



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2026 Standard Performance Evaluation Corporation

Epsilon IT Sp. z o.o.

SPECrate®2017_int_base = 344

eterio 220 RC3 (2.00 GHz, Intel Xeon Silver 4416+)

SPECrate®2017_int_peak = 350

CPU2017 License: 9081

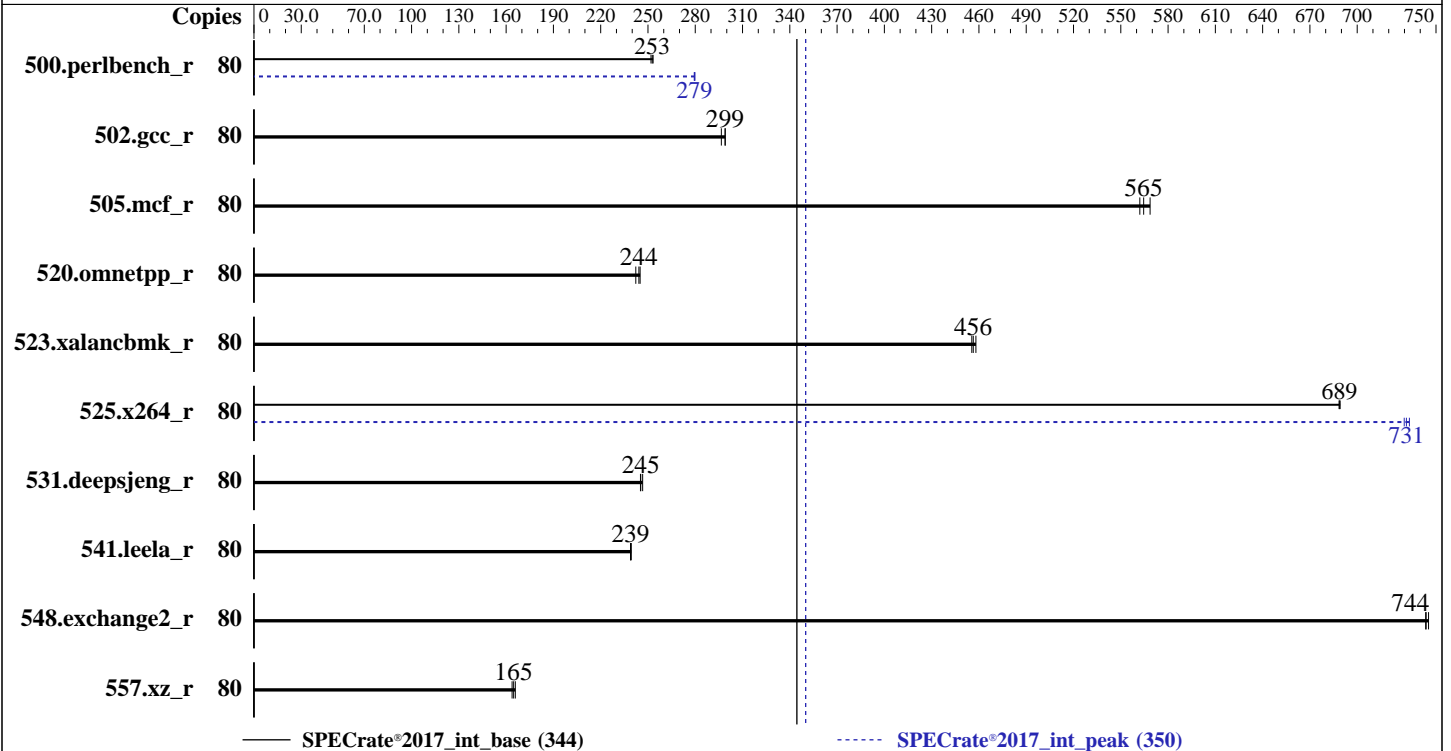
Test Sponsor: Epsilon IT Sp. z o.o.

Tested by: Epsilon IT Sp. z o.o.

