



SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL560 Gen11

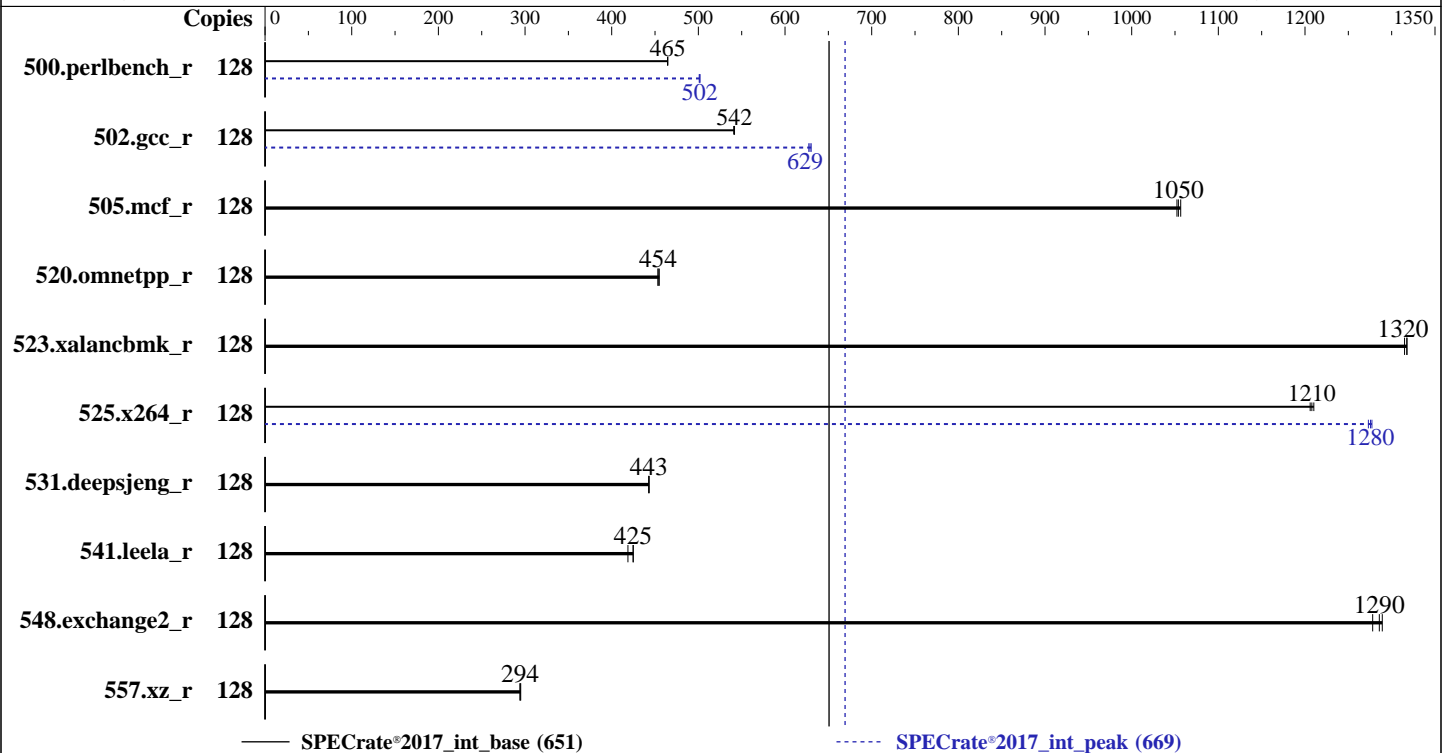
(2.90 GHz, Intel Xeon Platinum 8444H)

SPECrate®2017_int_base = 651

SPECrate®2017_int_peak = 669

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 Platinum 8444H
Max MHz: 4000
Nominal: 2900
Enabled: 64 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: 45 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: 32/64-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
500.perlbench_r	128	439	465	439	465	439	464	128	406	502	407	501	406	502
502.gcc_r	128	335	541	335	542	335	542	128	288	629	289	627	288	630
505.mcf_r	128	196	1050	197	1050	196	1060	128	196	1050	197	1050	196	1060
520.omnetpp_r	128	370	454	369	455	370	453	128	370	454	369	455	370	453
523.xalancbmk_r	128	103	1320	103	1310	103	1320	128	103	1320	103	1310	103	1320
525.x264_r	128	186	1210	186	1210	185	1210	128	176	1280	175	1280	176	1270
531.deepsjeng_r	128	331	443	331	443	331	443	128	331	443	331	443	331	443
541.leela_r	128	499	425	506	419	499	425	128	499	425	506	419	499	425
548.exchange2_r	128	260	1290	261	1290	262	1280	128	260	1290	261	1290	262	1280
557.xz_r	128	469	295	470	294	470	294	128	469	295	470	294	470	294

