



# SPEC CPU®2017 Floating Point Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

### ProLiant DL560 Gen11

(3.70 GHz, Intel Xeon Gold 6434H)

## SPECrate®2017\_fp\_base = 564

## SPECrate®2017\_fp\_peak = 573

CPU2017 License: 3

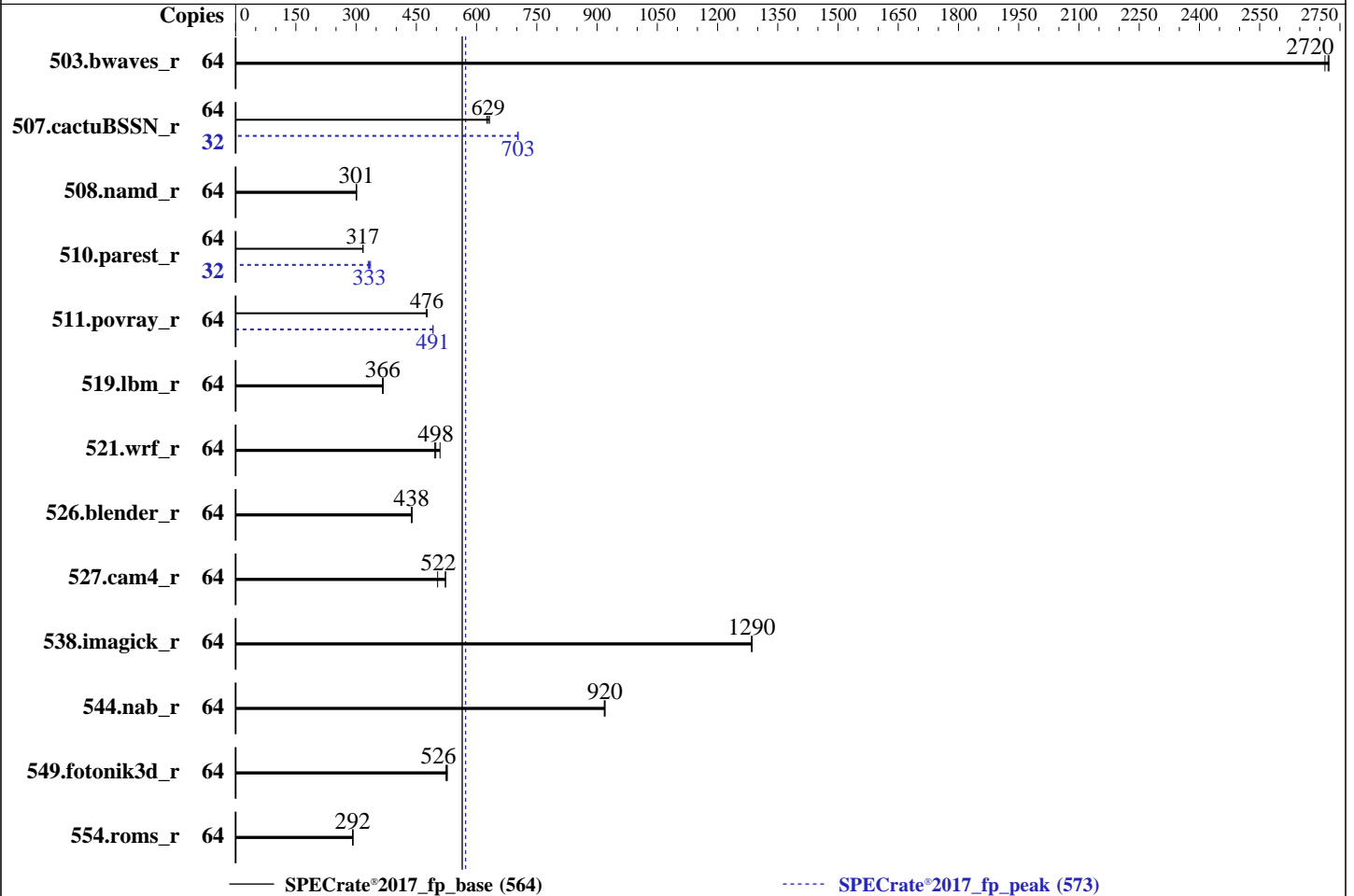
Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: May-2023

Software Availability: Dec-2022



### Hardware

CPU Name: Intel Xeon Gold 6434H  
 Max MHz: 4100  
 Nominal: 3700  
 Enabled: 32 cores, 4 chips, 2 threads/core  
 Orderable: 1, 2, 4 chip(s)  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 2 MB I+D on chip per core  
 L3: 22.5 MB I+D on chip per chip  
 Other: None  
 Memory: 1 TB (32 x 32 GB 2Rx8 PC5-4800B-R)  
 Storage: 1 x 480 GB SATA SSD  
 Other: None

