SPEC CPU®2017 Integer Speed Result

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Dell Inc.

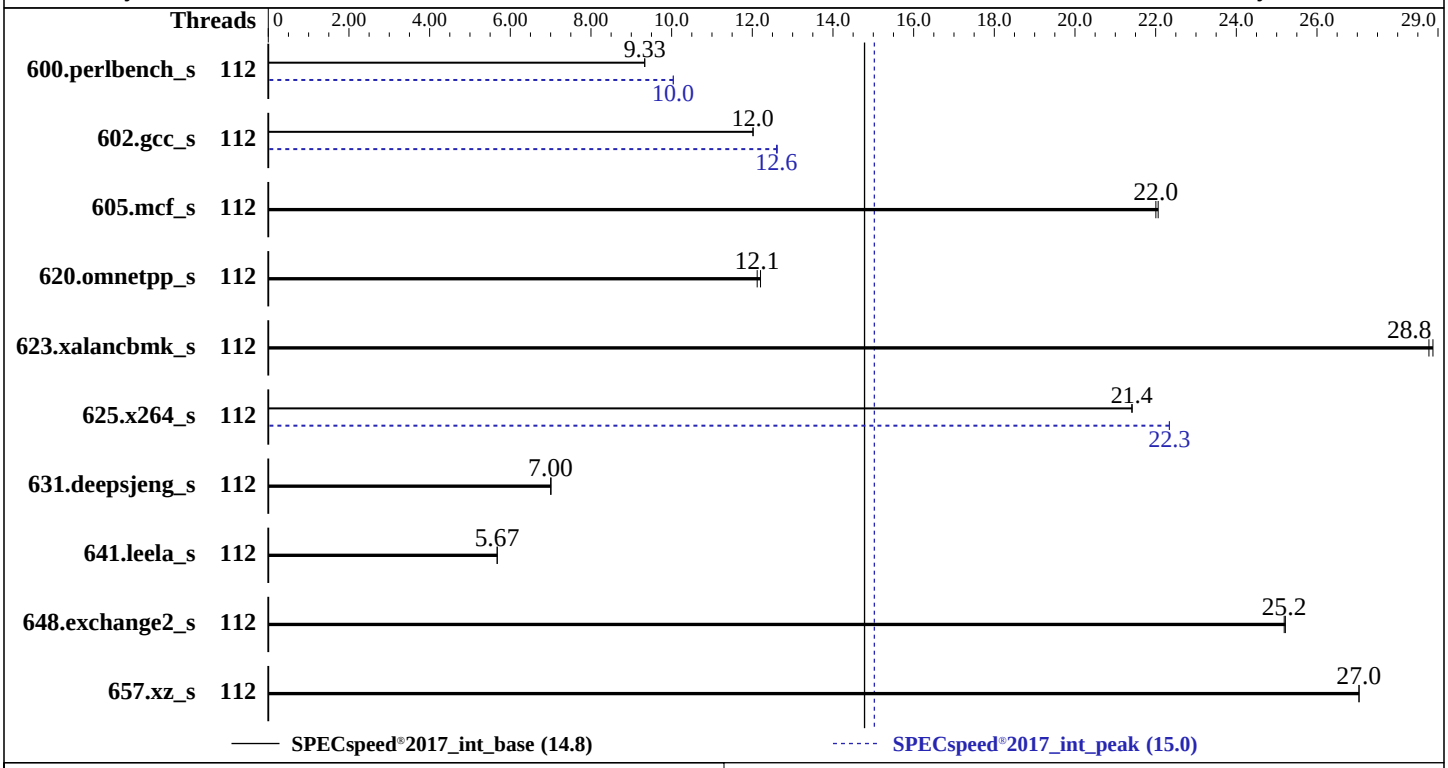
PowerEdge XE9640 (Intel Xeon Platinum 8480+)

SPECspeed®2017_int_base = 14.8

SPECspeed®2017_int_peak = 15.0

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

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



Hardware

CPU Name:	Intel Xeon Platinum 8480+
Max MHz:	3800
Nominal:	2000
Enabled:	112 cores, 2 chips
Orderable:	1,2 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:	1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	80 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 0.4.32 released Apr-2023
File System:	tmpfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	jemalloc memory allocator V5.0.1
Power Management:	BIOS and OS set to prefer performance at the cost of additional power usage.

