



SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

SPECrate®2017_fp_base = 783

PowerEdge C6620 (Intel Xeon Platinum 8460Y+)

SPECrate®2017_fp_peak = 827

CPU2017 License: 6573

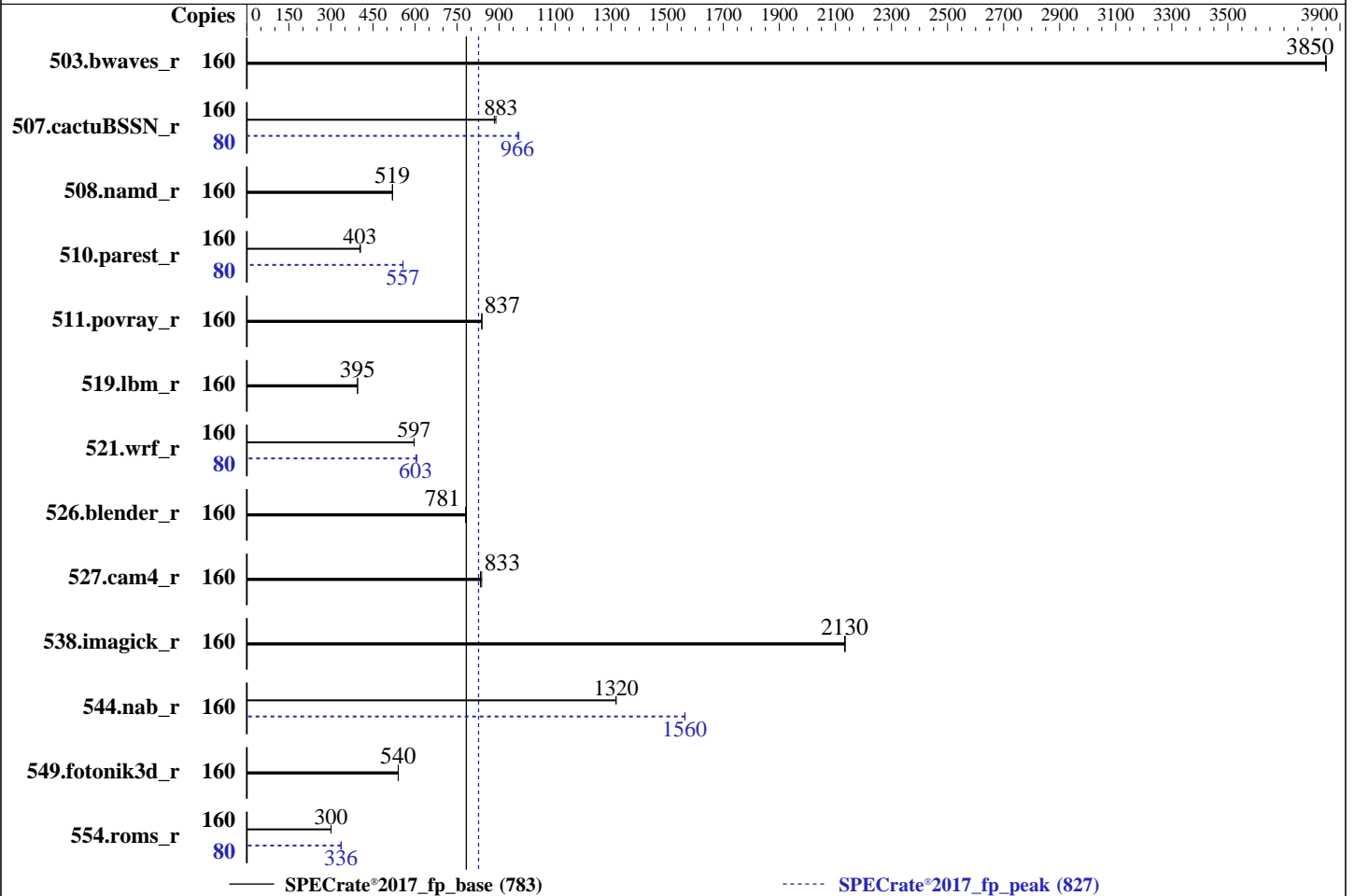
Test Date: Jan-2023

Test Sponsor: Dell Inc.

Hardware Availability: Feb-2023

Tested by: Dell Inc.

