



SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

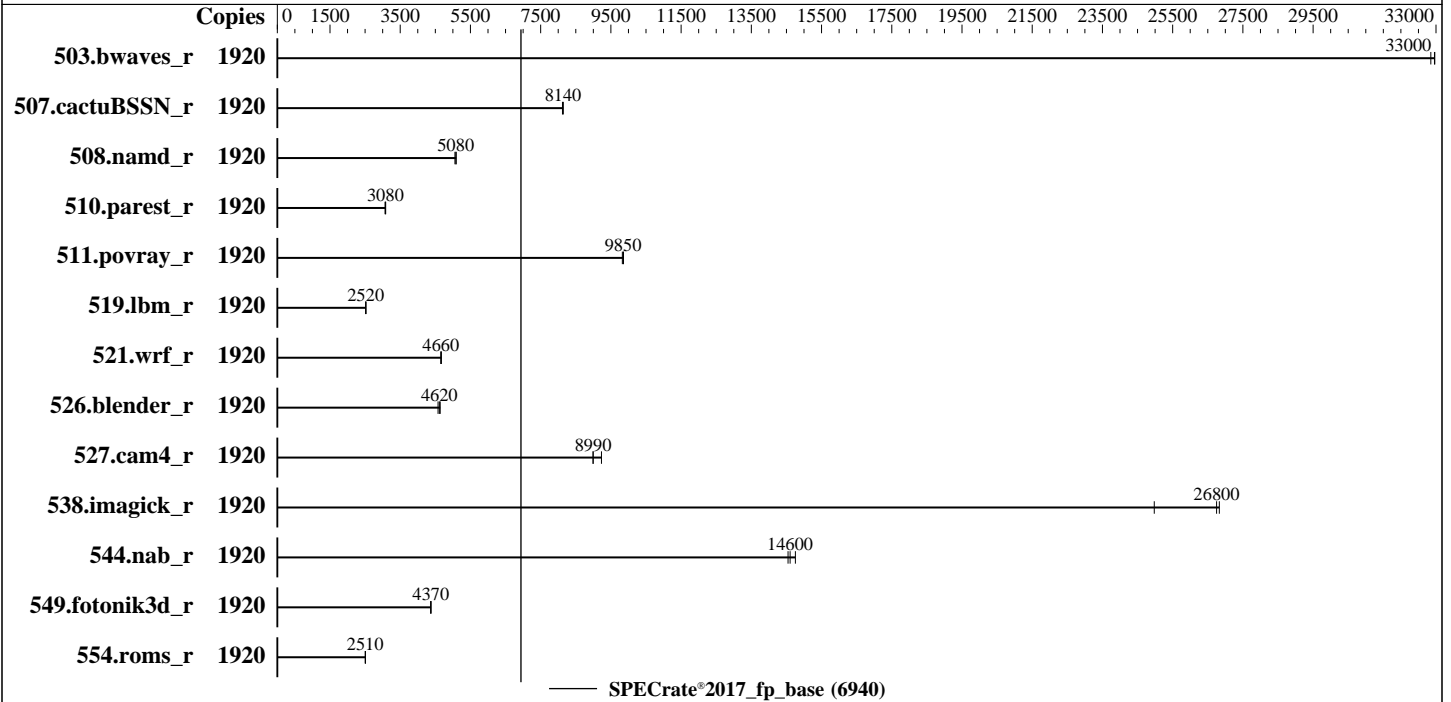
HPE Compute Scale-up Server 3200
(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base = 6940

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: 960 cores, 16 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: 8 TB (128 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 6.4 TB NVMe 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	1920	586	32900	<u>584</u>	<u>33000</u>	584	33000							
507.cactuBSSN_r	1920	299	8140	<u>299</u>	<u>8140</u>	299	8120							
508.namd_r	1920	361	5060	<u>359</u>	<u>5080</u>	358	5090							
510.parest_r	1920	1637	3070	1628	3090	<u>1630</u>	<u>3080</u>							
511.povray_r	1920	<u>455</u>	<u>9850</u>	456	9830	455	9860							
519.lbm_r	1920	<u>803</u>	<u>2520</u>	802	2520	804	2520							
521.wrf_r	1920	923	4660	<u>923</u>	<u>4660</u>	921	4670							
526.blender_r	1920	<u>634</u>	<u>4620</u>	630	4640	639	4580							
527.cam4_r	1920	364	9230	373	8990	<u>373</u>	<u>8990</u>							
538.imagick_r	1920	178	26800	191	25000	<u>178</u>	<u>26800</u>							
544.nab_r	1920	222	14500	<u>221</u>	<u>14600</u>	219	14800							
549.fotonik3d_r	1920	<u>1711</u>	<u>4370</u>	1713	4370	1710	4380							
554.roms_r	1920	<u>1217</u>	<u>2510</u>	1218	2510	1215	2510							

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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.