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	112	**190**	**9.33**	190	9.33			112	**177**	**10.0**	177	10.0		
602.gcc_s	112	**331**	**12.0**	331	12.0			112	**316**	**12.6**	316	12.6		
605.mcf_s	112	214	22.1	**215**	**22.0**			112	214	22.1	**215**	**22.0**		
620.omnetpp_s	112	**135**	**12.1**	134	12.2			112	**135**	**12.1**	134	12.2		
623.xalancbmk_s	112	**49.2**	**28.8**	49.1	28.9			112	**49.2**	**28.8**	49.1	28.9		
625.x264_s	112	**82.4**	**21.4**	82.4	21.4			112	**79.0**	**22.3**	79.0	22.3		
631.deepsjeng_s	112	**205**	**7.00**	204	7.01			112	**205**	**7.00**	204	7.01		
641.leela_s	112	**301**	**5.67**	301	5.68			112	**301**	**5.67**	301	5.68		
648.exchange2_s	112	**117**	**25.2**	117	25.2			112	**117**	**25.2**	117	25.2		
657.xz_s	112	229	27.0	**229**	**27.0**			112	229	27.0	**229**	**27.0**		

SPECspeed®2017_int_base = 14.8

SPECspeed®2017_int_peak = 15.0

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
```

(Continued on next page)

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 80 GB ramdisk created with the cmd: "mount -t tmpfs -o size=80G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
                 ADDDC Setting : Disabled
        DIMM Self Healing on
    Uncorrectable Memory Error : Disabled
             Logical Processor : Disabled
     Virtualization Technology : Disabled
       DCU Streamer Prefetcher : 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 Fri May 19 17:38:54 2023

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

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

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Platform Notes (Continued)

```
 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
   17:38:54 up 13 min,  1 user,  load average: 0.31, 0.08, 0.03
  USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1      17:37   30.00s  0.94s  0.00s /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-VirtD=1 --define DL-BIOS-SNC=2 --define DL-VERS=v4.6 --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) 4124001
  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) 4124001
  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_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-VirtD=1 --define DL-BIOS-SNC=2 --define DL-VERS=v4.6 --define
   DL-LQC=1 --output_format html,pdf,txt
```

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Platform Notes (Continued)

```
 /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-VirtD=1 --define DL-BIOS-SNC=2 --define DL-VERS=v4.6 --define
   DL-LQC=1 --output_format html,pdf,txt
 runcpu --nobuild --action validate --define default-platform-flags -c
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=112 --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-VirtD=1 --define DL-BIOS-SNC=2 --define
   DL-VERS=v4.6 --define DL-LQC=1 --output_format html,pdf,txt intspeed
 runcpu --nobuild --action validate --define default-platform-flags --configfile
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=112 --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-VirtD=1 --define DL-BIOS-SNC=2
   --define DL-VERS=v4.6 --define DL-LQC=1 --output_format 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 8480+
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 6
    microcode       : 0x2b000461
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 56
    siblings        : 56
    2 physical ids (chips)
    112 processors (hardware threads)
    physical id 0: core ids 0-55
    physical id 1: core ids 0-55
    physical id 0: apicids
    0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
    ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110
    physical id 1: apicids
    128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,1
    80,182,184,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230,23
    2,234,236,238
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.