Test Date: Mar-2026

Hardware Availability: Dec-2023

Software Availability: Jan-2026



Hardware

CPU Name: Intel Xeon Silver 4416+
 Max MHz: 3900
 Nominal: 2000
 Enabled: 40 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chip(s)
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 37.5 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-6400B-R, running at 4000)
 Storage: 1 x 1.92 TB SATA III SSD
 Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 16.0
 Kernel 6.12.0-160000.9-default x86_64
 Compiler: C/C++: Version 2025.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2025.2 of Intel Fortran Compiler for Linux;
 Parallel: No
 Firmware: BIOS Version 06.09.01 released Aug-2025
 File System: ext4
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 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	80	503	253	504	253	506	252	80	455	280	456	279	456	279
502.gcc_r	80	379	299	382	297	379	299	80	379	299	382	297	379	299
505.mcf_r	80	227	569	229	565	230	562	80	227	569	229	565	230	562
520.omnetpp_r	80	428	245	433	242	430	244	80	428	245	433	242	430	244
523.xalancbmk_r	80	185	455	185	456	184	458	80	185	455	185	456	184	458
525.x264_r	80	203	689	203	689	203	689	80	191	733	192	730	192	731
531.deepsjeng_r	80	374	245	374	245	372	247	80	374	245	374	245	372	247
541.leela_r	80	554	239	554	239	553	239	80	554	239	554	239	553	239
548.exchange2_r	80	281	745	282	744	282	743	80	281	745	282	744	282	743
557.xz_r	80	521	166	524	165	528	164	80	521	166	524	165	528	164

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/cpu2017-1.1.9/lib/intel64:/cpu2017-1.1.9/lib/ia32:/cpu2017-1.1.9/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.



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Platform Notes

Bios settings:

ENERGY_PERF_BIAS_CFG mode = Performance
Patrol Scrub = Disabled
SNC = Enable SNC2 (2-Clusters)
Enable LP [Global] = ALL LPs

BMC Configuration:

Fan mode = Generic mode

Sysinfo program /cpu2017-1.1.9/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on SUT Fri Mar 27 15:38:07 2026

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. Systemd service manager version: systemd 257 (257.10+suse.31.gfb9d92682b)
11. Services, from systemctl list-unit-files
12. Linux kernel boot-time arguments, from /proc/cmdline
13. cpupower frequency-info
14. tuned-adm active
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

```
1. uname -a
Linux SUT 6.12.0-160000.9-default #1 SMP PREEMPT_DYNAMIC Fri Jan 16 09:29:05 UTC 2026 (9badd3c) x86_64
x86_64 x86_64 GNU/Linux
```

```
2. w
15:38:07 up 2 min,  2 users,  load average: 0.42, 0.46, 0.20
USER   TTY      FROM          LOGIN@   IDLE   JCPU   PCPU   WHAT
root   tty1     -             16:36    31.00s 1.23s  0.02s -bash
root   tty2     -             16:36    21.00s 0.02s  0.02s -bash
```

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

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Platform Notes (Continued)

```

4. ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size (blocks, -c) unlimited
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) unlimited
max locked memory (kbytes, -l) unlimited
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) unlimited
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

```

```

5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize=47
login -- root
-bash
-bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=80 -c
ic2025.2-linux64-sapphirerapids-rate-20250605.cfg --define smt-on --define cores=40 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak -o pdf intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=80 --configfile
ic2025.2-linux64-sapphirerapids-rate-20250605.cfg --define smt-on --define cores=40 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak --output_format pdf --nopower
--runmode rate --tune base:peak --size refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /cpu2017-1.1.9

```

```

6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) Silver 4416+
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping       : 8
microcode      : 0x2b000643
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb bhi spectre_v2_user vmscape
cpu cores      : 20
siblings       : 40
2 physical ids (chips)
80 processors (hardware threads)
physical id 0: core ids 0-19
physical id 1: core ids 0-19
physical id 0: apicids 0-39
physical id 1: apicids 128-167
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
virtualized systems. Use the above data carefully.

```

7. lscpu

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Platform Notes (Continued)

