SPEC CPU®2017 Integer Speed Result

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Dell Inc.

PowerEdge R860 (Intel Xeon Platinum 8468H)

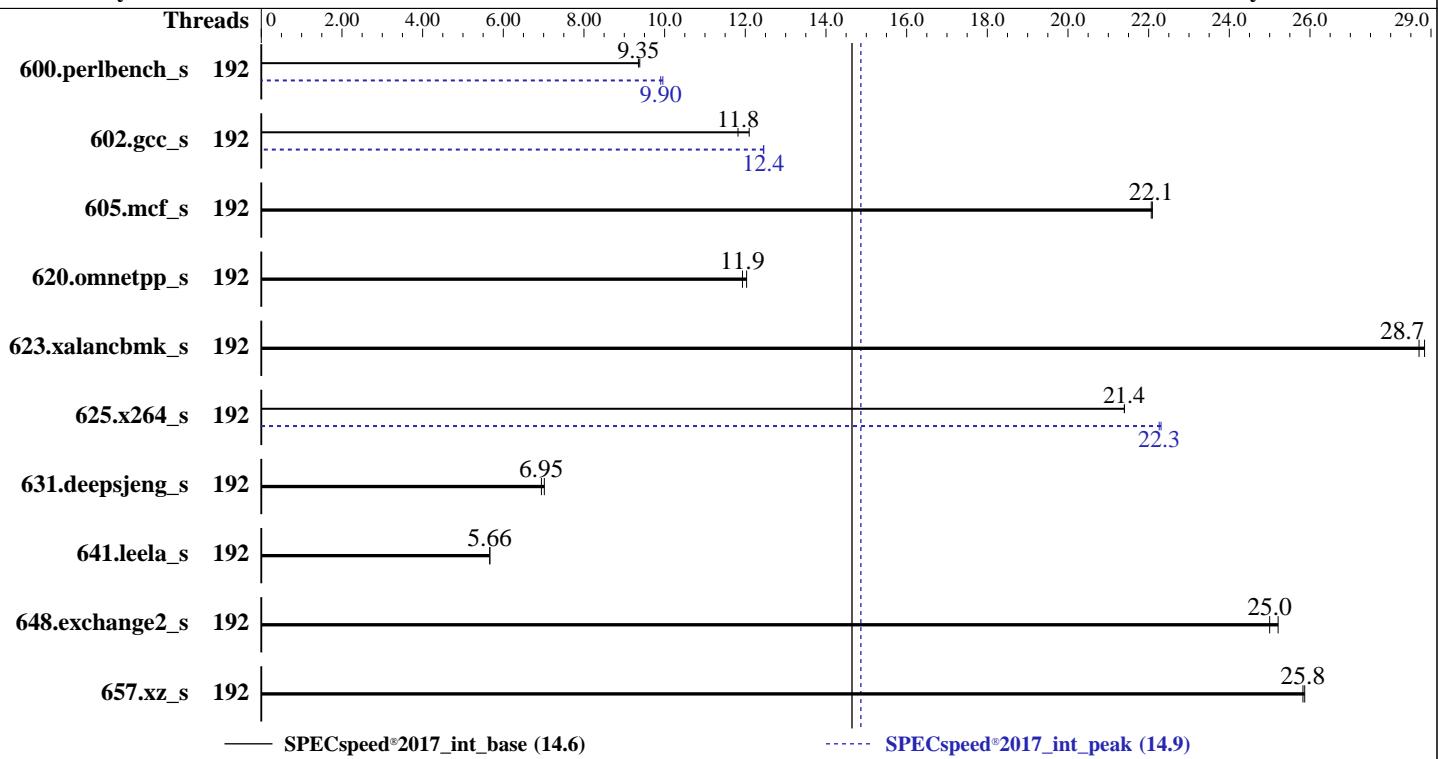$SPECspeed®2017\_int\_base = 14.6$

$SPECspeed®2017\_int\_peak = 14.9$

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

Benchmark	Threads	base	peak
600.perlbench_s	192	9.35	9.90
602.gcc_s	192	11.8	12.4
605.mcf_s	192	22.1	
620.omnetpp_s	192	11.9	
623.xalancbmk_s	192	28.7	
625.x264_s	192	21.4	22.3
631.deepsjeng_s	192	6.95	
641.leela_s	192	5.66	
648.exchange2_s	192	25.0	
657.xz_s	192	25.8	

