(Continued on next page)

Platform Notes (Continued)

```
Model:                   143
Thread(s) per core:      2
Core(s) per socket:      60
Socket(s):               4
Stepping:                8
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 monitor
                         ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1
                         sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
                         lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cat_l2 cdp_l3
                         invpcid_single cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                         vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2
                         erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                         clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
                         xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                         split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                         avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq
                         avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect
                         cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
                         arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities
Virtualization:          VT-x
L1d cache:               11.3 MiB (240 instances)
L1i cache:               7.5 MiB (240 instances)
L2 cache:                480 MiB (240 instances)
L3 cache:                450 MiB (4 instances)
NUMA node(s):            16
NUMA node0 CPU(s):       0,16,32,48,64,80,96,112,128,144,160,176,192,208,224,240,256,272,288,304,32
                         0,336,352,368,384,400,416,432,448,464
NUMA node1 CPU(s):       8,24,40,56,72,88,104,120,136,152,168,184,200,216,232,248,264,280,296,312,3
                         28,344,360,376,392,408,424,440,456,472
NUMA node2 CPU(s):       4,20,36,52,68,84,100,116,132,148,164,180,196,212,228,244,260,276,292,308,3
                         24,340,356,372,388,404,420,436,452,468
NUMA node3 CPU(s):       12,28,44,60,76,92,108,124,140,156,172,188,204,220,236,252,268,284,300,316,
                         332,348,364,380,396,412,428,444,460,476
NUMA node4 CPU(s):       1,17,33,49,65,81,97,113,129,145,161,177,193,209,225,241,257,273,289,305,32
                         1,337,353,369,385,401,417,433,449,465
NUMA node5 CPU(s):       9,25,41,57,73,89,105,121,137,153,169,185,201,217,233,249,265,281,297,313,3
                         29,345,361,377,393,409,425,441,457,473
NUMA node6 CPU(s):       5,21,37,53,69,85,101,117,133,149,165,181,197,213,229,245,261,277,293,309,3
                         25,341,357,373,389,405,421,437,453,469
NUMA node7 CPU(s):       13,29,45,61,77,93,109,125,141,157,173,189,205,221,237,253,269,285,301,317,
                         333,349,365,381,397,413,429,445,461,477
NUMA node8 CPU(s):       2,18,34,50,66,82,98,114,130,146,162,178,194,210,226,242,258,274,290,306,32
                         2,338,354,370,386,402,418,434,450,466
NUMA node9 CPU(s):       10,26,42,58,74,90,106,122,138,154,170,186,202,218,234,250,266,282,298,314,
                         330,346,362,378,394,410,426,442,458,474
NUMA node10 CPU(s):      6,22,38,54,70,86,102,118,134,150,166,182,198,214,230,246,262,278,294,310,3
                         26,342,358,374,390,406,422,438,454,470
NUMA node11 CPU(s):      14,30,46,62,78,94,110,126,142,158,174,190,206,222,238,254,270,286,302,318,
                         334,350,366,382,398,414,430,446,462,478
NUMA node12 CPU(s):      3,19,35,51,67,83,99,115,131,147,163,179,195,211,227,243,259,275,291,307,32
                         3,339,355,371,387,403,419,435,451,467
NUMA node13 CPU(s):      11,27,43,59,75,91,107,123,139,155,171,187,203,219,235,251,267,283,299,315,
                         331,347,363,379,395,411,427,443,459,475
NUMA node14 CPU(s):      7,23,39,55,71,87,103,119,135,151,167,183,199,215,231,247,263,279,295,311,3
                         27,343,359,375,391,407,423,439,455,471
NUMA node15 CPU(s):      15,31,47,63,79,95,111,127,143,159,175,191,207,223,239,255,271,287,303,319,
```