### Software

OS: Ubuntu 22.04.1 LTS  
 Kernel 5.15.0-43-generic  
 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: No  
 Firmware: HPE BIOS Version v1.30 03/01/2023 released Mar-2023  
 File System: ext4  
 System State: Run level 5 (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	64	<u>236</u>	<u>2720</u>	236	2720	237	2710	64	<u>236</u>	<u>2720</u>	236	2720	237	2710
507.cactuBSSN_r	64	128	632	130	625	<u>129</u>	<u>629</u>	32	<u>57.6</u>	<u>703</u>	57.7	702	57.6	703
508.namd_r	64	202	301	203	300	<u>202</u>	<u>301</u>	64	202	301	203	300	<u>202</u>	<u>301</u>
510.parest_r	64	<u>528</u>	<u>317</u>	528	317	528	317	32	254	330	249	336	<u>251</u>	<u>333</u>
511.povray_r	64	<u>314</u>	<u>476</u>	315	475	314	477	64	304	491	304	492	<u>304</u>	<u>491</u>
519.lbm_r	64	184	366	<u>184</u>	<u>366</u>	184	367	64	184	366	<u>184</u>	<u>366</u>	184	367
521.wrf_r	64	289	496	<u>288</u>	<u>498</u>	282	509	64	289	496	<u>288</u>	<u>498</u>	282	509
526.blender_r	64	<u>222</u>	<u>438</u>	222	440	223	437	64	<u>222</u>	<u>438</u>	222	440	223	437
527.cam4_r	64	214	523	<u>214</u>	<u>522</u>	223	503	64	214	523	<u>214</u>	<u>522</u>	223	503
538.imagick_r	64	<u>124</u>	<u>1290</u>	124	1290	124	1290	64	<u>124</u>	<u>1290</u>	124	1290	124	1290
544.nab_r	64	<u>117</u>	<u>920</u>	117	920	117	918	64	<u>117</u>	<u>920</u>	117	920	117	918
549.fotonik3d_r	64	<u>475</u>	<u>526</u>	476	524	473	527	64	<u>475</u>	<u>526</u>	476	524	473	527
554.roms_r	64	<u>349</u>	<u>292</u>	348	292	349	291	64	<u>349</u>	<u>292</u>	348	292	349	291

SPECrate®2017\_fp\_base = **564**

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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>
IRQ balance service was stopped using "systemctl stop irqbalance.service"
tuned-adm profile was set to Throughput-Performance using "tuned-adm profile throughput-performance"
perf-bias for all the CPUs is set using "cpupower set -b 0"
```

## 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"  
MALLOCONF = "retain:true"



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## 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.

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 0x2b0001b0 for the Intel Xeon Gold 6434H Processor

BIOS Configuration

Workload Profile set to General Throughput Compute

Memory Patrol Scrubbing set to Disabled

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

Enhanced Processor Performance Profile set to Aggressive

Thermal Configuration set to Maximum Cooling

Workload Profile set to Custom

Adjacent Sector Prefetch set to Disabled

DCU Stream Prefetcher set to Disabled

Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on admin1 Thu May 11 09:35:26 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 249 (249.11-0ubuntu3.4)
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. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode

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## Platform Notes (Continued)

24. BIOS

1. uname -a  
Linux admin1 5.15.0-43-generic #46-Ubuntu SMP Tue Jul 12 10:30:17 UTC 2022 x86\_64 x86\_64 x86\_64 GNU/Linux

2. w  
09:35:26 up 11 min, 3 users, load average: 0.11, 0.04, 0.01  
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT  
admin1 tty1 - 27Jun22 317days 0.04s 0.00s -bash  
admin1 pts/0 172.16.0.100 27Jun22 317days 0.03s 0.01s sshd: admin1 [priv]  
admin1 pts/1 172.16.0.100 27Jun22 14.00s 0.86s 0.03s sudo -i

3. Username  
From environment variable \$USER: root  
From the command 'logname': admin1

4. ulimit -a  
time(seconds) unlimited  
file(blocks) unlimited  
data(kbytes) unlimited  
stack(kbytes) unlimited  
coredump(blocks) 0  
memory(kbytes) unlimited  
locked memory(kbytes) 132060700  
process 4126458  
nofiles 1024  
vmemory(kbytes) unlimited  
locks unlimited  
rtprio 0

5. sysinfo process ancestry  
/sbin/init  
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups  
sshd: admin1 [priv]  
sshd: admin1@pts/0  
-bash  
sudo -i  
sudo -i  
-bash  
-bash  
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 -c  
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=32 --define physicalfirst  
--define invoke\_with\_interleave --define drop\_caches --tune base,peak -o all fprate  
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 --configfile  
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=32 --define physicalfirst  
--define invoke\_with\_interleave --define drop\_caches --tune base,peak --output\_format all --nopower  
--runmode rate --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile  
\$SPEC/tmp/CPU2017.009/templogs/preenv.fprate.009.0.log --lognum 009.0 --from\_runcpu 2  
specperl \$SPEC/bin/sysinfo  
\$SPEC = /home/cpu2017

6. /proc/cpuinfo  
model name : Intel(R) Xeon(R) Gold 6434H

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## Platform Notes (Continued)