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

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 Accelerator-Performance using "tuned-adm profile accelerator-performance"
perf-bias for all the CPUs is set using "cpupower set -b 0"



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Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/lib/ia32:/home/cpu2017/je5.0.1-32"
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.
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 Platinum 8444H 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
Intel UPI Link Power Management set to Enabled
Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State
The reported date by sysinfo is incorrect due to computer clock being not set correctly.
The correct test date is: May-2023

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on admin1 Mon Jun 27 18:38:17 2022

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

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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

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Platform Notes (Continued)

- 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
- 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
18:38:17 up 9 min, 3 users, load average: 0.00, 0.02, 0.00
USER      TTY      FROM          LOGIN@      IDLE        JCPU      PCPU      WHAT
admin1    tty1    -              18:35       3:02       0.03s     0.00s    -bash
admin1    pts/0   172.16.0.100  18:36       1:53       0.05s     0.01s    sshd: admin1 [priv]
admin1    pts/1   172.16.0.100  18:36       9.00s     0.92s     0.04s    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) 132058320
process            4126384
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=128 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak -o all intrate
```

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```
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
--runmode rate --tune base:peak --size refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.007/templogs/preenv.intrate.007.0.log --lognum 007.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017
```

6. /proc/cpuinfo

```
model name      : Intel(R) Xeon(R) Platinum 8444H
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping       : 6
microcode      : 0x2b0001b0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores      : 16
siblings       : 32
4 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-15
physical id 1: core ids 0-15
physical id 2: core ids 0-15
physical id 3: core ids 0-15
physical id 0: apicids 0-31
physical id 1: apicids 128-159
physical id 2: apicids 256-287
physical id 3: apicids 384-415
```

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): 128
On-line CPU(s) list: 0-127
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8444H
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 4
Stepping: 6
BogoMIPS: 5800.00
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
```

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Platform Notes (Continued)

```
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
L1d cache: 3 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 128 MiB (64 instances)
L3 cache: 180 MiB (4 instances)
NUMA node(s): 16
NUMA node0 CPU(s): 0-3,64-67
NUMA node1 CPU(s): 4-7,68-71
NUMA node2 CPU(s): 8-11,72-75
NUMA node3 CPU(s): 12-15,76-79
NUMA node4 CPU(s): 16-19,80-83
NUMA node5 CPU(s): 20-23,84-87
NUMA node6 CPU(s): 24-27,88-91
NUMA node7 CPU(s): 28-31,92-95
NUMA node8 CPU(s): 32-35,96-99
NUMA node9 CPU(s): 36-39,100-103
NUMA node10 CPU(s): 40-43,104-107
NUMA node11 CPU(s): 44-47,108-111
NUMA node12 CPU(s): 48-51,112-115
NUMA node13 CPU(s): 52-55,116-119
NUMA node14 CPU(s): 56-59,120-123
NUMA node15 CPU(s): 60-63,124-127
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: 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 3M 12 Data 1 64 1 64
L1i 32K 2M 8 Instruction 1 64 1 64
L2 2M 128M 16 Unified 2 2048 1 64
L3 45M 180M 15 Unified 3 49152 1 64
```