Software Availability: May-2022



Hardware

CPU Name: Intel Xeon Platinum 8460Y+
 Max MHz: 3700
 Nominal: 2000
 Enabled: 80 cores, 2 chips, 2 threads/core
 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: 125 GB on tmpfs
 Other: None

Software

OS: Red Hat Enterprise Linux 8.6 (Ootpa)
 4.18.0-372.9.1.el8.x86_64
 Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
 Parallel: No
 Firmware: Version 1.0.1 released Dec-2022
 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 | | | | | | |
|-----------------|--------|-------------|-------------|-------------|-------------|---------|-------|--------|------------|-------------|-------------|-------------|---------|-------|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 503.bwaves_r | 160 | 417 | 3850 | <u>417</u> | <u>3850</u> | | | 160 | 417 | 3850 | <u>417</u> | <u>3850</u> | | |
| 507.cactuBSSN_r | 160 | 228 | 889 | <u>229</u> | <u>883</u> | | | 80 | 104 | 971 | <u>105</u> | <u>966</u> | | |
| 508.namd_r | 160 | <u>293</u> | <u>519</u> | 292 | 520 | | | 160 | <u>293</u> | <u>519</u> | 292 | 520 | | |
| 510.parest_r | 160 | <u>1038</u> | <u>403</u> | 1032 | 406 | | | 80 | 376 | 557 | <u>376</u> | <u>557</u> | | |
| 511.povray_r | 160 | <u>446</u> | <u>837</u> | 445 | 839 | | | 160 | <u>446</u> | <u>837</u> | 445 | 839 | | |
| 519.lbm_r | 160 | <u>427</u> | <u>395</u> | 427 | 395 | | | 160 | <u>427</u> | <u>395</u> | 427 | 395 | | |
| 521.wrf_r | 160 | <u>601</u> | <u>597</u> | 600 | 597 | | | 80 | <u>297</u> | <u>603</u> | 295 | 606 | | |
| 526.blender_r | 160 | 312 | 781 | <u>312</u> | <u>781</u> | | | 160 | 312 | 781 | <u>312</u> | <u>781</u> | | |
| 527.cam4_r | 160 | <u>336</u> | <u>833</u> | 334 | 838 | | | 160 | <u>336</u> | <u>833</u> | 334 | 838 | | |
| 538.imagick_r | 160 | <u>187</u> | <u>2130</u> | 186 | 2140 | | | 160 | <u>187</u> | <u>2130</u> | 186 | 2140 | | |
| 544.nab_r | 160 | <u>204</u> | <u>1320</u> | 204 | 1320 | | | 160 | <u>172</u> | <u>1560</u> | 172 | 1560 | | |
| 549.fotonik3d_r | 160 | 1153 | 541 | <u>1155</u> | <u>540</u> | | | 160 | 1153 | 541 | <u>1155</u> | <u>540</u> | | |
| 554.roms_r | 160 | <u>847</u> | <u>300</u> | 846 | 301 | | | 80 | 377 | 337 | <u>379</u> | <u>336</u> | | |

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

Submit Notes

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

Operating System Notes

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

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
"/mnt/ramdisk/cpu2017-1.1.9-ic2022.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2022.1/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default

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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
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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:

ADDC Setting : Disabled
DIMM Self Healing on
Uncorrectable Memory Error : Disabled
Virtualization Technology : Disabled
Sub NUMA Cluster : 4-way Clustering
DCU Streamer Prefetcher : Disabled
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-ic2022.1/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Fri Jan 13 17:57:02 2023

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

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Platform Notes (Continued)

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10. who -r
11. Systemd service manager version: systemd 239 (239-58.e18)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. BIOS

1. uname -a

```
Linux localhost.localdomain 4.18.0-372.9.1.el8.x86_64 #1 SMP Fri Apr 15 22:12:19 EDT 2022 x86_64 x86_64
x86_64 GNU/Linux
```

2. w

```
17:57:02 up 4:37, 1 user, load average: 114.15, 149.08, 155.76
USER      TTY      FROM          LOGIN@      IDLE        JCPU       PCPU       WHAT
root     tty1      -              13:26      4:28m     1.35s     0.00s /bin/bash ./dell-norun-specrate.sh
--iterations 2 --output_format csv,html,pdf,txt --define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc
```

3. Username

From environment variable \$USER: root

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Platform Notes (Continued)

```

4. ulimit -a
   core file size          (blocks, -c) 0
   data seg size           (kbytes, -d) unlimited
   scheduling priority     (-e) 0
   file size               (blocks, -f) unlimited
   pending signals        (-i) 4126062
   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) 4126062
   virtual memory         (kbytes, -v) unlimited
   file locks             (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 18
login -- root
-bash
/bin/bash ./DELL_rate.sh
/bin/bash ./dell-norun-main.sh rate
/bin/bash ./dell-norun-main.sh rate
/bin/bash ./dell-norun-specrate.sh --iterations 2 --output_format csv,html,pdf,txt --define
  Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc
/bin/bash ./dell-norun-specrate.sh --iterations 2 --output_format csv,html,pdf,txt --define
  Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=160 -c
  ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=80 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base,peak -o all --iterations 2
  --output_format csv,html,pdf,txt --define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=160 --configfile
  ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=80 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --iterations 2
  --output_format csv,html,pdf,txt --define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc --nopower --runmode rate
  --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /mnt/ramdisk/cpu2017-1.1.9-ic2022.1