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Platform Notes (Continued)

```
                                335,351,367,383,399,415,431,447,463,479
  Vulnerability Itlb multihit:     Not affected
  Vulnerability L1tf:              Not affected
  Vulnerability Mds:               Not affected
  Vulnerability Meltdown:          Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:        Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
  Vulnerability Srbds:             Not affected
  Vulnerability Tsx async abort:   Not affected

From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
     L1d       48K    11.3M   12 Data            1     64        1             64
     L1i       32K     7.5M    8 Instruction     1     64        1             64
     L2         2M     480M   16 Unified         2   2048        1             64
     L3     112.5M     450M   15 Unified         3 122880        1             64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 16 nodes (0-15)
  node 0 cpus:
  0,16,32,48,64,80,96,112,128,144,160,176,192,208,224,240,256,272,288,304,320,336,352,368,384,400,416,432,448
  ,464
  node 0 size: 127957 MB
  node 0 free: 127484 MB
  node 1 cpus:
  8,24,40,56,72,88,104,120,136,152,168,184,200,216,232,248,264,280,296,312,328,344,360,376,392,408,424,440,45
  6,472
  node 1 size: 129017 MB
  node 1 free: 128635 MB
  node 2 cpus:
  4,20,36,52,68,84,100,116,132,148,164,180,196,212,228,244,260,276,292,308,324,340,356,372,388,404,420,436,45
  2,468
  node 2 size: 129017 MB
  node 2 free: 118862 MB
  node 3 cpus:
  12,28,44,60,76,92,108,124,140,156,172,188,204,220,236,252,268,284,300,316,332,348,364,380,396,412,428,444,4
  60,476
  node 3 size: 129017 MB
  node 3 free: 128648 MB
  node 4 cpus:
  1,17,33,49,65,81,97,113,129,145,161,177,193,209,225,241,257,273,289,305,321,337,353,369,385,401,417,433,449
  ,465
  node 4 size: 128981 MB
  node 4 free: 128596 MB
  node 5 cpus:
  9,25,41,57,73,89,105,121,137,153,169,185,201,217,233,249,265,281,297,313,329,345,361,377,393,409,425,441,45
  7,473
  node 5 size: 129017 MB
  node 5 free: 128608 MB
  node 6 cpus:
  5,21,37,53,69,85,101,117,133,149,165,181,197,213,229,245,261,277,293,309,325,341,357,373,389,405,421,437,45
  3,469
  node 6 size: 129017 MB
  node 6 free: 128634 MB
  node 7 cpus:
  13,29,45,61,77,93,109,125,141,157,173,189,205,221,237,253,269,285,301,317,333,349,365,381,397,413,429,445,4
  61,477
```

(Continued on next page)

Platform Notes (Continued)

```
node 7 size: 129017 MB
node 7 free: 128597 MB
node 8 cpus:
2,18,34,50,66,82,98,114,130,146,162,178,194,210,226,242,258,274,290,306,322,338,354,370,386,402,418,434,450
,466
node 8 size: 129017 MB
node 8 free: 128601 MB
node 9 cpus:
10,26,42,58,74,90,106,122,138,154,170,186,202,218,234,250,266,282,298,314,330,346,362,378,394,410,426,442,4
58,474
node 9 size: 129017 MB
node 9 free: 128630 MB
node 10 cpus:
6,22,38,54,70,86,102,118,134,150,166,182,198,214,230,246,262,278,294,310,326,342,358,374,390,406,422,438,45
4,470
node 10 size: 129017 MB
node 10 free: 127108 MB
node 11 cpus:
14,30,46,62,78,94,110,126,142,158,174,190,206,222,238,254,270,286,302,318,334,350,366,382,398,414,430,446,4
62,478
node 11 size: 129017 MB
node 11 free: 128632 MB
node 12 cpus:
3,19,35,51,67,83,99,115,131,147,163,179,195,211,227,243,259,275,291,307,323,339,355,371,387,403,419,435,451
,467
node 12 size: 129017 MB
node 12 free: 128570 MB
node 13 cpus:
11,27,43,59,75,91,107,123,139,155,171,187,203,219,235,251,267,283,299,315,331,347,363,379,395,411,427,443,4
59,475
node 13 size: 129017 MB
node 13 free: 128643 MB
node 14 cpus:
7,23,39,55,71,87,103,119,135,151,167,183,199,215,231,247,263,279,295,311,327,343,359,375,391,407,423,439,45
5,471
node 14 size: 129017 MB
node 14 free: 128615 MB
node 15 cpus:
15,31,47,63,79,95,111,127,143,159,175,191,207,223,239,255,271,287,303,319,335,351,367,383,399,415,431,447,4
63,479
node 15 size: 128988 MB
node 15 free: 128629 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  0:  10  12  12  12  21  21  21  21  21  21  21  21  21  21  21  21
  1:  12  10  12  12  21  21  21  21  21  21  21  21  21  21  21  21
  2:  12  12  10  12  21  21  21  21  21  21  21  21  21  21  21  21
  3:  12  12  12  10  21  21  21  21  21  21  21  21  21  21  21  21
  4:  21  21  21  21  10  12  12  12  21  21  21  21  21  21  21  21
  5:  21  21  21  21  12  10  12  12  21  21  21  21  21  21  21  21
  6:  21  21  21  21  12  12  10  12  21  21  21  21  21  21  21  21
  7:  21  21  21  21  12  12  12  10  21  21  21  21  21  21  21  21
  8:  21  21  21  21  21  21  21  21  10  12  12  12  21  21  21  21
  9:  21  21  21  21  21  21  21  21  12  10  12  12  21  21  21  21
 10:  21  21  21  21  21  21  21  21  12  12  10  12  21  21  21  21
 11:  21  21  21  21  21  21  21  21  12  12  12  10  21  21  21  21
 12:  21  21  21  21  21  21  21  21  21  21  21  21  10  12  12  12
 13:  21  21  21  21  21  21  21  21  21  21  21  21  12  10  12  12
 14:  21  21  21  21  21  21  21  21  21  21  21  21  12  12  10  12
 15:  21  21  21  21  21  21  21  21  21  21  21  21  12  12  12  10
```