```

vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping      : 7
microcode     : 0x2b0001b0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores     : 8
siblings      : 16
4 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-7
physical id 1: core ids 0-7
physical id 2: core ids 0-7
physical id 3: core ids 0-7
physical id 0: apicids 0-15
physical id 1: apicids 128-143
physical id 2: apicids 256-271
physical id 3: apicids 384-399

```

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 2.37.2:

```

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):                64
On-line CPU(s) list:  0-63
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Gold 6434H
CPU family:            6
Model:                143
Thread(s) per core:   2
Core(s) per socket:   8
Socket(s):             4
Stepping:              7
BogoMIPS:              7400.00
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
                        vnmi 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
                        cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
                        arch_lbr amx_bf16 avx512_fp16 amx_tile amx_int8 flush_lld
                        arch_capabilities
Virtualization:        VT-x
Lld cache:             1.5 MiB (32 instances)

```

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## Platform Notes (Continued)

```

L1i cache:          1 MiB (32 instances)
L2 cache:           64 MiB (32 instances)
L3 cache:           90 MiB (4 instances)
NUMA node(s):       8
NUMA node0 CPU(s): 0-3,32-35
NUMA node1 CPU(s): 4-7,36-39
NUMA node2 CPU(s): 8-11,40-43
NUMA node3 CPU(s): 12-15,44-47
NUMA node4 CPU(s): 16-19,48-51
NUMA node5 CPU(s): 20-23,52-55
NUMA node6 CPU(s): 24-27,56-59
NUMA node7 CPU(s): 28-31,60-63
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf:      Not affected
Vulnerability Mds:       Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
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	1.5M	12	Data	1	64	1	64
L1i	32K	1M	8	Instruction	1	64	1	64
L2	2M	64M	16	Unified	2	2048	1	64
L3	22.5M	90M	15	Unified	3	24576	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: 0-3,32-35
node 0 size: 128608 MB
node 0 free: 128355 MB
node 1 cpus: 4-7,36-39
node 1 size: 129021 MB
node 1 free: 128779 MB
node 2 cpus: 8-11,40-43
node 2 size: 129021 MB
node 2 free: 128807 MB
node 3 cpus: 12-15,44-47
node 3 size: 128988 MB
node 3 free: 128768 MB
node 4 cpus: 16-19,48-51
node 4 size: 129021 MB
node 4 free: 128748 MB
node 5 cpus: 20-23,52-55
node 5 size: 129021 MB
node 5 free: 128670 MB
node 6 cpus: 24-27,56-59
node 6 size: 129021 MB
node 6 free: 128758 MB
node 7 cpus: 28-31,60-63
node 7 size: 129017 MB
node 7 free: 128684 MB
node distances:
node  0  1  2  3  4  5  6  7

```

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## Platform Notes (Continued)

0:	10	20	30	30	30	30	30	30
1:	20	10	30	30	30	30	30	30
2:	30	30	10	20	30	30	30	30
3:	30	30	20	10	30	30	30	30
4:	30	30	30	30	10	20	30	30
5:	30	30	30	30	20	10	30	30
6:	30	30	30	30	30	30	10	20
7:	30	30	30	30	30	30	20	10

```
9. /proc/meminfo
   MemTotal:      1056485628 kB
```

```
10. who -r
    run-level 5 Jun 27 18:30
```

```
11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.4)
    Default Target   Status
    graphical        degraded
```

```
12. Failed units, from systemctl list-units --state=failed
    UNIT                                LOAD    ACTIVE SUB    DESCRIPTION
    * systemd-networkd-wait-online.service loaded failed failed Wait for Network to be Configured
```

