



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

Synergy 480 Gen10 Plus

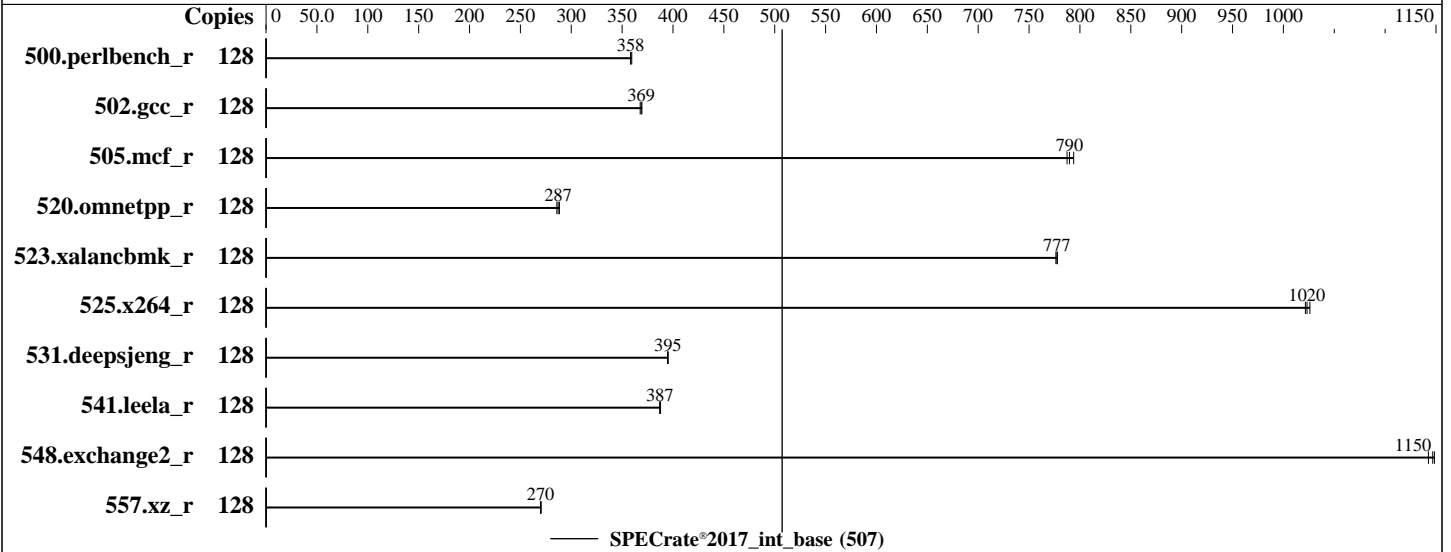
(2.60 GHz, Intel Xeon Platinum 8358)

SPECrate®2017\_int\_base = 507

SPECrate®2017\_int\_peak = Not Run

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

Test Date: Jan-2023  
Hardware Availability: Sep-2022  
Software Availability: Nov-2022



## Hardware

CPU Name: Intel Xeon Platinum 8358  
Max MHz: 3400  
Nominal: 2600  
Enabled: 64 cores, 2 chips, 2 threads/core  
Orderable: 1, 2 chip(s)  
Cache L1: 32 KB I + 48 KB D on chip per core  
L2: 1.25 MB I+D on chip per core  
L3: 48 MB I+D on chip per chip  
Other: None  
Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R)  
Storage: 1 x 960 GB SATA SSD  
Other: None

## Software

OS: Red Hat Enterprise Linux 9.1 (Plow)  
Kernel 5.14.0-162.6.1.el9\_1.x86\_64  
Compiler: C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;  
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;  
Parallel: No  
Firmware: HPE BIOS Version v1.66 09/19/2022 released Sep-2022  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: Not Applicable  
Other: None  
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	567	359	<b><u>569</u></b>	<b><u>358</u></b>	569	358							
502.gcc_r	128	491	369	<b><u>491</u></b>	<b><u>369</u></b>	493	368							
505.mcf_r	128	<b><u>262</u></b>	<b><u>790</u></b>	261	794	263	787							
520.omnetpp_r	128	582	288	588	286	<b><u>585</u></b>	<b><u>287</u></b>							
523.xalancbmk_r	128	174	778	174	776	<b><u>174</u></b>	<b><u>777</u></b>							
525.x264_r	128	218	1030	219	1020	<b><u>219</u></b>	<b><u>1020</u></b>							
531.deepsjeng_r	128	372	395	<b><u>371</u></b>	<b><u>395</u></b>	371	395							
541.leela_r	128	548	387	547	388	<b><u>548</u></b>	<b><u>387</u></b>							
548.exchange2_r	128	292	1150	294	1140	<b><u>292</u></b>	<b><u>1150</u></b>							
557.xz_r	128	512	270	511	270	<b><u>512</u></b>	<b><u>270</u></b>							

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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](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>



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## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

LD\_LIBRARY\_PATH = "/cpu2017/lib/intel64:/cpu2017/lib/ia32:/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.

