



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

## Dell Inc.

### SPECrate®2017\_fp\_base = 427

### PowerEdge C6620 (Intel Xeon Platinum 8461V)

### SPECrate®2017\_fp\_peak = 458

CPU2017 License: 6573

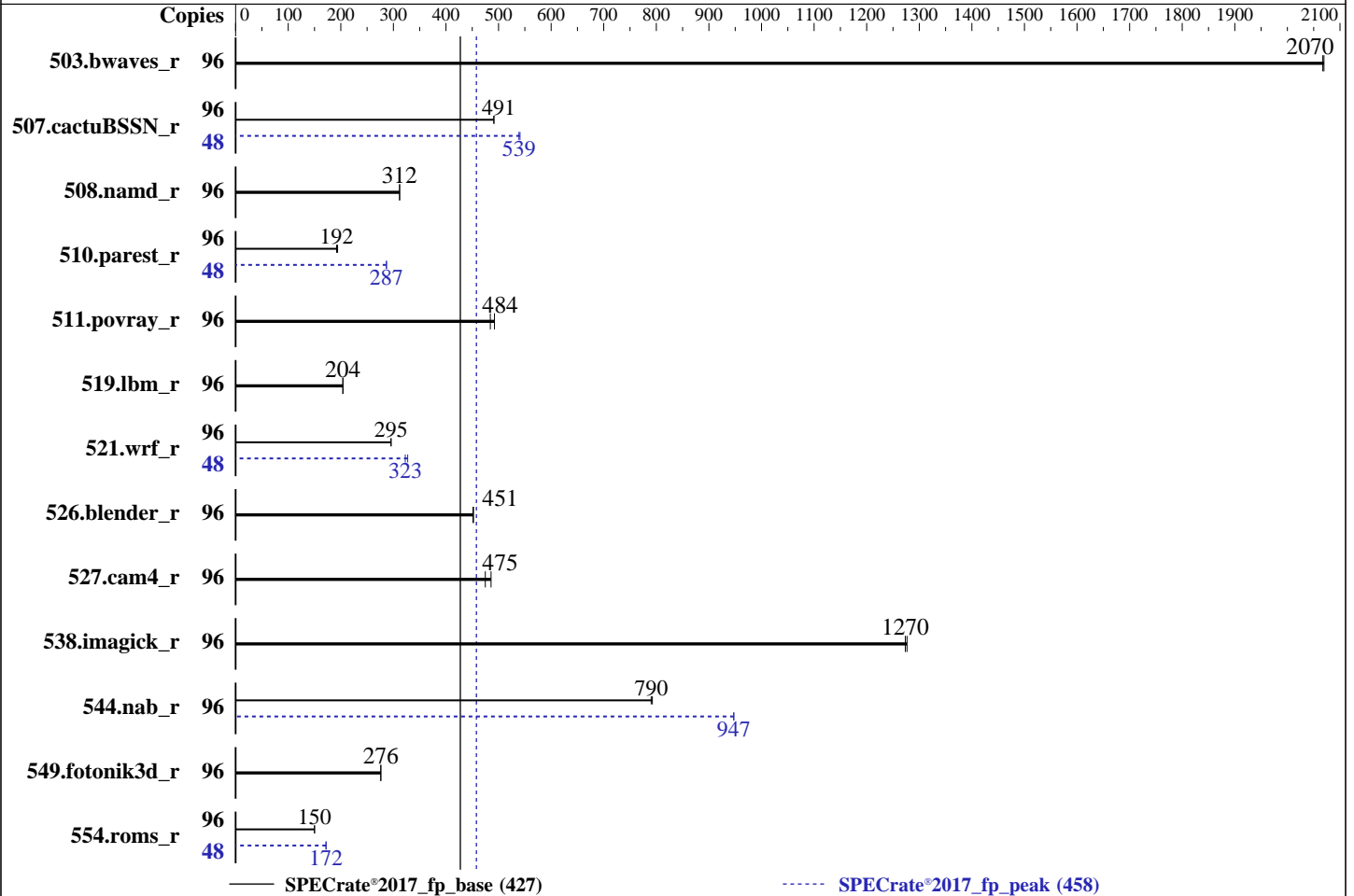
Test Date: Jan-2023

Test Sponsor: Dell Inc.

Hardware Availability: Feb-2023

Tested by: Dell Inc.