```
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 16 nodes (0-15)
node 0 cpus: 0-3,64-67
node 0 size: 64096 MB
node 0 free: 63831 MB
node 1 cpus: 4-7,68-71
node 1 size: 64509 MB
node 1 free: 64340 MB
node 2 cpus: 8-11,72-75
```

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```

node 2 size: 64509 MB
node 2 free: 64329 MB
node 3 cpus: 12-15,76-79
node 3 size: 64509 MB
node 3 free: 64270 MB
node 4 cpus: 16-19,80-83
node 4 size: 64509 MB
node 4 free: 64362 MB
node 5 cpus: 20-23,84-87
node 5 size: 64509 MB
node 5 free: 64373 MB
node 6 cpus: 24-27,88-91
node 6 size: 64509 MB
node 6 free: 64356 MB
node 7 cpus: 28-31,92-95
node 7 size: 64509 MB
node 7 free: 64373 MB
node 8 cpus: 32-35,96-99
node 8 size: 64476 MB
node 8 free: 64315 MB
node 9 cpus: 36-39,100-103
node 9 size: 64509 MB
node 9 free: 64320 MB
node 10 cpus: 40-43,104-107
node 10 size: 64509 MB
node 10 free: 64379 MB
node 11 cpus: 44-47,108-111
node 11 size: 64509 MB
node 11 free: 64328 MB
node 12 cpus: 48-51,112-115
node 12 size: 64509 MB
node 12 free: 64316 MB
node 13 cpus: 52-55,116-119
node 13 size: 64509 MB
node 13 free: 64331 MB
node 14 cpus: 56-59,120-123
node 14 size: 64509 MB
node 14 free: 64316 MB
node 15 cpus: 60-63,124-127
node 15 size: 64503 MB
node 15 free: 64250 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
0:  10 20 30 30 30 30 30 30 30 30 30 30 30 30 30 30
1:  20 10 30 30 30 30 30 30 30 30 30 30 30 30 30 30
2:  30 30 10 20 30 30 30 30 30 30 30 30 30 30 30 30
3:  30 30 20 10 30 30 30 30 30 30 30 30 30 30 30 30
4:  30 30 30 30 10 20 30 30 30 30 30 30 30 30 30 30
5:  30 30 30 30 20 10 30 30 30 30 30 30 30 30 30 30
6:  30 30 30 30 30 30 10 20 30 30 30 30 30 30 30 30
7:  30 30 30 30 30 30 20 10 30 30 30 30 30 30 30 30
8:  30 30 30 30 30 30 30 30 10 20 30 30 30 30 30 30
9:  30 30 30 30 30 30 30 30 20 10 30 30 30 30 30 30
10: 30 30 30 30 30 30 30 30 30 30 10 20 30 30 30 30
11: 30 30 30 30 30 30 30 30 30 30 20 10 30 30 30 30
12: 30 30 30 30 30 30 30 30 30 30 30 30 10 20 30 30
13: 30 30 30 30 30 30 30 30 30 30 30 30 20 10 30 30
14: 30 30 30 30 30 30 30 30 30 30 30 30 30 30 10 20
15: 30 30 30 30 30 30 30 30 30 30 30 30 30 20 10

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Platform Notes (Continued)

9. /proc/meminfo

MemTotal: 1056466568 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	uuid
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

16. tuned-adm active

Current active profile: accelerator-performance

17. sysctl

kernel.numa_balancing	1
kernel.randomize_va_space	2
vm.compaction_proactiveness	20

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```

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_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  210G  209G  51% /

```

```

-----
22. /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL560 Gen11
Product Family: ProLiant
Serial:          CNX22605RZ

```

```

-----
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

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(2.90 GHz, Intel Xeon Platinum 8444H)

SPECrate®2017_int_base = 651

SPECrate®2017_int_peak = 669

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: May-2023

Hardware Availability: May-2023

Software Availability: Dec-2022

Platform Notes (Continued)

3x Hynix HMC888MEBRA113N 32 GB 2 rank 4800
1x Hynix HMC888MEBRA115N 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 | 502.gcc_r(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
| 557.xz_r(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

C | 502.gcc_r(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.0.0 Build 20221201
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C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
| 557.xz_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++ | 520.omnetpp_r(base, peak) 523.xalancbnk_r(base, peak) 531.deepsjeng_r(base, peak)
| 541.leela_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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Fortran | 548.exchange2_r(base, peak)

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

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Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

502.gcc_r: -DSPEC_LP64

505.mcf_r: -DSPEC_LP64

520.omnetpp_r: -DSPEC_LP64

523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX

525.x264_r: -DSPEC_LP64

531.deepsjeng_r: -DSPEC_LP64

541.leela_r: -DSPEC_LP64

548.exchange2_r: -DSPEC_LP64

557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math

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

-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin

-lqkmalloc

C++ benchmarks:

-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math

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

-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin

-lqkmalloc

Fortran benchmarks:

-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto

(Continued on next page)



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Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmallocc
```

Peak Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Peak Portability Flags

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -w -std=c11 -m64 -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
-fno-strict-overflow
```

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Peak Optimization Flags (Continued)

500.perlbench_r (continued):

```
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin  
-lqkmallo
```

502.gcc_r: -m32

```
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/ia32_lin  
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)  
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)  
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse  
-funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc
```

505.mcf_r: basepeak = yes

```
525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast  
-ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -fno-alias  
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin  
-lqkmallo
```

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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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