## Platform Notes

The system ROM used for this result contains Intel microcode version 0xd000375 for the Intel Xeon Platinum 8362 processor.

BIOS Configuration:

Workload Profile set to General Throughput Compute  
Advanced Memory Protection set to Advanced ECC  
Memory Patrol Scrubbing set to Disabled  
Last Level Cache (LLC) Dead Line Allocation set to Disabled  
Intel UPI Link Enablement set to Single Link Operation  
Intel UPI Link Frequency set to Min UPI Speed  
Direct To UPI (D2K) set to Disabled  
Enhanced Processor Performance set to Enabled  
XPT Remote Prefetcher set to Enabled  
Thermal Configuration set to Maximum Cooling  
Workload Profile set to Custom  
Energy Efficient Turbo set to Enabled  
Adjacent Sector Prefetch set to Disabled  
DCU Stream Prefetcher set to Disabled  
Intel UPI Link Power Management set to Enabled

Sysinfo program /cpu2017/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on sy480 Tue Jan 17 17:15:12 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

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## Platform Notes (Continued)

```

9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 250 (250-12.e19_1)
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. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS

```

```

-----
1. uname -a
Linux sy480 5.14.0-162.6.1.e19_1.x86_64 #1 SMP PREEMPT_DYNAMIC Fri Sep 30 07:36:03 EDT 2022 x86_64 x86_64
x86_64 GNU/Linux

```

```

-----
2. w
17:15:12 up 1 min,  1 user,  load average: 0.18, 0.08, 0.03
USER      TTY      LOGIN@  IDLE   JCPU   PCPU   WHAT
root     pts/0    17:14   8.00s  1.18s  0.00s  -bash

```

```

-----
3. Username
From environment variable $USER:  root

```

```

-----
4. ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size              (blocks, -c) 0
data seg size                (kbytes, -d) unlimited
scheduling priority         (-e) 0
file size                    (blocks, -f) unlimited
pending signals              (-i) 8255540
max locked memory            (kbytes, -l) 64
max memory size              (kbytes, -m) unlimited
open files                   (-n) 1024
pipe size                    (512 bytes, -p) 8
POSIX message queues         (bytes, -q) 819200
real-time priority           (-r) 0
stack size                   (kbytes, -s) unlimited
cpu time                     (seconds, -t) unlimited
max user processes           (-u) 8255540
virtual memory                (kbytes, -v) unlimited
file locks                   (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@pts/0
-bash
-bash

```

(Continued on next page)



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## Platform Notes (Continued)

```

runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c
ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
ic2022.1-lin-core-avx512-rate-20220316.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.006/templogs/preenv.intrate.006.0.log --lognum 006.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /cpu2017

```

```

6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
vendor_id      : GenuineIntel
cpu family     : 6
model          : 106
stepping       : 6
microcode      : 0xd000375
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs mmio_stale_data eibrs_pbrsb
cpu cores      : 32
siblings       : 64
2 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31
physical id 0: apicids 0-63
physical id 1: apicids 128-191

```

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 2.37.4:

```

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
BIOS Vendor ID:       Intel(R) Corporation
Model name:            Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
BIOS Model name:      Intel(R) Xeon(R) Platinum 8358 CPU @ 2.60GHz
CPU family:            6
Model:                 106
Thread(s) per core:    2
Core(s) per socket:    32
Socket(s):             2
Stepping:              6
BogoMIPS:              5200.00
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 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 invpcid_single ssbd mba ibrs ibpb
stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase

```

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## Platform Notes (Continued)

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 wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku ospke avx512\_vbmi2 gfni vaes vpclmulqdq avx512\_vnni avx512\_bitalg tme avx512\_vpopcntdq la57 rdpid fsrm md\_clear pconfig flush\_lld arch\_capabilities

Virtualization:	VT-x
L1d cache:	3 MiB (64 instances)
L1i cache:	2 MiB (64 instances)
L2 cache:	80 MiB (64 instances)
L3 cache:	96 MiB (2 instances)
NUMA node(s):	4
NUMA node0 CPU(s):	0-15,64-79
NUMA node1 CPU(s):	16-31,80-95
NUMA node2 CPU(s):	32-47,96-111
NUMA node3 CPU(s):	48-63,112-127
Vulnerability Itlb multihit:	Not affected
Vulnerability Lltf:	Not affected
Vulnerability Mds:	Not affected
Vulnerability Meltdown:	Not affected
Vulnerability Mmio stale data:	Mitigation; Clear CPU buffers; SMT vulnerable
Vulnerability Retbleed:	Not affected
Vulnerability Spec store bypass:	Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1:	Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2:	Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSE-eIBRS SW sequence
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	1.3M	80M	20	Unified	2	1024	1	64
L3	48M	96M	12	Unified	3	65536	1	64

