



# SPEC CPU®2017 Floating Point Speed Result

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## Dell Inc.

SPECspeed®2017\_fp\_base = 335

PowerEdge XE9640 (Intel Xeon Platinum 8470Q)

SPECspeed®2017\_fp\_peak = 336

CPU2017 License: 6573

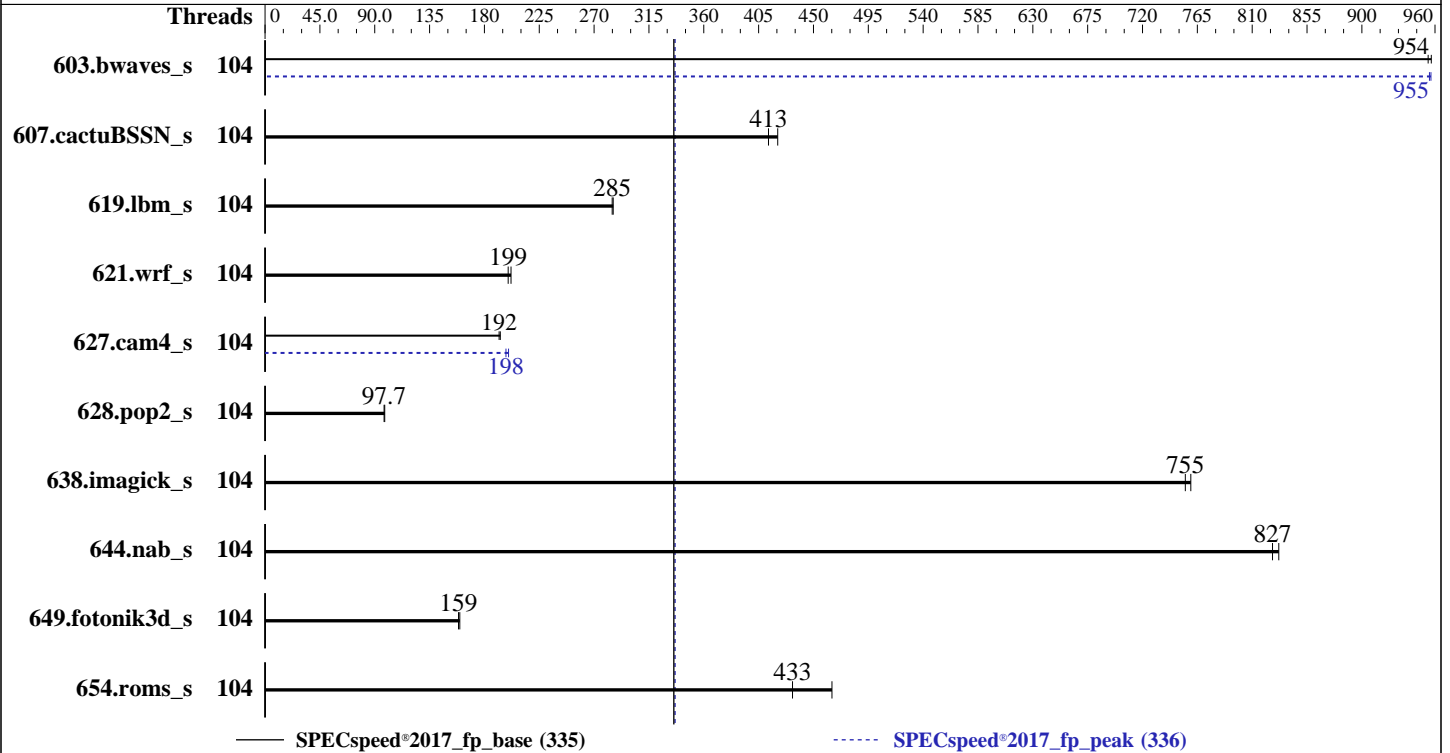
Test Date: May-2023

Test Sponsor: Dell Inc.

Hardware Availability: Sep-2023

Tested by: Dell Inc.

