



SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

SPECspeed®2017_fp_base = 314

PowerEdge R960 (Intel Xeon Platinum 8454H)

SPECspeed®2017_fp_peak = 314

CPU2017 License: 6573

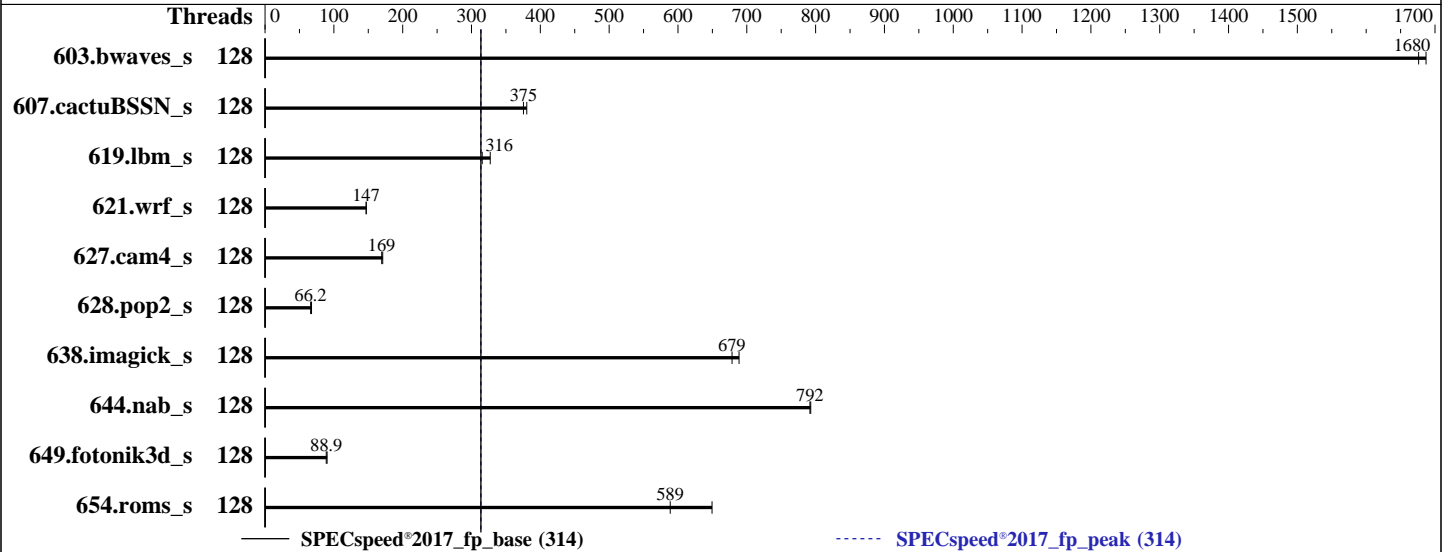
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Mar-2023

Hardware Availability: May-2023

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Platinum 8454H
 Max MHz: 3400
 Nominal: 2100
 Enabled: 128 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: 82.5 MB I+D on chip per chip
 Other: None
 Memory: 2 TB (32 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 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
603.bwaves_s	128	<u>35.2</u>	<u>1680</u>	35.0	1690			128	<u>35.2</u>	<u>1680</u>	35.0	1690		
607.cactuBSSN_s	128	43.8	380	<u>44.4</u>	<u>375</u>			128	43.8	380	<u>44.4</u>	<u>375</u>		
619.lbm_s	128	16.0	327	<u>16.6</u>	<u>316</u>			128	16.0	327	<u>16.6</u>	<u>316</u>		
621.wrf_s	128	89.9	147	<u>90.1</u>	<u>147</u>			128	89.9	147	<u>90.1</u>	<u>147</u>		
627.cam4_s	128	51.8	171	<u>52.3</u>	<u>169</u>			128	51.8	171	<u>52.3</u>	<u>169</u>		
628.pop2_s	128	176	67.5	<u>179</u>	<u>66.2</u>			128	176	67.5	<u>179</u>	<u>66.2</u>		
638.imagick_s	128	20.9	689	<u>21.3</u>	<u>679</u>			128	20.9	689	<u>21.3</u>	<u>679</u>		
644.nab_s	128	<u>22.1</u>	<u>792</u>	22.0	793			128	<u>22.1</u>	<u>792</u>	22.0	793		
649.fotonik3d_s	128	<u>103</u>	<u>88.9</u>	101	90.2			128	<u>103</u>	<u>88.9</u>	101	90.2		
654.roms_s	128	24.2	650	<u>26.7</u>	<u>589</u>			128	24.2	650	<u>26.7</u>	<u>589</u>		

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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 80 GB ramdisk created with the cmd: "mount -t tmpfs -o size=80G 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
      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 Thu Mar 30 17:37:20 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
17:37:20 up 2:30, 1 user, load average: 5.30, 5.10, 3.08
USER      TTY      LOGIN@  IDLE   JCPU   PCPU   WHAT
-----

```

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Platform Notes (Continued)

```
root      :1      15:07  ?xdm?   6:01   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) 8252233
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) 8252233
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
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=128 --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-SNC=2 --output_format csv,html,pdf,txt fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=128 --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-SNC=2 --output_format csv,html,pdf,txt --nopower --runmode
speed --tune base:peak --size refspeed 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

