



# SPEC CPU®2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

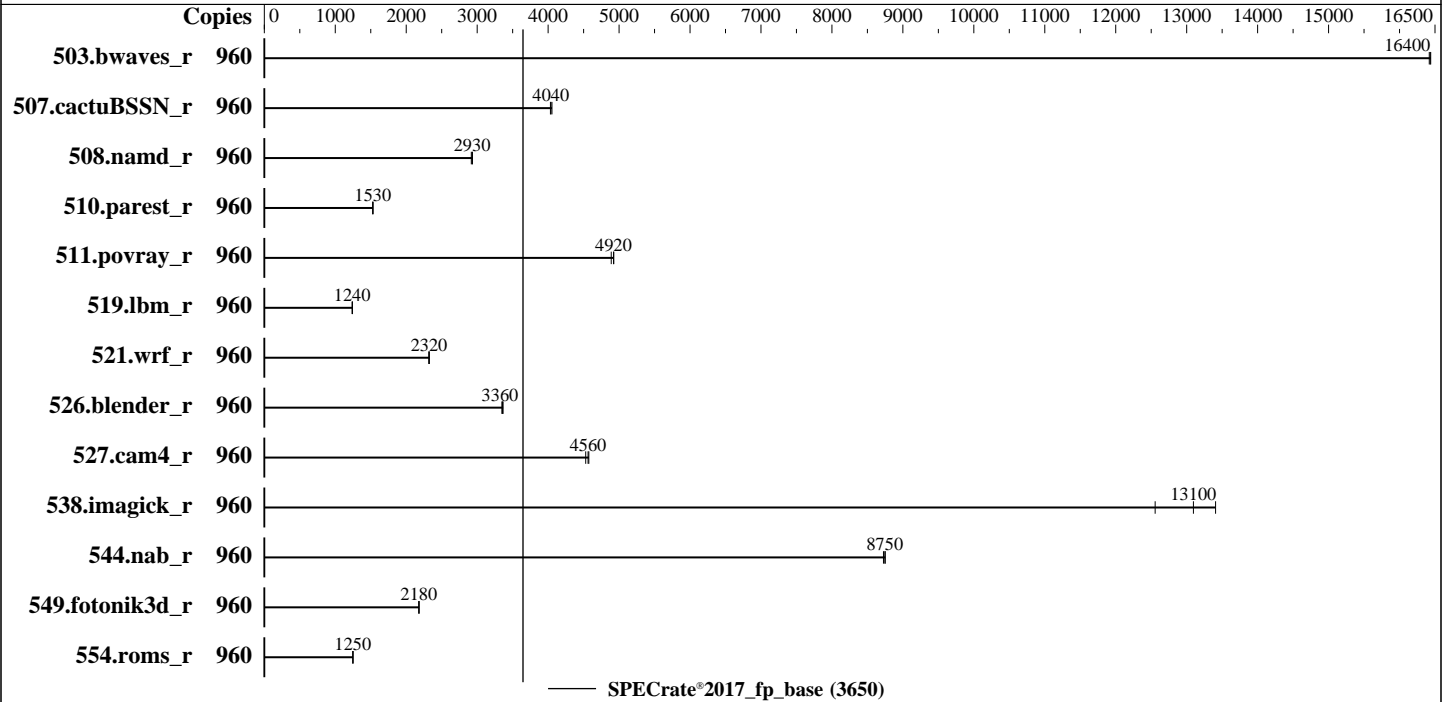
HPE Compute Scale-up Server 3200  
(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017\_fp\_base = 3650

SPECrate®2017\_fp\_peak = Not Run

CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE

Test Date: Jan-2024  
Hardware Availability: Dec-2023  
Software Availability: Dec-2023