(Continued on next page)

Platform Notes (Continued)

```
------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       2112671384 kB

------------------------------------------------------------
10. who -r
  run-level 3 May 8 09:26

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

------------------------------------------------------------
12. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
                   accounts-daemon atd auditd avahi-daemon bluetooth chronyd crond cups dbus-broker firewalld
                   gdm getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragemgmt
                   low-memory-monitor lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname
                   nvmefc-boot-connections ostree-remount power-profiles-daemon qemu-guest-agent rhsmcertd
                   rsyslog rtkit-daemon selinux-autorelabel-mark smartd sshd sssd switcheroo-control
                   systemd-network-generator udisks2 upower vgauthd vmtoolsd
  enabled-runtime  systemd-remount-fs
  disabled         arp-ethers blk-availability brltty canberra-system-bootup canberra-system-shutdown
                   canberra-system-shutdown-reboot chrony-wait cni-dhcp console-getty cpupower cups-browsed
                   dbus-daemon debug-shell dnsmasq iprdump iprinit iprupdate iscsid iscsiuio kpatch kvm_stat
                   ledmon man-db-restart-cache-update nftables nvmf-autoconnect podman podman-auto-update
                   podman-restart psacct ras-mc-ctl rasdaemon rdisc rhcd rhsm rhsm-facts rpmdb-rebuild
                   serial-getty@ speech-dispatcherd sshd-keygen@ systemd-boot-check-no-failures
                   systemd-pstore systemd-sysext wpa_supplicant
  indirect         spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo

------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
  root=/dev/mapper/rhel-root
  ro
  crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
  resume=/dev/mapper/rhel-swap
  rd.lvm.lv=rhel/root
  rd.lvm.lv=rhel/swap
  rhgb
  quiet

------------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 0:
    Unable to determine current policy
    boost state support:
      Supported: yes
      Active: yes

------------------------------------------------------------
15. sysctl
  kernel.numa_balancing               1
  kernel.randomize_va_space           2
  vm.compaction_proactiveness        20
  vm.dirty_background_bytes           0
```

(Continued on next page)

Platform Notes (Continued)

```
  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

------------------------------------------------------------
16. /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

------------------------------------------------------------
17. /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

------------------------------------------------------------
18. 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)

------------------------------------------------------------
19. Disk information
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-ic2023.0
  Filesystem     Type   Size  Used Avail Use% Mounted on
  tmpfs          tmpfs  230G  4.2G  226G   2% /mnt/ramdisk

------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge R960
    Product Family: PowerEdge
    Serial:         SLR9601

------------------------------------------------------------
21. dmidecode
  Additional information from dmidecode 3.3 follows.  WARNING: Use caution when you interpret this section.
  The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
  determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
  "DMTF SMBIOS" standard.
  Memory:
```

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Platform Notes (Continued)

```
     31x 00AD063200AD HMCG94AEBRA109N 64 GB 2 rank 4800
     1x 00AD063200AD HMCG94MEBRA109N 64 GB 2 rank 4800


 ------------------------------------------------------------
 22. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Dell Inc.
    BIOS Version:      1.4.3
    BIOS Date:         05/04/2023
    BIOS Revision:     1.4
```

Compiler Version Notes

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

==============================================================================================================
C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
        | 557.xz_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C       | 502.gcc_r(peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
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--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
        | 557.xz_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
        | 541.leela_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran | 548.exchange2_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Base Portability Flags

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

Base Optimization Flags

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

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

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

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Peak Portability Flags

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

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -w -std=c11 -m64 -Wl,-z,muldefs
-fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

502.gcc_r: -m32
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

(Continued on next page)

Peak Optimization Flags (Continued)

505.mcf_r: `basepeak = yes`

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

557.xz_r: `basepeak = yes`

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

523.xalancbmk_r: `basepeak = yes`

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `basepeak = yes`

Fortran benchmarks:

548.exchange2_r: `basepeak = yes`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.3.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/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.3.xml`

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