SPEC CPU®2017 Integer Rate Result

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Dell Inc.

PowerEdge R860 (Intel Xeon Platinum 8460H)

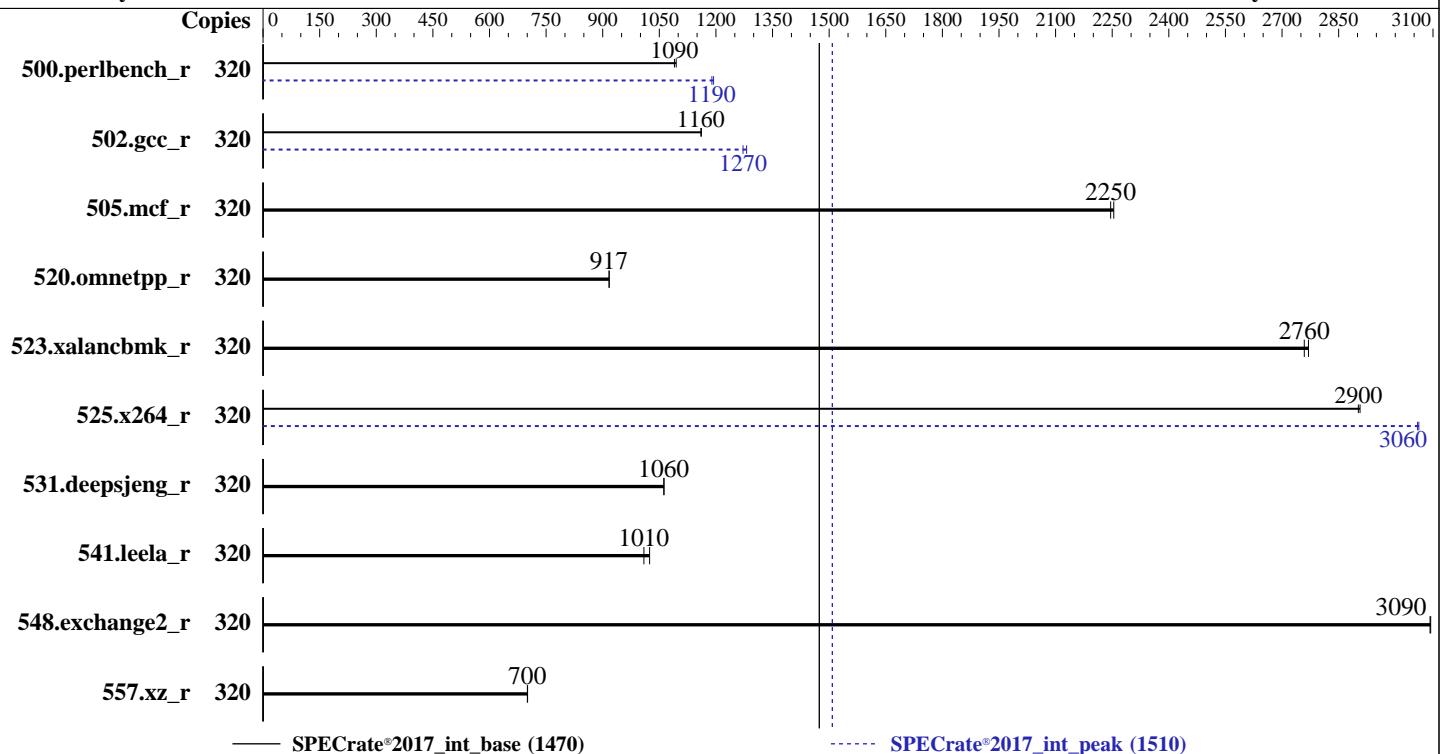$SPECrate^{®}2017\_int\_base = 1470$

$SPECrate^{®}2017\_int\_peak = 1510$

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

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

Benchmark	Copies	Base	Peak
500.perlbench_r	320	1090	1190
502.gcc_r	320	1160	1270
505.mcf_r	320	2250	
520.omnetpp_r	320	917	
523.xalancbmk_r	320	2760	
525.x264_r	320	2900	3060
531.deepsjeng_r	320	1060	
541.leela_r	320	1010	
548.exchange2_r	320	3090	
557.xz_r	320	700	

SPECrate®2017_int_base (1470)   SPECrate®2017_int_peak (1510)

Hardware

CPU Name: Intel Xeon Platinum 8460H
 Max MHz: 3800
 Nominal: 2200
Enabled: 160 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: 105 MB I+D on chip per chip
 Other: None
Memory: 2 TB (32 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 160 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	320	465	1090	**467**	**1090**			320	427	1190	**428**	**1190**		
502.gcc_r	320	390	1160	**391**	**1160**			320	**356**	**1270**	354	1280		
505.mcf_r	320	**230**	**2250**	229	2250			320	**230**	**2250**	229	2250		
520.omnetpp_r	320	458	917	**458**	**917**			320	458	917	**458**	**917**		
523.xalancbmk_r	320	**122**	**2760**	122	2770			320	**122**	**2760**	122	2770		
525.x264_r	320	193	2910	**193**	**2900**			320	**183**	**3060**	183	3060		
531.deepsjeng_r	320	**345**	**1060**	345	1060			320	**345**	**1060**	345	1060		
541.leela_r	320	**525**	**1010**	517	1020			320	**525**	**1010**	517	1020		
548.exchange2_r	320	271	3090	**271**	**3090**			320	271	3090	**271**	**3090**		
557.xz_r	320	493	701	**493**	**700**			320	493	701	**493**	**700**		
SPECrate®2017_int_base =	**1470**													
SPECrate®2017_int_peak =	**1510**													