### Hardware

CPU Name: Intel Xeon Platinum 8490H  
Max MHz: 3500  
Nominal: 1900  
Enabled: 480 cores, 8 chips, 2 threads/core  
Orderable: 4, 8, 16 chip(s)  
Cache L1: 32 KB I + 48 KB D on chip per core  
L2: 2 MB I+D on chip per core  
L3: 112.5 MB I+D on chip per chip  
Other: None  
Memory: 4 TB (64 x 64 GB 2Rx4 PC5-4800B-R)  
Storage: 1 x 480 GB SATA SSD  
Other: None

### Software

OS: Red Hat Enterprise Linux 8.8 (Ootpa)  
Kernel 4.18.0-477.10.1.el8\_8.x86\_64  
Compiler: C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;  
Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;  
Parallel: No  
Firmware: HPE Firmware Bundle Version 1.10.342 released Dec-2023  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: jemalloc memory allocator V5.0.1  
HPE Foundation Software 2.5.0  
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	960	<b>586</b>	<b>16400</b>	586	16400	586	16400							
507.cactuBSSN_r	960	300	4050	301	4030	<b>301</b>	<b>4040</b>							
508.namd_r	960	313	2920	311	2930	<b>311</b>	<b>2930</b>							
510.parest_r	960	1641	1530	1643	1530	<b>1641</b>	<b>1530</b>							
511.povray_r	960	<b>455</b>	<b>4920</b>	455	4930	458	4890							
519.lbm_r	960	817	1240	<b>817</b>	<b>1240</b>	814	1240							
521.wrf_r	960	927	2320	925	2320	<b>926</b>	<b>2320</b>							
526.blender_r	960	437	3350	<b>436</b>	<b>3360</b>	434	3370							
527.cam4_r	960	371	4530	367	4570	<b>368</b>	<b>4560</b>							
538.imagick_r	960	190	12600	<b>182</b>	<b>13100</b>	178	13400							
544.nab_r	960	185	8750	185	8730	<b>185</b>	<b>8750</b>							
549.fotonik3d_r	960	1717	2180	1717	2180	<b>1717</b>	<b>2180</b>							
554.roms_r	960	1221	1250	1223	1250	<b>1222</b>	<b>1250</b>							

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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"  
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  
runcpu command invoked through numactl i.e.:  
numactl --interleave=all runcpu <etc>

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/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  
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)



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## General Notes (Continued)

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.

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>

## Platform Notes

The system ROM used for this result contains Intel microcode version 0x2b0004d0 for the Intel Xeon Platinum 8490H processor.

BIOS Configuration:

Workload Profile set to Custom

Energy/Performance Bias set to Maximum Performance

Energy Efficient Turbo set to Disabled

Advanced Memory Protection set to Advanced ECC Support

SR-IOV set to Disabled

Intel Virtualization Technology (Intel VT, VT-x) set to Disabled

Adjacent Sector Prefetch set to Disabled

DCU Stream Prefetcher set to Disabled

Last Level Cache (LLC) Dead Line Allocation set to Disabled

Enhanced Processor Performance Profile set to Aggressive

Memory Patrol Scrubbing set to Disabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on sph-152 Sun Jan 28 22:13:12 2024

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 239 (239-74.el8\_8)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. tuned-adm active
17. sysctl
18. /sys/kernel/mm/transparent\_hugepage
19. /sys/kernel/mm/transparent\_hugepage/khugepaged
20. OS release
21. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
22. Disk information
23. /sys/devices/virtual/dmi/id
24. dmidecode
25. BIOS