```

```

-----
6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) Platinum 8460Y+
   vendor_id      : GenuineIntel

```

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Platform Notes (Continued)

```
cpu family      : 6
model           : 143
stepping        : 8
microcode       : 0x2b000161
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores       : 40
siblings        : 80
2 physical ids (chips)
160 processors (hardware threads)
physical id 0: core ids 0-39
physical id 1: core ids 0-39
physical id 0: apicids 0-79
physical id 1: apicids 128-207
```

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 2.32.1:

```
Architecture:      x86_64
CPU op-mode(s):    32-bit, 64-bit
Byte Order:        Little Endian
CPU(s):            160
On-line CPU(s) list: 0-159
Thread(s) per core: 2
Core(s) per socket: 40
Socket(s):         2
NUMA node(s):     8
Vendor ID:         GenuineIntel
BIOS Vendor ID:   Intel
CPU family:        6
Model:            143
Model name:        Intel(R) Xeon(R) Platinum 8460Y+
BIOS Model name:   Intel(R) Xeon(R) Platinum 8460Y+
Stepping:          8
CPU MHz:           2000.000
BogoMIPS:          4000.00
L1d cache:         48K
L1i cache:         32K
L2 cache:          2048K
L3 cache:          107520K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,80,84,88,92,96,100,104,108,112,116
NUMA node1 CPU(s): 40,44,48,52,56,60,64,68,72,76,120,124,128,132,136,140,144,148,152,156
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,82,86,90,94,98,102,106,110,114,118
NUMA node3 CPU(s): 42,46,50,54,58,62,66,70,74,78,122,126,130,134,138,142,146,150,154,158
NUMA node4 CPU(s): 1,5,9,13,17,21,25,29,33,37,81,85,89,93,97,101,105,109,113,117
```

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Platform Notes (Continued)

NUMA node5 CPU(s): 41,45,49,53,57,61,65,69,73,77,121,125,129,133,137,141,145,149,153,157
 NUMA node6 CPU(s): 3,7,11,15,19,23,27,31,35,39,83,87,91,95,99,103,107,111,115,119
 NUMA node7 CPU(s): 43,47,51,55,59,63,67,71,75,79,123,127,131,135,139,143,147,151,155,159

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 aperfperf
 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 bml
 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

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```
available: 8 nodes (0-7)
node 0 cpus: 0,4,8,12,16,20,24,28,32,36,80,84,88,92,96,100,104,108,112,116
node 0 size: 128472 MB
node 0 free: 114287 MB
node 1 cpus: 40,44,48,52,56,60,64,68,72,76,120,124,128,132,136,140,144,148,152,156
node 1 size: 129019 MB
node 1 free: 119745 MB
node 2 cpus: 2,6,10,14,18,22,26,30,34,38,82,86,90,94,98,102,106,110,114,118
node 2 size: 129019 MB
node 2 free: 120208 MB
node 3 cpus: 42,46,50,54,58,62,66,70,74,78,122,126,130,134,138,142,146,150,154,158
node 3 size: 129019 MB
node 3 free: 118822 MB
node 4 cpus: 1,5,9,13,17,21,25,29,33,37,81,85,89,93,97,101,105,109,113,117
node 4 size: 129019 MB
node 4 free: 121229 MB
node 5 cpus: 41,45,49,53,57,61,65,69,73,77,121,125,129,133,137,141,145,149,153,157
node 5 size: 128977 MB
node 5 free: 121416 MB
node 6 cpus: 3,7,11,15,19,23,27,31,35,39,83,87,91,95,99,103,107,111,115,119
node 6 size: 129019 MB
node 6 free: 121401 MB
node 7 cpus: 43,47,51,55,59,63,67,71,75,79,123,127,131,135,139,143,147,151,155,159
node 7 size: 129007 MB
node 7 free: 121449 MB
node distances:
```

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Platform Notes (Continued)

| node | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------|----|----|----|----|----|----|----|----|
| 0: | 10 | 12 | 12 | 12 | 21 | 21 | 21 | 21 |
| 1: | 12 | 10 | 12 | 12 | 21 | 21 | 21 | 21 |
| 2: | 12 | 12 | 10 | 12 | 21 | 21 | 21 | 21 |
| 3: | 12 | 12 | 12 | 10 | 21 | 21 | 21 | 21 |
| 4: | 21 | 21 | 21 | 21 | 10 | 12 | 12 | 12 |
| 5: | 21 | 21 | 21 | 21 | 12 | 10 | 12 | 12 |
| 6: | 21 | 21 | 21 | 21 | 12 | 12 | 10 | 12 |
| 7: | 21 | 21 | 21 | 21 | 12 | 12 | 12 | 10 |