SPECspeed®2017_int_base (14.6)　　　SPECspeed®2017_int_peak (14.9)

Hardware

CPU Name: Intel Xeon Platinum 8468H
　Max MHz: 3800
　Nominal: 2100
Enabled: 192 cores, 4 chips
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: 110 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: Yes
Firmware: Version 1.4.0 released Mar-2023
File System: tmpfs
System State: Run level 5 (graphical multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	192	**190**	**9.35**	189	9.38			192	**179**	**9.90**	178	9.96		
602.gcc_s	192	329	12.1	**337**	**11.8**			192	320	12.5	**320**	**12.4**		
605.mcf_s	192	214	22.1	**214**	**22.1**			192	214	22.1	**214**	**22.1**		
620.omnetpp_s	192	**137**	**11.9**	136	12.0			192	**137**	**11.9**	136	12.0		
623.xalancbmk_s	192	**49.4**	**28.7**	49.1	28.8			192	**49.4**	**28.7**	49.1	28.8		
625.x264_s	192	**82.4**	**21.4**	82.4	21.4			192	**79.2**	**22.3**	79.1	22.3		
631.deepsjeng_s	192	**206**	**6.95**	204	7.02			192	**206**	**6.95**	204	7.02		
641.leela_s	192	**301**	**5.66**	301	5.67			192	**301**	**5.66**	301	5.67		
648.exchange2_s	192	**118**	**25.0**	117	25.2			192	**118**	**25.0**	117	25.2		
657.xz_s	192	**239**	**25.8**	239	25.9			192	**239**	**25.8**	239	25.9		
SPECspeed®2017_int_base =		**14.6**												
SPECspeed®2017_int_peak =		**14.9**												

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.
```

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH =
    "/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default
```

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General Notes (Continued)

```
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>         /proc/sys/vm/drop_caches
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 110 GB ramdisk created with the cmd: "mount -t tmpfs -o size=110G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
                   ADDDC Setting : Disabled
         DIMM Self Healing on
   Uncorrectable Memory Error : Disabled
             Logical Processor : Disabled
             Sub NUMA Cluster : 2-way Clustering
               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 Mar 27 22:08:45 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. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
```

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Platform Notes (Continued)

```
 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
    22:08:45 up 2 min,  1 user,  load average: 0.51, 0.27, 0.11
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     :1         22:06   ?xdm?  9:56   0.00s /usr/libexec/gdm-x-session --register-session --run-script
   gnome-session


  ------------------------------------------------------------
 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) 8252144
   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) 8252144
   virtual memory              (kbytes, -v) unlimited
   file locks                      (-x) unlimited

  ------------------------------------------------------------
 5. sysinfo process ancestry
  /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
  /usr/lib/systemd/systemd --user
  /usr/libexec/gnome-terminal-server
  bash
  /bin/bash ./DELL_speed.sh
  /bin/bash ./dell-run-main.sh speed
  /bin/bash ./dell-run-main.sh speed
  /bin/bash ./dell-run-speccpu.sh speed --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-LogProcD=1
    --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=2 --output_format csv,html,pdf,txt
  /bin/bash ./dell-run-speccpu.sh speed --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-LogProcD=1
    --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=2 --output_format csv,html,pdf,txt
  runcpu --nobuild --action validate --define default-platform-flags -c
```

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Platform Notes (Continued)

```
    ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=192 --tune base,peak -o all --define
    intspeedaffinity --define drop_caches --iterations 2 --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define
    DL-BIOS-LogProcD=1 --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=2 --output_format csv,html,pdf,txt
    intspeed
 runcpu --nobuild --action validate --define default-platform-flags --configfile
    ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=192 --tune base,peak --output_format all
    --define intspeedaffinity --define drop_caches --iterations 2 --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc
    --define DL-BIOS-LogProcD=1 --define DL-BIOS-adddcD=1 --define DL-BIOS-SNC=2 --output_format
    csv,html,pdf,txt --nopower --runmode speed --tune base:peak --size refspeed intspeed --nopreenv
    --note-preenv --logfile $SPEC/tmp/CPU2017.001/templogs/preenv.intspeed.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 8468H
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 48
    siblings        : 48
    4 physical ids (chips)
    192 processors (hardware threads)
    physical id 0: core ids 0-47
    physical id 1: core ids 0-47
    physical id 2: core ids 0-47
    physical id 3: core ids 0-47
    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
    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
    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
    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
 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):                  192
 On-line CPU(s) list:     0-191
 Vendor ID:               GenuineIntel
 BIOS Vendor ID:          Intel
 Model name:              Intel(R) Xeon(R) Platinum 8468H
 BIOS Model name:         Intel(R) Xeon(R) Platinum 8468H
```