6. /proc/cpuinfo
model name : Intel(R) Xeon(R) Platinum 8454H
vendor_id : GenuineIntel
cpu family : 6
model : 143
stepping : 8

(Continued on next page)



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Platform Notes (Continued)

```

microcode      : 0x2b0001b0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores     : 32
siblings      : 32
4 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31
physical id 2: core ids 0-31
physical id 3: core ids 0-31
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
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
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
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

```

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):                 128
On-line CPU(s) list:   0-127
Vendor ID:              GenuineIntel
BIOS Vendor ID:        Intel
Model name:             Intel(R) Xeon(R) Platinum 8454H
BIOS Model name:       Intel(R) Xeon(R) Platinum 8454H
CPU family:             6
Model:                  143
Thread(s) per core:    1
Core(s) per socket:    32
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
                        vmi 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

```

(Continued on next page)



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Platform Notes (Continued)

```
cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
arch_lbr avx512_fp16 amx_tile flush_llid arch_capabilities
```

VT-x

Virtualization:

L1d cache:

6 MiB (128 instances)

L1i cache:

4 MiB (128 instances)

L2 cache:

256 MiB (128 instances)

L3 cache:

330 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

NUMA node1 CPU(s):

4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124

NUMA node2 CPU(s):

1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121

NUMA node3 CPU(s):

5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125

NUMA node4 CPU(s):

2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122

NUMA node5 CPU(s):

6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126

NUMA node6 CPU(s):

3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123

NUMA node7 CPU(s):

7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127

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	6M	12	Data	1	64	1	64
L1i	32K	4M	8	Instruction	1	64	1	64
L2	2M	256M	16	Unified	2	2048	1	64
L3	82.5M	330M	15	Unified	3	90112	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

node 0 size: 256856 MB

node 0 free: 247272 MB

node 1 cpus: 4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124

node 1 size: 258044 MB

node 1 free: 256676 MB

node 2 cpus: 1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121

node 2 size: 258044 MB

node 2 free: 257647 MB

node 3 cpus: 5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125

node 3 size: 258007 MB

node 3 free: 257059 MB

node 4 cpus: 2,10,18,26,34,42,50,58,66,74,82,90,98,106,114,122

node 4 size: 258044 MB

node 4 free: 257560 MB

node 5 cpus: 6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126

node 5 size: 258044 MB

node 5 free: 257491 MB

node 6 cpus: 3,11,19,27,35,43,51,59,67,75,83,91,99,107,115,123

node 6 size: 258044 MB

node 6 free: 257677 MB

node 7 cpus: 7,15,23,31,39,47,55,63,71,79,87,95,103,111,119,127

node 7 size: 258033 MB

(Continued on next page)



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Platform Notes (Continued)

```
node 7 free: 257748 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:      2112634852 kB
```

```
-----
10. who -r
run-level 5 Mar 30 15:07
```

```
-----
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
getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragemgmt lm_sensors
low-memory-monitor lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname
nvme-fc-boot-connections ostree-remount pmcd pmie pmlonger 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 vmttoolsd
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 iscsiuiop kpatch kvm_stat ledmon
libvirt-guests libvirtd lldpad man-db-restart-cache-update named named-chroot nfs-blkmap
nfs-server nftables nmb numad nvme-fc-autoconnect pmfind pmie_farm pmlonger_farm pmproxy
podman podman-auto-update podman-restart postfix powertop psacct ras-mc-ctl rasdaemon
rdisc rhcd rhsm rhsm-facts rpmbd-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-sysex target
targetclid tog-pegasus trace-cmd virtinterfaced virtnetworkd virtnodedevd virtnwfilterd
virtproxyd virtsecretd virtstoraged vsftpd wpa_supplicant
indirect pcsd 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
```

(Continued on next page)



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Platform Notes (Continued)

```
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
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+madvice [madvice] never
enabled         [always] madvice 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
```

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SPECspeed®2017_fp_base = 314

PowerEdge R960 (Intel Xeon Platinum 8454H)

SPECspeed®2017_fp_peak = 314

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

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

Platform Notes (Continued)

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
Vendor: Dell Inc.
Product: PowerEdge R960
Product Family: PowerEdge

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:
15x 00AD00B300AD HMC94MEBRA121N 64 GB 2 rank 4800
17x 00AD063200AD HMC94MEBRA109N 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

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

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

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

Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)

(Continued on next page)



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Test Date: Mar-2023

Hardware Availability: May-2023

Software Availability: Dec-2022

Compiler Version Notes (Continued)

Intel(R) Fortran 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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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

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 -xsapphirerapids -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

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Test Date: Mar-2023

Hardware Availability: May-2023

Software Availability: Dec-2022

Base Optimization Flags (Continued)

Fortran benchmarks:

```
-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
```

Benchmarks using both Fortran and C:

```
-m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -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 -xsapphirerapids -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
```

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



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Tested by: Dell Inc.

Test Date: Mar-2023

Hardware Availability: May-2023

Software Availability: Dec-2022

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: basepeak = yes

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes

627.cam4_s: basepeak = yes

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-v1.3.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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