Software Availability: May-2022



### Hardware

CPU Name: Intel Xeon Platinum 8461V  
 Max MHz: 3700  
 Nominal: 2200  
 Enabled: 48 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 2 MB I+D on chip per core  
 L3: 97.5 MB I+D on chip per chip  
 Other: None  
 Memory: 512 GB (8 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 0.3.1 released Nov-2022  
 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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	96	465	2070	<b><u>466</u></b>	<b><u>2070</u></b>			96	465	2070	<b><u>466</u></b>	<b><u>2070</u></b>		
507.cactuBSSN_r	96	<b><u>248</u></b>	<b><u>491</u></b>	247	491			48	<b><u>113</u></b>	<b><u>539</u></b>	112	541		
508.namd_r	96	292	312	<b><u>293</u></b>	<b><u>312</u></b>			96	292	312	<b><u>293</u></b>	<b><u>312</u></b>		
510.parest_r	96	1295	194	<b><u>1308</u></b>	<b><u>192</u></b>			48	<b><u>438</u></b>	<b><u>287</u></b>	438	287		
511.povray_r	96	455	492	<b><u>463</u></b>	<b><u>484</u></b>			96	455	492	<b><u>463</u></b>	<b><u>484</u></b>		
519.lbm_r	96	496	204	<b><u>496</u></b>	<b><u>204</u></b>			96	496	204	<b><u>496</u></b>	<b><u>204</u></b>		
521.wrf_r	96	<b><u>728</u></b>	<b><u>295</u></b>	727	296			48	329	327	<b><u>333</u></b>	<b><u>323</u></b>		
526.blender_r	96	323	452	<b><u>324</u></b>	<b><u>451</u></b>			96	323	452	<b><u>324</u></b>	<b><u>451</u></b>		
527.cam4_r	96	<b><u>354</u></b>	<b><u>475</u></b>	346	486			96	<b><u>354</u></b>	<b><u>475</u></b>	346	486		
538.imagick_r	96	187	1280	<b><u>187</u></b>	<b><u>1270</u></b>			96	187	1280	<b><u>187</u></b>	<b><u>1270</u></b>		
544.nab_r	96	<b><u>204</u></b>	<b><u>790</u></b>	204	793			96	171	947	<b><u>171</u></b>	<b><u>947</u></b>		
549.fotonik3d_r	96	1355	276	<b><u>1355</u></b>	<b><u>276</u></b>			96	1355	276	<b><u>1355</u></b>	<b><u>276</u></b>		
554.roms_r	96	1017	150	<b><u>1017</u></b>	<b><u>150</u></b>			48	<b><u>444</u></b>	<b><u>172</u></b>	443	172		

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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

(Continued on next page)



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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 l Wed Jan 25 11:50:57 2023

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

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## Platform Notes (Continued)

### 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 239 (239-58.el8)
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 1 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
11:50:57 up 4:37, 1 user, load average: 64.48, 88.41, 92.84
USER      TTY      FROM          LOGIN@      IDLE        JCPU   PCPU   WHAT
donald    :1       :1            07:16      ?xdm?      1:19    0.00s /usr/libexec/gdm-x-session
--register-session --run-script gnome-session
```

```
3. Username
From environment variable $USER:  root
From the command 'logname':      donald
```

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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) 2060667
   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) 2060667
   virtual memory         (kbytes, -v) unlimited
   file locks              (-x) unlimited

```

```

-----
5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 17
   /usr/lib/systemd/systemd --user
   /usr/libexec/gnome-terminal-server
   bash
   sudo su
   su
   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=96 -c
     ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=48 --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=96 --configfile
     ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=48 --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/temlogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /mnt/ramdisk/cpu2017-1.1.9-ic2022.1

```

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## Platform Notes (Continued)

```

6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) Platinum 8461V
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 8
   microcode       : 0x2b000111
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores       : 48
   siblings        : 96
   1 physical ids (chips)
   96 processors (hardware threads)
   physical id 0: core ids 0-47
   physical id 0: apicids 0-95

```

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):            96
On-line CPU(s) list: 0-95
Thread(s) per core: 2
Core(s) per socket: 48
Socket(s):         1
NUMA node(s):     4
Vendor ID:         GenuineIntel
BIOS Vendor ID:   Intel
CPU family:        6
Model:            143
Model name:        Intel(R) Xeon(R) Platinum 8461V
BIOS Model name:   Intel(R) Xeon(R) Platinum 8461V
Stepping:         8
CPU MHz:           2200.000
BogoMIPS:          4400.00
L1d cache:        48K
L1i cache:        32K
L2 cache:         2048K
L3 cache:         99840K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,48,50,52,54,56,58,60,62,64,66,68,70
NUMA node1 CPU(s): 24,26,28,30,32,34,36,38,40,42,44,46,72,74,76,78,80,82,84,86,88,90,92,94
NUMA node2 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,49,51,53,55,57,59,61,63,65,67,69,71

```

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## Platform Notes (Continued)

```

NUMA node3 CPU(s): 25,27,29,31,33,35,37,39,41,43,45,47,73,75,77,79,81,83,85,87,89,91,93,95
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 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
      xsaes 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_lld arch_capabilities

```

8. numactl --hardware

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