Software Availability: Dec-2022



### Hardware

CPU Name: Intel Xeon Platinum 8470Q  
 Max MHz: 3800  
 Nominal: 2100  
 Enabled: 104 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: 70 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 0.5.33 released May-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 |
| 603.bwaves_s    | 104     | 61.7               | 957               | <b><u>61.8</u></b> | <b><u>954</u></b>  |         |       | 104     | 61.7               | 957               | <b><u>61.7</u></b> | <b><u>955</u></b>  |         |       |
| 607.cactuBSSN_s | 104     | 39.6               | 421               | <b><u>40.4</u></b> | <b><u>413</u></b>  |         |       | 104     | 39.6               | 421               | <b><u>40.4</u></b> | <b><u>413</u></b>  |         |       |
| 619.lbm_s       | 104     | <b><u>18.4</u></b> | <b><u>285</u></b> | 18.3               | 286                |         |       | 104     | <b><u>18.4</u></b> | <b><u>285</u></b> | 18.3               | 286                |         |       |
| 621.wrf_s       | 104     | 65.5               | 202               | <b><u>66.3</u></b> | <b><u>199</u></b>  |         |       | 104     | 65.5               | 202               | <b><u>66.3</u></b> | <b><u>199</u></b>  |         |       |
| 627.cam4_s      | 104     | 45.9               | 193               | <b><u>46.2</u></b> | <b><u>192</u></b>  |         |       | 104     | <b><u>44.8</u></b> | <b><u>198</u></b> | 44.4               | 200                |         |       |
| 628.pop2_s      | 104     | 121                | 98.2              | <b><u>122</u></b>  | <b><u>97.7</u></b> |         |       | 104     | 121                | 98.2              | <b><u>122</u></b>  | <b><u>97.7</u></b> |         |       |
| 638.imagick_s   | 104     | 19.0               | 760               | <b><u>19.1</u></b> | <b><u>755</u></b>  |         |       | 104     | 19.0               | 760               | <b><u>19.1</u></b> | <b><u>755</u></b>  |         |       |
| 644.nab_s       | 104     | 21.0               | 832               | <b><u>21.1</u></b> | <b><u>827</u></b>  |         |       | 104     | 21.0               | 832               | <b><u>21.1</u></b> | <b><u>827</u></b>  |         |       |
| 649.fotonik3d_s | 104     | <b><u>57.4</u></b> | <b><u>159</u></b> | 57.0               | 160                |         |       | 104     | <b><u>57.4</u></b> | <b><u>159</u></b> | 57.0               | 160                |         |       |
| 654.roms_s      | 104     | <b><u>36.4</u></b> | <b><u>433</u></b> | 33.8               | 465                |         |       | 104     | <b><u>36.4</u></b> | <b><u>433</u></b> | 33.8               | 465                |         |       |

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

## 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,compact"  
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  
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 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"



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## 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
      CLE : 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 Thu May 25 13:38:34 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.e19_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.e19_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
   x86_64 x86_64 GNU/Linux
-----
2. w

```

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## Platform Notes (Continued)

```
13:38:34 up 2:14, 1 user, load average: 6.55, 5.68, 3.32
USER      TTY      LOGIN@  IDLE   JCPU   PCPU WHAT
root      tty1     11:24   2:14m  1.31s  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) 4124008
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) 4124008
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
/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=104 --tune base,peak -o all --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 fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=104 --tune base,peak --output_format all
--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 refspped fpspeed
--nopreenv --note-preenv --logfile $SPEC/tmp/CPU2017.002/templogs/preenv.fpspeed.002.0.log --lognum 002.0
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /mnt/ramdisk/cpu2017-1.1.9-ic2023.0
```

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### Platform Notes (Continued)

```
6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) Platinum 8470Q
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping       : 6
microcode      : 0x2b0004b1
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores      : 52
siblings       : 52
2 physical ids (chips)
104 processors (hardware threads)
physical id 0: core ids 0-51
physical id 1: core ids 0-51
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
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
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):           104
On-line CPU(s) list: 0-103
Vendor ID:        GenuineIntel
BIOS Vendor ID:   Intel
Model name:       Intel(R) Xeon(R) Platinum 8470Q
BIOS Model name:  Intel(R) Xeon(R) Platinum 8470Q
CPU family:       6
Model:            143
Thread(s) per core: 1
Core(s) per socket: 52
Socket(s):        2
Stepping:         6
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 noopl 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
xsavesopt 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
```

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### Platform Notes (Continued)