```
13. Services, from systemctl list-unit-files
    STATE      UNIT FILES
    enabled    ModemManager apparmor blk-availability cloud-config cloud-final cloud-init
    cloud-init-local console-setup cron dmesg e2scrub_reap finalrd getty@ gpu-manager
    grub-common grub-initrd-fallback irqbalance keyboard-setup lvm2-monitor lxd-agent
    multipathd networkd-dispatcher open-iscsi open-vm-tools pollinate rsyslog secureboot-db
    setvtrgb snapd ssh systemd-networkd systemd-networkd-wait-online systemd-pstore
    systemd-resolved systemd-timesyncd thermald tuned ua-reboot-cmds ubuntu-advantage udisks2
    ufw unattended-upgrades vgauth
    enabled-runtime netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
    disabled      console-getty debug-shell iscsid nftables powertop rsync serial-getty@
    systemd-boot-check-no-failures systemd-network-generator systemd-sysext
    systemd-time-wait-sync upower
    generated     apport
    indirect      uidd
    masked        cryptdisks cryptdisks-early hwclock lvm2 multipath-tools-boot rc rcS screen-cleanup sudo
    x11-common
```

```
14. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/vmlinuz-5.15.0-43-generic
    root=/dev/mapper/ubuntu--vg-ubuntu--lv
    ro
```

```
15. 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)

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

17. 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	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+madvise	[madvise]	never
enabled	always	[madvise]		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_shared	256
max_ptes_swap	64
pages_to_scan	4096
scan_sleep_millisecs	10000

-----

20. OS release

```
From /etc/*-release /etc/*-version
os-release Ubuntu 22.04.1 LTS
```

-----

21. Disk information

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv	ext4	437G	213G	206G	51%	/

-----

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

Vendor:	HPE
Product:	ProLiant DL560 Gen11
Product Family:	ProLiant
Serial:	CNX22605RZ

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## Platform Notes (Continued)

### 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:

28x Hynix HMC88AEBRA168N 32 GB 2 rank 4800  
3x Hynix HMC88MEBRA113N 32 GB 2 rank 4800  
1x Hynix HMC88MEBRA115N 32 GB 2 rank 4800  
32x UNKNOWN NOT AVAILABLE

### 24. BIOS

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

BIOS Vendor: HPE  
BIOS Version: 1.30  
BIOS Date: 03/01/2023  
BIOS Revision: 1.30  
Firmware Revision: 1.20

## 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 2023.0.0 Build 20221201  
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=====  
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 2023.0.0 Build 20221201  
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=====  
C++, C | 511.povray\_r(base, peak) 526.blender\_r(base, peak)  
=====

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

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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201  
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# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant DL560 Gen11

(3.70 GHz, Intel Xeon Gold 6434H)

SPECrate®2017\_fp\_base = 564

SPECrate®2017\_fp\_peak = 573

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

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

## Compiler Version Notes (Continued)

-----  
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 2023.0.0 Build 20221201  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.  
-----

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

## 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  
521.wrf\_r: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian  
526.blender\_r: -DSPEC\_LP64 -DSPEC\_LINUX -funsigned-char

(Continued on next page)



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**Software Availability:** Dec-2022

## Base Portability Flags (Continued)

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
```

### 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
```



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SPECrate®2017\_fp\_base = 564

SPECrate®2017\_fp\_peak = 573

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** May-2023

**Hardware Availability:** May-2023

**Software Availability:** Dec-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: basepeak = yes

C++ benchmarks:

508.namd\_r: basepeak = yes

510.parest\_r: -w -std=c++14 -m64 -Wl,-z,muldefs -xsapfirerapids  
-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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**Tested by:** HPE

**Test Date:** May-2023

**Hardware Availability:** May-2023

**Software Availability:** Dec-2022

## Peak Optimization Flags (Continued)

Fortran benchmarks:

503.bwaves\_r: basepeak = yes

549.fotonik3d\_r: basepeak = yes

554.roms\_r: basepeak = yes

Benchmarks using both Fortran and C:

521.wrf\_r: basepeak = yes

527.cam4\_r: basepeak = yes

Benchmarks using both C and C++:

```
511.povray_r: -w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs
-fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xCORE-AVX512 -ffast-math -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
```

526.blender\_r: basepeak = yes

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/HPE-Platform-Flags-Intel-SPR-rev1.2.html>

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html>

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

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SPR-rev1.2.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml>



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**Hardware Availability:** May-2023

**Software Availability:** Dec-2022

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