```
9. /proc/meminfo
   MemTotal:          1056312172 kB
```

```
10. who -r
    run-level 3 Jan 13 13:20
```

```
11. Systemd service manager version: systemd 239 (239-58.e18)
    Default Target    Status
    multi-user        running
```

```
12. Services, from systemctl list-unit-files
    STATE      UNIT FILES
    enabled    NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd autovt@ crond
              firewallld getty@ import-state insights-client-boot irqbalance iscsi iscsi-onboot kdump
              loadmodules lvm2-monitor mdmonitor microcode multipathd nis-domainname rhsmcertd rsyslog
              selinux-autorelabel-mark sshd sssd syslog timedatex tuned udisks2
    disabled   blk-availability chrony-wait chronyd cni-dhcp console-getty cpupower debug-shell ebttables
              hwloc-dump-hwdata iprdump iprinit iprupdate ipsec iscsid iscsiuiio kvm_stat
              man-db-restart-cache-update nftables podman podman-auto-update podman-restart rdisc rhcd rhsm
              rhsm-facts serial-getty@ sshd-keygen@ systemd-resolved tcsd
    indirect   sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
    masked     systemd-timedated
```

```
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=(hd3,gpt4)/vmlinuz-4.18.0-372.9.1.el8.x86_64
    root=/dev/mapper/rhel-root
    ro
    resume=/dev/mapper/rhel-swap
    rd.lvm.lv=rhel/root
    rd.lvm.lv=rhel/swap
    rhgb
    quiet
```

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Platform Notes (Continued)

```

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

```

```

-----
15. tuned-adm active
   Current active profile: throughput-performance

```

```

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

```

```

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

```

```

-----
18. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs 60000
   defrag                 1
   max_ptes_none          511

```

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Platform Notes (Continued)

```
max_ptes_swap          64
pages_to_scan          4096
scan_sleep_millisecs  10000
```

19. OS release

```
From /etc/*-release /etc/*-version
os-release      Red Hat Enterprise Linux 8.6 (Ootpa)
redhat-release  Red Hat Enterprise Linux release 8.6 (Ootpa)
system-release  Red Hat Enterprise Linux release 8.6 (Ootpa)
```

20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities

```
itlb_multihit      Not affected
lltf                Not affected
mds                Not affected
meltdown           Not affected
spec_store_bypass  Mitigation: Speculative Store Bypass disabled via prctl and seccomp
spectre_v1          Mitigation: usercopy/swaps barriers and __user pointer sanitization
spectre_v2          Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
srbds              Not affected
tsx_async_abort     Not affected
```

For more information, see the Linux documentation on hardware vulnerabilities, for example <https://www.kernel.org/doc/html/latest/admin-guide/hw-vuln/index.html>

21. Disk information

```
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-ic2022.1
Filesystem      Type      Size  Used Avail Use% Mounted on
tmpfs            tmpfs     125G   66G   60G   53% /mnt/ramdisk
```

22. /sys/devices/virtual/dmi/id

```
Vendor:          Dell Inc.
Product:         PowerEdge C6620
Product Family:  PowerEdge
```

23. 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 HMC94MEBRA109N 64 GB 2 rank 4800
```

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SPECrate®2017_fp_peak = 827

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

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: May-2022

Platform Notes (Continued)

24. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Dell Inc.
BIOS Version: 1.0.1
BIOS Date: 12/27/2022
BIOS Revision: 1.0

Compiler Version Notes

=====
C | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
| 544.nab_r(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
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=====
C++ | 508.namd_r(base, peak) 510.parest_r(base, peak)

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=====
C++, C | 511.povray_r(base, peak) 526.blender_r(base, peak)

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=====
C++, C, Fortran | 507.cactuBSSN_r(base, peak)

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Compiler Version Notes (Continued)

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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316

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=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316

Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
2022.1.0 Build 20220316

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316

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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

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



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Base Portability Flags

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

Base Optimization Flags

C benchmarks:

-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:

-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:

-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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Software Availability: May-2022

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Peak Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: basepeak = yes

```
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
```

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Peak Optimization Flags (Continued)

544.nab_r (continued):

```
-qopt-mem-layout-trans=4 -qopt-zmm-usage=high -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

C++ benchmarks:

508.namd_r: basepeak = yes

```
510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

```
554.roms_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs  
-align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:

```
521.wrf_r: -w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast  
-ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs  
-align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: basepeak = yes

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```



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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-ic2022-official-linux64-revB.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-ic2022-official-linux64-revB.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.3.xml>

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