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## Platform Notes (Continued)

```

-----
1. uname -a
Linux sph-152 4.18.0-477.10.1.el8_8.x86_64 #1 SMP Wed Apr 5 13:35:01 EDT 2023 x86_64 x86_64 x86_64
GNU/Linux

-----
2. w
 22:13:12 up 17 min,  2 users,  load average: 0.02, 0.21, 0.27
USER      TTY      FROM          LOGIN@   IDLE   JCPU   PCPU   WHAT
test     ttyS0    -              21:57    8.00s  1.27s  0.01s  login -- test
test     pts/0    10.3.6.213    22:08    1:17   0.04s  0.02s  sshd: test [priv]

-----
3. Username
From environment variable $USER:  root
From the command 'logname':      test

-----
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) 16249854
max locked memory       (kbytes, -l) 64
max memory size         (kbytes, -m) unlimited
open files              (-n) 40000
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) 16249854
virtual memory          (kbytes, -v) unlimited
file locks              (-x) unlimited

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 18
login -- test
-bash
sudo su
su
bash
bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=960 -c
  ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=480 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base -o all fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=960 --configfile
  ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=480 --define physicalfirst
  --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
  rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.001/templogs/preenv.fprate.001.0.log --lognum 001.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

-----
6. /proc/cpuinfo

```

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## Platform Notes (Continued)

```

model name      : Intel(R) Xeon(R) Platinum 8490H
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping       : 6
microcode      : 0x2b0004d0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores      : 60
siblings       : 120
8 physical ids (chips)
960 processors (hardware threads)
physical id 0: core ids 0-59
physical id 1: core ids 0-59
physical id 2: core ids 0-59
physical id 3: core ids 0-59
physical id 4: core ids 0-59
physical id 5: core ids 0-59
physical id 6: core ids 0-59
physical id 7: core ids 0-59
physical id 0: apicids 0-119
physical id 1: apicids 128-247
physical id 2: apicids 256-375
physical id 3: apicids 384-503
physical id 4: apicids 512-631
physical id 5: apicids 640-759
physical id 6: apicids 768-887
physical id 7: apicids 896-1015

```

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): 960
On-line CPU(s) list: 0-959
Thread(s) per core: 2
Core(s) per socket: 60
Socket(s): 8
NUMA node(s): 8
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
CPU family: 6
Model: 143
Model name: Intel(R) Xeon(R) Platinum 8490H
BIOS Model name: Intel(R) Xeon(R) Platinum 8490H
Stepping: 6
CPU MHz: 3500.000
CPU max MHz: 3500.0000
CPU min MHz: 800.0000
BogoMIPS: 3799.98
L1d cache: 48K
L1i cache: 32K
L2 cache: 2048K
L3 cache: 115200K
NUMA node0 CPU(s): 0-59,480-539
NUMA node1 CPU(s): 60-119,540-599

```

(Continued on next page)



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## Platform Notes (Continued)