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"
```

Standard Performance Evaluation Corporation (info@spec.org)
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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 160 GB ramdisk created with the cmd: "mount -t tmpfs -o size=160G 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 14:58:16 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)

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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
       14:58:16 up 1 min,  1 user,  load average: 0.79, 0.49, 0.19
      USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
      root     tty1       14:57   31.00s 1.21s  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) 8252512
      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) 8252512
      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
```

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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=320 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=160 --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=320 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=160 --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 8460H
    vendor_id         : GenuineIntel
    cpu family        : 6
    model             : 143
    stepping          : 8
    microcode         : 0x2b0001b0
    bugs              : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores         : 40
    siblings          : 80
    4 physical ids (chips)
    320 processors (hardware threads)
    physical id 0: core ids 0-39
    physical id 1: core ids 0-39
    physical id 2: core ids 0-39
    physical id 3: core ids 0-39
    physical id 0: apicids 0-79
    physical id 1: apicids 128-207
    physical id 2: apicids 256-335
    physical id 3: apicids 384-463
  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):                   320
   On-line CPU(s) list:      0-319
   Vendor ID:                GenuineIntel
   BIOS Vendor ID:           Intel
   Model name:               Intel(R) Xeon(R) Platinum 8460H
   BIOS Model name:          Intel(R) Xeon(R) Platinum 8460H
   CPU family:               6
```

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Platform Notes (Continued)

```
    Model:                        143
    Thread(s) per core:           2
    Core(s) per socket:           40
    Socket(s):                    4
    Stepping:                     8
    BogoMIPS:                     4400.00
    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:                    7.5 MiB (160 instances)
    L1i cache:                    5 MiB (160 instances)
    L2 cache:                     320 MiB (160 instances)
    L3 cache:                     420 MiB (4 instances)
    NUMA node(s):                 16
    NUMA node0 CPU(s):            0,16,36,48,60,84,96,112,132,148,160,176,196,208,220,244,256,272,292,308
    NUMA node1 CPU(s):            8,24,32,40,52,76,92,120,140,152,168,184,192,200,212,236,252,280,300,312
    NUMA node2 CPU(s):            4,20,28,64,72,88,100,116,124,136,164,180,188,224,232,248,260,276,284,296
    NUMA node3 CPU(s):            12,44,56,68,80,104,108,128,144,156,172,204,216,228,240,264,268,288,304,316
    NUMA node4 CPU(s):            1,17,29,45,61,101,113,125,141,149,161,177,189,205,221,261,273,285,301,309
    NUMA node5 CPU(s):            9,37,53,69,81,93,105,121,133,153,169,197,213,229,241,253,265,281,293,313
    NUMA node6 CPU(s):            5,21,33,49,65,77,89,109,117,129,165,181,193,209,225,237,249,269,277,289
    NUMA node7 CPU(s):            13,25,41,57,73,85,97,137,145,157,173,185,201,217,233,245,257,297,305,317
    NUMA node8 CPU(s):            2,18,42,82,94,102,114,126,138,146,162,178,202,242,254,262,274,286,298,306
    NUMA node9 CPU(s):            10,26,34,46,58,66,78,106,130,154,170,186,194,206,218,226,238,266,290,314
    NUMA node10 CPU(s):           6,22,30,54,74,86,98,118,142,150,166,182,190,214,234,246,258,278,302,310
    NUMA node11 CPU(s):           14,38,50,62,70,90,110,122,134,158,174,198,210,222,230,250,270,282,294,318
    NUMA node12 CPU(s):           3,27,39,51,63,79,95,103,119,143,163,187,199,211,223,239,255,263,279,303
    NUMA node13 CPU(s):           11,19,31,43,71,87,111,127,139,155,171,179,191,203,231,247,271,287,299,315
    NUMA node14 CPU(s):           7,15,55,67,83,107,123,135,147,151,167,175,215,227,243,267,283,295,307,311
    NUMA node15 CPU(s):           23,35,47,59,75,91,99,115,131,159,183,195,207,219,235,251,259,275,291,319
    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     7.5M   12 Data            1     64        1             64
      L1i       32K       5M    8 Instruction     1     64        1             64
      L2         2M     320M   16 Unified         2   2048        1             64
```

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Platform Notes (Continued)