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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-201 Sun Jan 21 01:09:01 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. 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
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Platform Notes (Continued)

1. `uname -a`
Linux sph-201 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`
01:09:01 up 5 min, 1 user, load average: 1.21, 4.92, 2.68
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
test ttyS0 - 01:06 4.00s 1.52s 0.02s login -- test

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) 32506863
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) 32506863
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=1920 -c
ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=960 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=1920 --configfile
ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=960 --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/CPU2017.011/templogs/preenv.fprate.011.0.log --lognum 011.0 --from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /home/cpu2017

6. `/proc/cpuinfo`
model name : Intel(R) Xeon(R) Platinum 8490H
vendor_id : GenuineIntel

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Platform Notes (Continued)

```

cpu family      : 6
model          : 143
stepping       : 8
microcode      : 0x2b0004d0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores      : 60
siblings       : 120
16 physical ids (chips)
1920 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 8: core ids 0-59
physical id 9: core ids 0-59
physical id 10: core ids 0-59
physical id 11: core ids 0-59
physical id 12: core ids 0-59
physical id 13: core ids 0-59
physical id 14: core ids 0-59
physical id 15: 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
physical id 8: apicids 1024-1143
physical id 9: apicids 1152-1271
physical id 10: apicids 1280-1399
physical id 11: apicids 1408-1527
physical id 12: apicids 1536-1655
physical id 13: apicids 1664-1783
physical id 14: apicids 1792-1911
physical id 15: apicids 1920-2039

```

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):            1920
On-line CPU(s) list: 0-1919
Thread(s) per core: 2
Core(s) per socket: 60
Socket(s):         16
NUMA node(s):     16
Vendor ID:         GenuineIntel
BIOS Vendor ID:   Intel(R) Corporation
CPU family:        6

```

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Platform Notes (Continued)

```

Model: 143
Model name: Intel(R) Xeon(R) Platinum 8490H
BIOS Model name: Intel(R) Xeon(R) Platinum 8490H
Stepping: 8
CPU MHz: 3500.000
CPU max MHz: 3500.0000
CPU min MHz: 800.0000
BogoMIPS: 3800.02
L1d cache: 48K
L1i cache: 32K
L2 cache: 2048K
L3 cache: 115200K
NUMA node0 CPU(s): 0-59,960-1019
NUMA node1 CPU(s): 60-119,1020-1079
NUMA node2 CPU(s): 120-179,1080-1139
NUMA node3 CPU(s): 180-239,1140-1199
NUMA node4 CPU(s): 240-299,1200-1259
NUMA node5 CPU(s): 300-359,1260-1319
NUMA node6 CPU(s): 360-419,1320-1379
NUMA node7 CPU(s): 420-479,1380-1439
NUMA node8 CPU(s): 480-539,1440-1499
NUMA node9 CPU(s): 540-599,1500-1559
NUMA node10 CPU(s): 600-659,1560-1619
NUMA node11 CPU(s): 660-719,1620-1679
NUMA node12 CPU(s): 720-779,1680-1739
NUMA node13 CPU(s): 780-839,1740-1799
NUMA node14 CPU(s): 840-899,1800-1859
NUMA node15 CPU(s): 900-959,1860-1919
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: 16 nodes (0-15)
node 0 cpus: 0-59,960-1019
node 0 size: 506926 MB
node 0 free: 505246 MB
node 1 cpus: 60-119,1020-1079
node 1 size: 508063 MB
node 1 free: 506591 MB
node 2 cpus: 120-179,1080-1139
node 2 size: 508063 MB
node 2 free: 507180 MB
node 3 cpus: 180-239,1140-1199
node 3 size: 508063 MB
node 3 free: 507181 MB

```

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Platform Notes (Continued)

```

node 4 cpus: 240-299,1200-1259
node 4 size: 508063 MB
node 4 free: 507504 MB
node 5 cpus: 300-359,1260-1319
node 5 size: 508063 MB
node 5 free: 507486 MB
node 6 cpus: 360-419,1320-1379
node 6 size: 508063 MB
node 6 free: 507495 MB
node 7 cpus: 420-479,1380-1439
node 7 size: 508063 MB
node 7 free: 507485 MB
node 8 cpus: 480-539,1440-1499
node 8 size: 508063 MB
node 8 free: 507347 MB
node 9 cpus: 540-599,1500-1559
node 9 size: 508063 MB
node 9 free: 507333 MB
node 10 cpus: 600-659,1560-1619
node 10 size: 508063 MB
node 10 free: 507259 MB
node 11 cpus: 660-719,1620-1679
node 11 size: 508063 MB
node 11 free: 507334 MB
node 12 cpus: 720-779,1680-1739
node 12 size: 508063 MB
node 12 free: 507414 MB
node 13 cpus: 780-839,1740-1799
node 13 size: 508020 MB
node 13 free: 507404 MB
node 14 cpus: 840-899,1800-1859
node 14 size: 508063 MB
node 14 free: 507472 MB
node 15 cpus: 900-959,1860-1919
node 15 size: 506994 MB
node 15 free: 506404 MB
node distances:

```