```

L1d cache:          4.9 MiB (104 instances)
L1i cache:          3.3 MiB (104 instances)
L2 cache:           208 MiB (104 instances)
L3 cache:           210 MiB (2 instances)
NUMA node(s):       4
NUMA node0 CPU(s): 0,4,8,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,92,96,100
NUMA node1 CPU(s): 2,6,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,90,94,98,102
NUMA node2 CPU(s): 1,5,9,13,17,21,25,29,33,35,39,45,49,53,57,61,67,69,71,75,79,83,87,91,97,101
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,37,41,43,47,51,55,59,63,65,73,77,81,85,89,93,95,99,103
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/swaps 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      | 4.9M     | 12   | Data        | 1     | 64     | 1        | 64             |
| L1i  | 32K      | 3.3M     | 8    | Instruction | 1     | 64     | 1        | 64             |
| L2   | 2M       | 208M     | 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: 0,4,8,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,92,96,100
node 0 size: 256982 MB
node 0 free: 256676 MB
node 1 cpus: 2,6,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,90,94,98,102
node 1 size: 258005 MB
node 1 free: 247968 MB
node 2 cpus: 1,5,9,13,17,21,25,29,33,35,39,45,49,53,57,61,67,69,71,75,79,83,87,91,97,101
node 2 size: 258042 MB
node 2 free: 257704 MB
node 3 cpus: 3,7,11,15,19,23,27,31,37,41,43,47,51,55,59,63,65,73,77,81,85,89,93,95,99,103
node 3 size: 258031 MB
node 3 free: 257755 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: 1055807984 kB

10. who -r

run-level 3 May 25 11:24

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## Platform Notes (Continued)

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  
nvme-fc-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  
systemd-remount-fs  
enabled-runtime  
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 iprump iprint iprupdate iscsid iscsiuiop kpatch kvm\_stat  
ledmon man-db-restart-cache-update nftables nvme-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-sysexec wpa\_supplicant  
indirect spice-vgagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo

13. Linux kernel boot-time arguments, from /proc/cmdline  
BOOT\_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9\_0.x86\_64  
root=/dev/mapper/rhel-root  
ro  
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M  
resume=/dev/mapper/rhel-swap  
rd.lvm.lv=rhel/root  
rd.lvm.lv=rhel/swap  
rhgb  
quiet

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

15. sysctl  
kernel.numa\_balancing 1  
kernel.randomize\_va\_space 2  
vm.compaction\_proactiveness 20  
vm.dirty\_background\_bytes 0  
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

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SPECspeed®2017\_fp\_base = 335

PowerEdge XE9640 (Intel Xeon Platinum 8470Q)

SPECspeed®2017\_fp\_peak = 336

CPU2017 License: 6573

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: May-2023

Hardware Availability: Sep-2023

Software Availability: Dec-2022

## Platform Notes (Continued)

```

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 70G  4.2G  66G   6% /mnt/ramdisk

```

```

-----
20. /sys/devices/virtual/dmi/id
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 HMC94MEBRA109N 64 GB 2 rank 4800

```

```

-----
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      Dell Inc.
BIOS Version:     0.5.33

```

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## Platform Notes (Continued)

BIOS Date: 05/18/2023  
BIOS Revision: 0.5

## Compiler Version Notes

=====  
C | 619.lbm\_s(base, peak) 638.imagick\_s(base, peak) 644.nab\_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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=====

=====  
C++, C, Fortran | 607.cactuBSSN\_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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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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=====

=====  
Fortran | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak) 654.roms\_s(base, peak)  
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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=====

=====  
Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak) 628.pop2\_s(base, peak)  
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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=====

## Base Compiler Invocation

C benchmarks:  
icx

Fortran benchmarks:  
ifx

Benchmarks using both Fortran and C:  
ifx icx

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



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## Base Portability Flags

```
603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
```

## Base Optimization Flags

### C benchmarks:

```
-m64 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

### Fortran benchmarks:

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

### Benchmarks using both Fortran and C:

```
-m64 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

### Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-mprefer-vector-width=512 -nostandard-realloc-lhs -align array32byte
-auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```



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Tested by: Dell Inc.

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

## Peak Compiler Invocation

C benchmarks:

icx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

619.lbm\_s: basepeak = yes

638.imagick\_s: basepeak = yes

644.nab\_s: basepeak = yes

Fortran benchmarks:

603.bwaves\_s: -m64 -Wl,-z,muldefs -DSPEC\_OPENMP -xsapphirerapids  
-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -fiopenmp -nostandard-realloc-lhs  
-align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc

649.fotonik3d\_s: basepeak = yes

654.roms\_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf\_s: basepeak = yes

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Software Availability: Dec-2022

## Peak Optimization Flags (Continued)

```
627.cam4_s: -m64 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

628.pop2\_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_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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Tested with SPEC CPU®2017 v1.1.9 on 2023-05-25 13:38:33-0400.

Report generated on 2023-09-13 14:47:46 by CPU2017 PDF formatter v6716.

Originally published on 2023-09-13.