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Platform Notes (Continued)

```
        CPU family:                 6
        Model:                      143
        Thread(s) per core:         1
        Core(s) per socket:         48
        Socket(s):                  4
        Stepping:                   8
        BogoMIPS:                   4200.00
        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:                  9 MiB (192 instances)
        L1i cache:                  6 MiB (192 instances)
        L2 cache:                   384 MiB (192 instances)
        L3 cache:                   420 MiB (4 instances)
        NUMA node(s):               8
        NUMA node0 CPU(s):          0,8,16,24,32,40,48,56,64,72,80,88,96,104,112,120,128,136,144,152,160,168,1
                                    76,184
        NUMA node1 CPU(s):          4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124,132,140,148,156,164,172
                                    ,180,188
        NUMA node2 CPU(s):          1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,129,137,145,153,161,169,1
                                    77,185
        NUMA node3 CPU(s):          5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125,133,141,149,157,165,173
                                    ,181,189
        NUMA node4 CPU(s):          2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122,130,138,146,154,162,170,
                                    178,186
        NUMA node5 CPU(s):          6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126,134,142,150,158,166,174
                                    ,182,190
        NUMA node6 CPU(s):          3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123,131,139,147,155,163,171,
                                    179,187
        NUMA node7 CPU(s):          7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127,135,143,151,159,167,175
                                    ,183,191
        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       9M   12 Data            1     64        1             64
        L1i      32K       6M    8 Instruction     1     64        1             64
```

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Platform Notes (Continued)

```
    L2         2M      384M   16 Unified         2   2048       1              64
    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: 8 nodes (0-7)
  node 0 cpus: 0,8,16,24,32,40,48,56,64,72,80,88,96,104,112,120,128,136,144,152,160,168,176,184
  node 0 size: 256855 MB
  node 0 free: 246841 MB
  node 1 cpus: 4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124,132,140,148,156,164,172,180,188
  node 1 size: 258006 MB
  node 1 free: 257334 MB
  node 2 cpus: 1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,129,137,145,153,161,169,177,185
  node 2 size: 258042 MB
  node 2 free: 257257 MB
  node 3 cpus: 5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125,133,141,149,157,165,173,181,189
  node 3 size: 258042 MB
  node 3 free: 257335 MB
  node 4 cpus: 2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122,130,138,146,154,162,170,178,186
  node 4 size: 258042 MB
  node 4 free: 257598 MB
  node 5 cpus: 6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126,134,142,150,158,166,174,182,190
  node 5 size: 258042 MB
  node 5 free: 257675 MB
  node 6 cpus: 3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123,131,139,147,155,163,171,179,187
  node 6 size: 258042 MB
  node 6 free: 256763 MB
  node 7 cpus: 7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127,135,143,151,159,167,175,183,191
  node 7 size: 258022 MB
  node 7 free: 257462 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  12  21  21  21  21  21  21
    1:  12  10  21  21  21  21  21  21
    2:  21  21  10  12  21  21  21  21
    3:  21  21  12  10  21  21  21  21
    4:  21  21  21  21  10  12  21  21
    5:  21  21  21  21  12  10  21  21
    6:  21  21  21  21  21  21  10  12
    7:  21  21  21  21  21  21  12  10


  --------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       2112612044 kB


  --------------------------------------------------------------
10. who -r
  run-level 5 Mar 27 22:06


  --------------------------------------------------------------
11. Systemd service manager version: systemd 250 (250-6.el9_0)
  Default Target  Status
  graphical       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 gdm
```