```

node 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
0: 10 16 16 18 40 40 40 40 40 40 40 40 40 40 40 40
1: 16 10 18 16 40 40 40 40 40 40 40 40 40 40 40 40
2: 16 18 10 16 40 40 40 40 40 40 40 40 40 40 40 40
3: 18 16 16 10 40 40 40 40 40 40 40 40 40 40 40 40
4: 40 40 40 40 10 16 18 18 40 40 40 40 40 40 40 40
5: 40 40 40 40 16 10 18 16 40 40 40 40 40 40 40 40
6: 40 40 40 40 16 18 10 16 40 40 40 40 40 40 40 40
7: 40 40 40 40 18 16 16 10 40 40 40 40 40 40 40 40
8: 40 40 40 40 40 40 40 40 10 16 16 18 40 40 40 40
9: 40 40 40 40 40 40 40 40 16 10 18 16 40 40 40 40
10: 40 40 40 40 40 40 40 40 16 18 10 16 40 40 40 40
11: 40 40 40 40 40 40 40 40 18 16 16 10 40 40 40 40
12: 40 40 40 40 40 40 40 40 40 40 40 10 16 16 18
13: 40 40 40 40 40 40 40 40 40 40 40 16 10 18 16
14: 40 40 40 40 40 40 40 40 40 40 40 16 18 10 16
15: 40 40 40 40 40 40 40 40 40 40 40 18 16 16 10

```

```

-----
9. /proc/meminfo
MemTotal: 8321815872 kB
-----

```

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Platform Notes (Continued)

10. who -r
run-level 3 Jan 21 01:06

11. Systemd service manager version: systemd 239 (239-74.el8_8)
Default Target Status
multi-user running

12. 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 libvirtd 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 brltty 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 iscsiui 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 sasauthd sendmail sm-client smb snmpd snmptrapd spamassassin speech-dispatcherd srp_daemon srp_daemon_port@ sshd-keygen@ switcheroo-control systemd-nspawn@ systemd-pstore systemd-resolved target targetclid tcsh tog-pegasus trace-cmd upower virtinterfaced virtnetworkd virtnodevd virtnwfilterd virtproxyd virtqemu virtsecret virtstorage wpa_supplicant ypbind
indirect	pcscd serial-getty@ spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo virtlockd virtlogd vsftpd@
masked	systemd-timedated

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd2,gpt4)/boot/vmlinuz-4.18.0-477.10.1.el8_8.x86_64
root=UUID=e65a817a-ecea-4172-8f09-b6a7120f7868
ro
loglevel=3
rd.auto=1
console=ttyS0,115200n8
selinux=0
security=
console=ttyS0,115200
udev.children-max=512
nmi_watchdog=0
uv_nmi.action=kdump
add_efi_memmap
tsc=nowatchdog
bau=0
earlyprintk=ttyS0,115200
log_buf_len=8M
numa_balancing=disable
crashkernel=1G,high

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Platform Notes (Continued)

14. 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

15. tuned-adm active

Current active profile: throughput-performance

16. 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

```

17. /sys/kernel/mm/transparent_hugepage

```

defrag          always defer defer+madvice [madvice] never
enabled         [always] madvice never
hpage_pmd_size  2097152
shmem_enabled   always within_size advise [never] deny force

```

18. /sys/kernel/mm/transparent_hugepage/khugepaged

```

alloc_sleep_millisecs  60000
defrag                  1
max_ptes_none          511
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 8.8 (Ootpa)

hpe-foundation-release HPE Foundation Software 2.5.0, Build 750.0880.240110T0100.a.rhel88hpe-240110T0100

redhat-release Red Hat Enterprise Linux release 8.8 (Ootpa)

system-release Red Hat Enterprise Linux release 8.8 (Ootpa)

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

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(Test Sponsor: HPE)

HPE Compute Scale-up Server 3200

(1.90 GHz, Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base = 6940

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

Platform Notes (Continued)

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
mmio_stale_data	Not affected
retbleed	Not affected
spec_store_bypass	Mitigation: Speculative Store Bypass disabled via prctl
spectre_v1	Mitigation: usercopy/swapgs barriers and __user pointer sanitization
spectre_v2	Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling, PBRSE-eIBRS: SW sequence
srbsds	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: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p4 xfs 2.3T 499G 1.8T 22% /

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

Vendor: HPE
Product: Compute Scale-up Server 3200
Product Family: 1590PID03030201
Serial: 5UF2491412-000

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:
63x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
65x Samsung M321R8GA0BB0-CQKZH 64 GB 2 rank 4800

24. 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)

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

(Continued on next page)



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Tested by: HPE

Test Date: Jan-2024

Hardware Availability: Dec-2023

Software Availability: Dec-2023

Compiler Version Notes (Continued)

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

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

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Software Availability: Dec-2023

Base Compiler Invocation (Continued)

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

```

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

```

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Tested by: HPE

Test Date: Jan-2024

Hardware Availability: Dec-2023

Software Availability: Dec-2023

Base Optimization Flags (Continued)

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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