8. numactl --hardware

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

```

available: 4 nodes (0-3)
node 0 cpus: 0-15,64-79
node 0 size: 515714 MB
node 0 free: 514695 MB
node 1 cpus: 16-31,80-95
node 1 size: 516088 MB
node 1 free: 514764 MB
node 2 cpus: 32-47,96-111
node 2 size: 516050 MB
node 2 free: 515220 MB
node 3 cpus: 48-63,112-127
node 3 size: 516075 MB
node 3 free: 515205 MB
node distances:
node  0  1  2  3
0:  10  20  30  30
1:  20  10  30  30
2:  30  30  10  20
3:  30  30  20  10

```

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## Platform Notes (Continued)

9. /proc/meminfo

MemTotal: 2113463336 kB

10. who -r

run-level 3 Jan 17 17:14

11. Systemd service manager version: systemd 250 (250-12.el9\_1)

Default Target Status  
multi-user running

12. Services, from systemctl list-unit-files

STATE	UNIT FILES
enabled	NetworkManager NetworkManager-dispatcher NetworkManager-wait-online atd auditd bluetooth chronyd crond dbus-broker firewalld getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragemgmt lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname nvme-fc-boot-connections rhsmcertd rsyslog selinux-autorelabel-mark smartd sshd sssd systemd-network-generator tuned udisks2
enabled-runtime	systemd-remount-fs
disabled	arp-ethers blk-availability chrony-wait cni-dhcp console-getty cpupower debug-shell iprdump iprprint iprupdate iscsid iscsiuiop kpatch kvm_stat ledmon man-db-restart-cache-update nftables nvme-f-autoconnect podman podman-auto-update podman-kube@ podman-restart psacct rdisc rhcd rhsm rhsm-facts rpmbd-rebuild serial-getty@ sshd-keygen@ systemd-boot-check-no-failures systemd-pstore systemd-sysext sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
indirect	

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

BOOT\_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-162.6.1.el9\_1.x86\_64  
root=/dev/mapper/rhel-root  
ro  
resume=/dev/mapper/rhel-swap  
rd.lvm.lv=rhel/root  
rd.lvm.lv=rhel/swap  
rhgb  
quiet

14. cpupower frequency-info

analyzing CPU 0:  
Unable to determine current policy  
boost state support:  
Supported: yes  
Active: yes

15. tuned-adm active

Current active profile: throughput-performance

16. 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

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## Platform Notes (Continued)

```

vm.dirty_expire_centisecs      3000
vm.dirty_ratio                  40
vm.dirty_writeback_centisecs   500
vm.dirtytime_expire_seconds    43200
vm.extfrag_threshold           500
vm.min_unmapped_ratio          1
vm.nr_hugepages                 0
vm.nr_hugepages_mempolicy      0
vm.nr_overcommit_hugepages     0
vm.swappiness                   10
vm.watermark_boost_factor      15000
vm.watermark_scale_factor      10
vm.zone_reclaim_mode           0

```

```

-----
17. /sys/kernel/mm/transparent_hugepage
defrag          always defer defer+madvise [madvise] never
enabled         [always] madvise never
hpage_pmd_size 2097152
shmem_enabled   always within_size advise [never] deny force

```

```

-----
18. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleep_millisecs  60000
defrag                  1
max_ptes_none          511
max_ptes_shared        256
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 9.1 (Plow)
redhat-release  Red Hat Enterprise Linux release 9.1 (Plow)
system-release  Red Hat Enterprise Linux release 9.1 (Plow)

```

```

-----
20. Disk information
SPEC is set to: /cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs   70G   34G   37G   48% /

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         Synergy 480 Gen10 Plus
Product Family: Synergy
Serial:          VCGD8AA000

```

```

-----
22. 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:
  32x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

```

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## Platform Notes (Continued)

-----  
23. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor: HPE  
BIOS Version: I44  
BIOS Date: 09/19/2022  
BIOS Revision: 1.66  
Firmware Revision: 2.72

## Compiler Version Notes

=====  
C | 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base) 525.x264\_r(base) 557.xz\_r(base)

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

=====  
C++ | 520.omnetpp\_r(base) 523.xalancbmk\_r(base) 531.deepsjeng\_r(base) 541.leela\_r(base)

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

=====  
Fortran | 548.exchange2\_r(base)

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

## 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

(Continued on next page)



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## Base Portability Flags (Continued)

```

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 -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc

```

C++ benchmarks:

```

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc

```

Fortran benchmarks:

```

-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2022.1.0/linux/compiler/lib/intel64_lin
-lqkmalloc

```

The flags files that were used to format this result can be browsed at

[http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.html)

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-ICX-revJ.html>

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

[http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml)

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-V1.2-ICX-revJ.xml>



# SPEC CPU®2017 Integer Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**Synergy 480 Gen10 Plus**

(2.60 GHz, Intel Xeon Platinum 8358)

**SPECrate®2017\_int\_base = 507**

**SPECrate®2017\_int\_peak = Not Run**

**CPU2017 License:** 3

**Test Sponsor:** HPE

**Tested by:** HPE

**Test Date:** Jan-2023

**Hardware Availability:** Sep-2022

**Software Availability:** Nov-2022

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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