```

NUMA node2 CPU(s): 120-179,600-659
NUMA node3 CPU(s): 180-239,660-719
NUMA node4 CPU(s): 240-299,720-779
NUMA node5 CPU(s): 300-359,780-839
NUMA node6 CPU(s): 360-419,840-899
NUMA node7 CPU(s): 420-479,900-959
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
arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf 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 intel_ppin
cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 avx2 smep bmi2
erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb
intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc
cqm_occup_llc cqm_mbm_total cqm_mbm_local split_lock_detect avx_vnni avx512_bf16
wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_pkg_req 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 amx_bf16 avx512_fp16 amx_tile amx_int8
flush_lld 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: 0-59,480-539
node 0 size: 507138 MB
node 0 free: 498222 MB
node 1 cpus: 60-119,540-599
node 1 size: 508063 MB
node 1 free: 507208 MB
node 2 cpus: 120-179,600-659
node 2 size: 508063 MB
node 2 free: 504636 MB
node 3 cpus: 180-239,660-719
node 3 size: 508063 MB
node 3 free: 505870 MB
node 4 cpus: 240-299,720-779
node 4 size: 508063 MB
node 4 free: 507405 MB
node 5 cpus: 300-359,780-839
node 5 size: 508063 MB
node 5 free: 507479 MB
node 6 cpus: 360-419,840-899
node 6 size: 508063 MB
node 6 free: 507174 MB
node 7 cpus: 420-479,900-959
node 7 size: 506998 MB
node 7 free: 506396 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10 16 16 18 40 40 40 40
1:  16 10 18 16 40 40 40 40
2:  16 18 10 16 40 40 40 40
3:  18 16 16 10 40 40 40 40
4:  40 40 40 40 10 16 16 18
5:  40 40 40 40 16 10 18 16
6:  40 40 40 40 16 18 10 16
7:  40 40 40 40 18 16 16 10

```

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## Platform Notes (Continued)

-----  
9. /proc/meminfo  
MemTotal: 4160021524 kB

-----  
10. who -r  
run-level 3 Jan 28 21:57

-----  
11. Systemd service manager version: systemd 239 (239-74.el8\_8)  
Default Target Status  
multi-user degraded

-----  
12. Failed units, from systemctl list-units --state=failed  
UNIT LOAD ACTIVE SUB DESCRIPTION  
\* dcdchkgracefulshutdown.service loaded failed failed Check if previous system shutdown was graceful

-----  
13. Services, from systemctl list-unit-files  
STATE UNIT FILES  
enabled ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online  
abrt-journal-core abrt-oops abrt-vmcore abrt-xorg abrttd accounts-daemon atd auditd autovt@  
avahi-daemon chronyd cpuset\_cpunodemap cpuset\_memory\_spread crond dcd dcdchkgracefulshutdown  
dcdshutdown display-manager gdm getty@ hpe-auto-config hpe\_irqbalance import-state  
insights-client-boot iscsi iscsi-onboot kdump ksm ksmtuned libstoragemgmt libvirtfd lm\_sensors  
loadmodules lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname  
nvme-fc-boot-connections ostree-remount pmcd pmie pmlogger qemu-guest-agent rpcbind rsyslog  
rtkit-daemon selinux-autorelabel-mark smartd sshd sssd syslog sysstat timedatex tuned udisks2 vdo  
vgauthd vmtoolsd vsftpd  
disabled abrt-ccpp abrt-pstoreoops arp-ethers autofs blk-availability bluetooth brlty  
canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot cgdbxd  
chrony-wait cni-dhcp console-getty cpupower cups cups-browsed debug-shell dnf-system-upgrade  
dnsmasq dovecot ebttables fancontrol fcoe firewalld grafana-server gssproxy httpd httpd@ ibacm  
iprdump iprinit iprupdate ipsec irqbalance iscsid iscsiuiio kpatch kvm\_stat ledmon libvirt-guests  
lldpad man-db-restart-cache-update named named-chroot ndctl-monitor netcf-transaction nfs-blkmap  
nfs-convert nfs-server nftables nmb numad nvme-autoconnect oddjobd pmfind pmie\_farm pmlogger\_farm  
pmpoxy podman podman-auto-update podman-clean-transient podman-kube@ podman-restart postfix  
powertop psacct ras-mc-ctl rasdaemon rdisc rhcd rrdcached saslauthd sendmail sm-client smb snmpd  
snmptrapd spamassassin speech-dispatcherd srp\_daemon srp\_daemon\_port@ sshd-keygen@  
switcheroo-control systemd-nsspawn@ systemd-pstore systemd-resolved target targetclid tcscd  
tog-pegasus trace-cmd upower virtinterfaced virtnetworkd virtnodevdev virtnwfilterd virtproxyd  
virtqemud virtsecretfd virtstoraged wpa\_supplicant ypbind  
indirect pcsd serial-getty@ spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh  
masked sssd-sudo virtlockd virtlogd vsftpd@  
systemd-timedated

-----  
14. Linux kernel boot-time arguments, from /proc/cmdline  
BOOT\_IMAGE=(hdi,gpt2)/boot/vmlinuz-4.18.0-477.10.1.el8\_8.x86\_64  
root=/dev/disk/by-label/sph-152R21  
ro  
rd.auto=1  
console=ttyS0,115200n8  
selinux=0  
security=  
console=ttyS0,115200  
udev.children-max=512  
nmi\_watchdog=0

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## Platform Notes (Continued)