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

From lscpu from util-linux 2.37.4:
  Architecture:                    x86_64
  CPU op-mode(s):                  32-bit, 64-bit
  Address sizes:                   52 bits physical, 57 bits virtual
  Byte Order:                      Little Endian
  CPU(s):                          112
  On-line CPU(s) list:             0-111
  Vendor ID:                       GenuineIntel
  BIOS Vendor ID:                  Intel
  Model name:                      Intel(R) Xeon(R) Platinum 8480+
  BIOS Model name:                 Intel(R) Xeon(R) Platinum 8480+
  CPU family:                      6
  Model:                           143
  Thread(s) per core:              1
```

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Platform Notes (Continued)

```
  Core(s) per socket:                56
  Socket(s):                         2
  Stepping:                          6
  BogoMIPS:                          4000.00
  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 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 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
  L1d cache:                         5.3 MiB (112 instances)
  L1i cache:                         3.5 MiB (112 instances)
  L2 cache:                          224 MiB (112 instances)
  L3 cache:                          210 MiB (2 instances)
  NUMA node(s):                      4
  NUMA node0 CPU(s):                 0,4,8,12,16,20,24,28,32,36,40,44,46,50,54,58,62,66,70,74,78,82,86,90,94,10
                                     0,104,108
  NUMA node1 CPU(s):                 2,6,10,14,18,22,26,30,34,38,42,48,52,56,60,64,68,72,76,80,84,88,92,96,98,1
                                     02,106,110
  NUMA node2 CPU(s):                 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,75,79,83,87,91,95,99,10
                                     3,105,109
  NUMA node3 CPU(s):                 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,73,77,81,85,89,93,97,1
                                     01,107,111
  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     5.3M   12 Data            1     64        1             64
     L1i       32K     3.5M    8 Instruction     1     64        1             64
     L2         2M     224M   16 Unified         2   2048        1             64
     L3       105M     210M   15 Unified         3 114688        1             64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0,4,8,12,16,20,24,28,32,36,40,44,46,50,54,58,62,66,70,74,78,82,86,90,94,100,104,108
  node 0 size: 256982 MB
  node 0 free: 256391 MB
  node 1 cpus: 2,6,10,14,18,22,26,30,34,38,42,48,52,56,60,64,68,72,76,80,84,88,92,96,98,102,106,110
  node 1 size: 258005 MB
  node 1 free: 248318 MB
```

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Platform Notes (Continued)

```
  node 2 cpus: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,75,79,83,87,91,95,99,103,105,109
  node 2 size: 258041 MB
  node 2 free: 257663 MB
  node 3 cpus: 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,73,77,81,85,89,93,97,101,107,111
  node 3 size: 258031 MB
  node 3 free: 257662 MB
  node distances:
  node   0   1   2   3
    0:  10  12  21  21
    1:  12  10  21  21
    2:  21  21  10  12
    3:  21  21  12  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1055806288 kB

------------------------------------------------------------
10. who -r
  run-level 3 May 19 17:25

------------------------------------------------------------
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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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   80G  4.2G   76G   6% /mnt/ramdisk

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

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Platform Notes (Continued)

```
     Vendor:         Dell Inc.
     Product:        PowerEdge XE9640
     Product Family: PowerEdge
     Serial:         MS01501

 ------------------------------------------------------------
 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:
     16x 00AD063200AD HMCG94MEBRA109N 64 GB 2 rank 4800


 ------------------------------------------------------------
 22. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Dell Inc.
    BIOS Version:      0.4.32
    BIOS Date:         04/25/2023
    BIOS Revision:     0.4
```

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)
--------------------------------------------------------------------------------------------------------------
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==============================================================================================================
C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
        | 641.leela_s(base, peak)
--------------------------------------------------------------------------------------------------------------
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==============================================================================================================
Fortran | 648.exchange2_s(base, peak)
--------------------------------------------------------------------------------------------------------------
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```

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

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Base Compiler Invocation (Continued)

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

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

(Continued on next page)

Peak Compiler Invocation (Continued)

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
-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:

(Continued on next page)

Peak Optimization Flags (Continued)

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-v1.5.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-v1.5.xml`

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