```

available: 4 nodes (0-3)
node 0 cpus: 0,2,4,6,8,10,12,14,16,18,20,22,48,50,52,54,56,58,60,62,64,66,68,70
node 0 size: 128214 MB
node 0 free: 112342 MB
node 1 cpus: 24,26,28,30,32,34,36,38,40,42,44,46,72,74,76,78,80,82,84,86,88,90,92,94
node 1 size: 129018 MB
node 1 free: 118378 MB
node 2 cpus: 1,3,5,7,9,11,13,15,17,19,21,23,49,51,53,55,57,59,61,63,65,67,69,71
node 2 size: 129018 MB
node 2 free: 117896 MB
node 3 cpus: 25,27,29,31,33,35,37,39,41,43,45,47,73,75,77,79,81,83,85,87,89,91,93,95
node 3 size: 128974 MB
node 3 free: 116100 MB
node distances:
node  0  1  2  3
  0:  10  12  12  12
  1:  12  10  12  12
  2:  12  12  10  12
  3:  12  12  12  10

```

9. /proc/meminfo

MemTotal: 527591512 kB

10. who -r

run-level 5 Jan 25 07:15

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## Platform Notes (Continued)

11. Systemd service manager version: systemd 239 (239-58.el8)

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 autovt@ avahi-daemon bluetooth chronyd crond cups display-manager firewalld gdm getty@ import-state insights-client-boot irqbalance iscsi iscsi-onboot kdump ksm ksmtuned libstoragemgmt libvirt-d loadmodules lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname nvme-fc-boot-connections ostree-remount qemu-guest-agent rhsmcertd rpcbind rsyslog rtkit-daemon selinux-autorelabel-mark smartd sshd sssd syslog timedatex tuned udisks2 vdo vgauthd vmtoolsd
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 debug-shell dnsmasq ebttables gssproxy hwloc-dump-hwdata initial-setup initial-setup-reconfiguration ipr-dump ipr-print ipr-update iscsid iscsiui kpatch kvm_stat ledmon libvirt-guests man-db-restart-cache-update ndctl-monitor netcf-transaction nfs-blkmap nfs-convert nfs-server nftables numad nvme-autoconnect oddjobd podman podman-auto-update podman-restart psacct ras-mc-ctl rasdaemon rdisc rhcd rhsm rhsm-facts saslauthd serial-getty@ speech-dispatcherd sshd-keygen@ switcheroo-control systemd-nspawn@ systemd-resolved tcsd upower virtinterfaced virtnetworkd virtnodedevd virtnwfilterd virtproxyd virtqemud virtsecret virtstorage wpa_supplicant
indirect	spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo virtlockd virtlogd
masked	systemd-timedated

13. Linux kernel boot-time arguments, from /proc/cmdline

```

BOOT_IMAGE=(hd0,gpt2)/vmlinuz-4.18.0-372.9.1.el8.x86_64
root=/dev/mapper/rhel-root
ro
crashkernel=auto
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

```

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## Platform Notes (Continued)

-----  
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+madvise	[madvise]	never
enabled	[always]	madvise	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
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)

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## Platform Notes (Continued)

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/swapgs 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  43G  83G  35% /mnt/ramdisk
-----
```

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

```
-----
Vendor:      Dell Inc.
Product:     PowerEdge C6620
Product Family: PowerEdge
Serial:      SL6C201
-----
```

### 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:  
8x 002C00B3002C MTC40F2046S1RC48BA1 64 GB 2 rank 4800

### 24. BIOS

(This section combines info from /sys/devices and dmidecode.)

```
-----
BIOS Vendor:      Dell Inc.
BIOS Version:     0.3.1
BIOS Date:        11/24/2022
BIOS Revision:    0.3
-----
```



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Dell Inc.

SPECrate®2017\_fp\_base = 427

PowerEdge C6620 (Intel Xeon Platinum 8461V)

SPECrate®2017\_fp\_peak = 458

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

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

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

=====  
C++ | 508.namd\_r(base, peak) 510.parest\_r(base, peak)  
=====

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.  
-----

=====  
C++, C | 511.povray\_r(base, peak) 526.blender\_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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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
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-----

=====  
C++, C, Fortran | 507.cactuBSSN\_r(base, peak)  
=====

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
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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

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Hardware Availability: Feb-2023  
Software Availability: May-2022

## Compiler Version Notes (Continued)

2022.1.0 Build 20220316  
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-----  
=====  
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  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.  
-----

## 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

## 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

(Continued on next page)



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Hardware Availability: Feb-2023

Software Availability: May-2022

## Base Portability Flags (Continued)

```
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
```

### 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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Software Availability: May-2022

## 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  
-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

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## Peak Optimization Flags (Continued)

510.parest\_r (continued):

```
-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
```

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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