```
uv_nmi.action=kdump
add_efi_memmap
tsc=nowatchdog
bau=0
earlyprintk=ttyS0,115200
log_buf_len=8M
numa_balancing=disable
crashkernel=1G,high
```

```
-----
15. cpupower frequency-info
analyzing CPU 0:
  current policy: frequency should be within 3.50 GHz and 3.50 GHz.
                  The governor "performance" may decide which speed to use
                  within this range.
  boost state support:
    Supported: yes
    Active: yes
-----
```

```
-----
16. tuned-adm active
Current active profile: throughput-performance
-----
```

```
-----
17. sysctl
kernel.numa_balancing          0
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
-----
```

```
-----
18. /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
-----
```

```
-----
19. /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
-----
```

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## Platform Notes (Continued)

### 20. OS release

```
-----
From /etc/*-release /etc/*-version
os-release           Red Hat Enterprise Linux 8.8 (Ootpa)
hpe-foundation-release HPE Foundation Software 2.5.0, Build 750.0880.240125T0100.a.rhel88hpe-240125T0100
redhat-release       Red Hat Enterprise Linux release 8.8 (Ootpa)
system-release       Red Hat Enterprise Linux release 8.8 (Ootpa)
```

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

```
-----
itlb_multihit       Not affected
l1tf                 Not affected
mds                  Not affected
meltdown             Not affected
mmio_stale_data      Not affected
retbleed             Not affected
spec_store_bypass   Mitigation: Speculative Store Bypass disabled via prctl
spectre_v1           Mitigation: usercopy/swaps barriers and __user pointer sanitization
spectre_v2           Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling, PBRSE-eIBRS: SW sequence
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>

### 22. Disk information

```
-----
SPEC is set to: /home/cpu2017
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sdb2   xfs   447G  18G  430G  4% /
```

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

```
-----
Vendor:      HPE
Product:     Compute Scale-up Server 3200
Product Family: 1590PID03030201
Serial:      5UF2231941-000
```

### 24. 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:  
64x Hynix HMC94MEBRA121N 64 GB 2 rank 4800

### 25. BIOS

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

```
-----
BIOS Vendor:      HPE
BIOS Version:     Bundle:1.10.342-20231206_161054 SFW:009.010.108.000.2312042027
BIOS Date:        12/04/2023
```

## Compiler Version Notes

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

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**HPE Compute Scale-up Server 3200**

(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017\_fp\_base = 3650

SPECrate®2017\_fp\_peak = Not Run

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Jan-2024

**Hardware Availability:** Dec-2023

**Software Availability:** Dec-2023

## Compiler Version Notes (Continued)

-----  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
-----

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
-----

=====  
C++, C | 511.povray\_r(base) 526.blender\_r(base)  
-----

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
-----

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
-----

=====  
Fortran | 503.bwaves\_r(base) 549.fotonik3d\_r(base) 554.roms\_r(base)  
-----

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
-----

=====  
Fortran, C | 521.wrf\_r(base) 527.cam4\_r(base)  
-----

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x  
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-----

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

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SPECrate®2017\_fp\_peak = Not Run

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Jan-2024

**Hardware Availability:** Dec-2023

**Software Availability:** Dec-2023

## Base Compiler Invocation (Continued)

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

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 -xsapphirerapids -Ofast -ffast-math

-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4

-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc

-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast

-ffast-math -flto -mfpmath=sse -funroll-loops

-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc

-L/usr/local/jemalloc64-5.0.1/lib

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**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Jan-2024

**Hardware Availability:** Dec-2023

**Software Availability:** Dec-2023

## Base Optimization Flags (Continued)

Fortran benchmarks:

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

Benchmarks using both C and C++:

```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-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-ic2023p2-official-linux64.html>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SDSS-rev1.0.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SDSS-rev1.0.xml>

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