```
     L3        105M     420M   15 Unified        3 114688        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: 0,16,36,48,60,84,96,112,132,148,160,176,196,208,220,244,256,272,292,308
  node 0 size: 127959 MB
  node 0 free: 127132 MB
  node 1 cpus: 8,24,32,40,52,76,92,120,140,152,168,184,192,200,212,236,252,280,300,312
  node 1 size: 129019 MB
  node 1 free: 128616 MB
  node 2 cpus: 4,20,28,64,72,88,100,116,124,136,164,180,188,224,232,248,260,276,284,296
  node 2 size: 129019 MB
  node 2 free: 128605 MB
  node 3 cpus: 12,44,56,68,80,104,108,128,144,156,172,204,216,228,240,264,268,288,304,316
  node 3 size: 129019 MB
  node 3 free: 127241 MB
  node 4 cpus: 1,17,29,45,61,101,113,125,141,149,161,177,189,205,221,261,273,285,301,309
  node 4 size: 129019 MB
  node 4 free: 128670 MB
  node 5 cpus: 9,37,53,69,81,93,105,121,133,153,169,197,213,229,241,253,265,281,293,313
  node 5 size: 129019 MB
  node 5 free: 128682 MB
  node 6 cpus: 5,21,33,49,65,77,89,109,117,129,165,181,193,209,225,237,249,269,277,289
  node 6 size: 129019 MB
  node 6 free: 128640 MB
  node 7 cpus: 13,25,41,57,73,85,97,137,145,157,173,185,201,217,233,245,257,297,305,317
  node 7 size: 129019 MB
  node 7 free: 128650 MB
  node 8 cpus: 2,18,42,82,94,102,114,126,138,146,162,178,202,242,254,262,274,286,298,306
  node 8 size: 129019 MB
  node 8 free: 128640 MB
  node 9 cpus: 10,26,34,46,58,66,78,106,130,154,170,186,194,206,218,226,238,266,290,314
  node 9 size: 128983 MB
  node 9 free: 119827 MB
  node 10 cpus: 6,22,30,54,74,86,98,118,142,150,166,182,190,214,234,246,258,278,302,310
  node 10 size: 129019 MB
  node 10 free: 128667 MB
  node 11 cpus: 14,38,50,62,70,90,110,122,134,158,174,198,210,222,230,250,270,282,294,318
  node 11 size: 129019 MB
  node 11 free: 128576 MB
  node 12 cpus: 3,27,39,51,63,79,95,103,119,143,163,187,199,211,223,239,255,263,279,303
  node 12 size: 129019 MB
  node 12 free: 128687 MB
  node 13 cpus: 11,19,31,43,71,87,111,127,139,155,171,179,191,203,231,247,271,287,299,315
  node 13 size: 129019 MB
  node 13 free: 128696 MB
  node 14 cpus: 7,15,55,67,83,107,123,135,147,151,167,175,215,227,243,267,283,295,307,311
  node 14 size: 129019 MB
  node 14 free: 128660 MB
  node 15 cpus: 23,35,47,59,75,91,99,115,131,159,183,195,207,219,235,251,259,275,291,319
  node 15 size: 128990 MB
  node 15 free: 128632 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
```

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Dell Inc.

PowerEdge R860 (Intel Xeon Platinum 8460H)

SPECrate®2017_int_base = 1470

SPECrate®2017_int_peak = 1510

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

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

Platform Notes (Continued)

```
    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

   ------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       2112705364 kB


   ------------------------------------------------------------
10. who -r
   run-level 3 May 8 14:57


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

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Dell Inc.

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Platform Notes (Continued)

```
   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
     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  160G  4.2G  156G   3% /mnt/ramdisk


   ----------------------------------------------------------
   20. /sys/devices/virtual/dmi/id
```

(Continued on next page)

Dell Inc.

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Platform Notes (Continued)

```
      Vendor:         Dell Inc.
      Product:        PowerEdge R860
      Product Family: PowerEdge
      Serial:         SLR8603


    --------------------------------------------------------------
 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:
      31x 002C00B3002C MTC40F2046S1RC48BA1 64 GB 2 rank 4800
      1x 002C0632002C MTC40F2046S1RC48BA1 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
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++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak) 531.deepsjeng_r(base, peak)
         | 541.leela_r(base, peak)
```

(Continued on next page)

Dell Inc.

PowerEdge R860 (Intel Xeon Platinum 8460H)

SPECrate®2017_int_base = 1470

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CPU2017 License: 6573
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Test Date: May-2023
Hardware Availability: May-2023
Software Availability: Dec-2022

Compiler Version Notes (Continued)

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

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SPEC CPU®2017 Integer Rate Result

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PowerEdge R860 (Intel Xeon Platinum 8460H)

SPECrate®2017_int_base = 1470

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Software Availability: Dec-2022

Base Optimization Flags (Continued)

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`

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

Dell Inc.

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CPU2017 License: 6573		**Test Date:**	May-2023
Test Sponsor: Dell Inc.		**Hardware Availability:** May-2023
Tested by: Dell Inc.		**Software Availability:** Dec-2022

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`

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`

SPEC CPU®2017 Integer Rate Result

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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

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

Tested with SPEC CPU®2017 v1.1.9 on 2023-05-08 15:58:15-0400.

Report generated on 2024-01-29 17:45:31 by CPU2017 PDF formatter v6716.

Originally published on 2023-05-23.