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Platform Notes (Continued)

```
                  getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragemgmt lm_sensors
                  low-memory-monitor lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname
                  nvmefc-boot-connections ostree-remount pmcd pmie pmlogger power-profiles-daemon
                  qemu-guest-agent rhsmcertd rpcbind rsyslog rtkit-daemon selinux-autorelabel-mark smartd
                  sshd sssd switcheroo-control sysstat systemd-network-generator udisks2 upower vgauthd
                  virtqemud vmtoolsd
  enabled-runtime systemd-remount-fs
  disabled        arp-ethers autofs 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 dovecot fancontrol fcoe firewalld grafana-server gssproxy
                  httpd httpd@ ibacm iprdump iprinit iprupdate ipsec iscsid iscsiuio kpatch kvm_stat ledmon
                  libvirt-guests libvirtd lldpad man-db-restart-cache-update named named-chroot nfs-blkmap
                  nfs-server nftables nmb numad nvmf-autoconnect pmfind pmie_farm pmlogger_farm pmproxy
                  podman podman-auto-update podman-restart postfix powertop psacct ras-mc-ctl rasdaemon
                  rdisc rhcd rhsm rhsm-facts rpmdb-rebuild rrdcached saslauthd serial-getty@ smb snmpd
                  snmptrapd spamassassin speech-dispatcherd srp_daemon srp_daemon_port@ sshd-keygen@
                  systemd-boot-check-no-failures systemd-nspawn@ systemd-pstore systemd-sysext target
                  targetclid tog-pegasus trace-cmd virtinterfaced virtnetworkd virtnodedevd virtnwfilterd
                  virtproxyd virtsecretd virtstoraged vsftpd wpa_supplicant
  indirect        pcscd spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
                  virtlockd virtlogd vsftpd@

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

(Continued on next page)

Dell Inc.

PowerEdge R860 (Intel Xeon Platinum 8468H)

SPECspeed®2017_int_base = 14.6

SPECspeed®2017_int_peak = 14.9

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Tested by: Dell Inc.

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

Platform Notes (Continued)

```
  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  110G  4.2G  106G   4% /mnt/ramdisk


  ----------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge R860
    Product Family: PowerEdge
    Serial:         1234567


  ----------------------------------------------------------
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:
    32x 00AD00B300AD HMCG94MEBRA123N 64 GB 2 rank 4800



  ----------------------------------------------------------
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
  BIOS Vendor:     Dell Inc.
  BIOS Version:    1.4.0
  BIOS Date:       03/15/2023
  BIOS Revision:   1.4
```

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Tested by: Dell Inc.　　　　　　　　　　　　　　　　　**Software Availability:** Dec-2022

Compiler Version Notes

```
==============================================================================
C        | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak)
         | 657.xz_s(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++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
         | 641.leela_s(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
Fortran | 648.exchange2_s(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

600.perlbench_s: `-DSPEC_LP64 -DSPEC_LINUX_X64`
602.gcc_s: `-DSPEC_LP64`
605.mcf_s: `-DSPEC_LP64`
620.omnetpp_s: `-DSPEC_LP64`
623.xalancbmk_s: `-DSPEC_LP64 -DSPEC_LINUX`
625.x264_s: `-DSPEC_LP64`
631.deepsjeng_s: `-DSPEC_LP64`
641.leela_s: `-DSPEC_LP64`
648.exchange2_s: `-DSPEC_LP64`
657.xz_s: `-DSPEC_LP64`

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Base Optimization Flags

C benchmarks:
```
-m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:
```
-m64 -std=c++14 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:
```
-m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifx
```

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fiopenmp -DSPEC_OPENMP -fno-strict-overflow
```

(Continued on next page)

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Peak Optimization Flags (Continued)

600.perlbench_s (continued):
```
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

602.gcc_s: `-m64 -std=c11 -Wl,-z,muldefs -fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX2`(pass 1)
`-flto -Ofast`(pass 1) `-xCORE-AVX512 -O3 -ffast-math`
`-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-fiopenmp -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib`
`-ljemalloc`

605.mcf_s: basepeak = yes

625.x264_s: `-m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -O3`
`-ffast-math -flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP`
`-fno-alias -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: 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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