From lscpu from util-linux 2.41.1:

```

Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Address sizes:        52 bits physical, 57 bits virtual
Byte Order:           Little Endian
CPU(s):               80
On-line CPU(s) list:  0-79
Vendor ID:            GenuineIntel
Model name:           Intel(R) Xeon(R) Silver 4416+
CPU family:           6
Model:                143
Thread(s) per core:   2
Core(s) per socket:  20
Socket(s):            2
Stepping:             8
CPU(s) scaling MHz:  21%
CPU max MHz:          3900.0000
CPU min MHz:          800.0000
BogoMIPS:             4000.00
Flags:                fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat
pse36 clflush dts acpi mmx fxsr sse2 ss ht tm pbe syscall nx
pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good
nopl xtopology nonstop_tsc cpuid aperfperf tsc_known_freq 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 intel_ppin
cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust
bml 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
user_shstk avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes
vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpid
bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear
serialize tsxldtrk pconfig arch_lbr ibt amx_bf16 avx512_fp16
amx_tile amx_int8 flush_lld arch_capabilities

L1d cache:            1.9 MiB (40 instances)
L1i cache:            1.3 MiB (40 instances)
L2 cache:             80 MiB (40 instances)
L3 cache:             75 MiB (2 instances)
NUMA node(s):         4
NUMA node0 CPU(s):   0-9,40-49
NUMA node1 CPU(s):   10-19,50-59
NUMA node2 CPU(s):   20-29,60-69
NUMA node3 CPU(s):   30-39,70-79
Vulnerability Gather data sampling: Not affected
Vulnerability Indirect target selection: Not affected
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Reg file data sampling: Not affected
Vulnerability Retbleed: Not affected
Vulnerability Spec rstack overflow: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer
sanitization

```

(Continued on next page)



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Platform Notes (Continued)

Vulnerability Spectre v2:	Mitigation; Enhanced / Automatic IBRS; IBPB conditional; PRRSB-eIBRS SW sequence; BHI BHI_DIS_S
Vulnerability Srbds:	Not affected
Vulnerability Tsa:	Not affected
Vulnerability Tsx async abort:	Not affected
Vulnerability Vmscape:	Mitigation; IBPB before exit to userspace

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	1.9M	12	Data	1	64	1	64
L1i	32K	1.3M	8	Instruction	1	64	1	64
L2	2M	80M	16	Unified	2	2048	1	64
L3	37.5M	75M	15	Unified	3	40960	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: 0-9,40-49
node 0 size: 257614 MB
node 0 free: 256788 MB
node 1 cpus: 10-19,50-59
node 1 size: 258040 MB
node 1 free: 257086 MB
node 2 cpus: 20-29,60-69
node 2 size: 258040 MB
node 2 free: 257320 MB
node 3 cpus: 30-39,70-79
node 3 size: 257977 MB
node 3 free: 257466 MB
node distances:
node    0    1    2    3
0:    10   12   21   21
1:    12   10   21   21
2:    21   21   10   12
3:    21   21   12   10

```

9. /proc/meminfo

MemTotal: 1056432976 kB

'who -r' did not return a run level

10. Systemd service manager version: systemd 257 (257.10+suse.31.gfb9d92682b)

```

Default Target Status
multi-user      running

```

11. Services, from systemctl list-unit-files

STATE	UNIT FILES
enabled	NetworkManager NetworkManager-dispatcher NetworkManager-wait-online appstream-sync-cache audit-rules auditd chronyd dbus-broker firewalld getty@ irqbalance issue-generator kbdsettings klog lvm2-monitor rollback rsyslog smartd soft-reboot-cleanup sshd systemd-pstore wpa_supplicant wtmpdb-update-boot
enabled-runtime	systemd-fsck-root systemd-remount-fs
disabled	blk-availability boot-sysctl ca-certificates ca-certificates-setup chrony-wait console-getty containerd debug-shell dnsmasq docker exchange-bmc-os-info gpm grub2-once hwloc-dump-hwdata ipmievd issue-add-ssh-keys jeos-firstboot jeos-firstboot-snapshot kernel-sysctl kexec-load langset lastlog2-import lunmask lvm-devices-import man-db-create

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Platform Notes (Continued)

```

multipathd nftables nis-domainname rpmconfigcheck rsyncd serial-getty@
setup-systemd-proxy-env smartd_generate_opts snmpd snmptrapd
systemd-boot-check-no-failures systemd-confext systemd-network-generator systemd-sysex
systemd-time-wait-sync systemd-timesyncd systemd-udev-load-credentials tuned udisks2
wpa_supplicant@
systemd-userdbd

```

indirect

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

```

BOOT_IMAGE=/boot/vmlinuz-6.12.0-160000.9-default
root=UUID=59f9f04f-e759-4ecc-8e22-28acb39f7f76
mitigations=auto
quiet
security=

```

13. cpupower frequency-info

```

analyzing CPU 63:
  current policy: frequency should be within 800 MHz and 3.90 GHz.
                  The governor "performance" may decide which speed to use
                  within this range.

boost state support:
  Supported: yes
  Active: yes

```

14. tuned-adm active

```

It seems that tuned daemon is not running, preset profile is not activated.
Preset profile: throughput-performance

```

15. 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                  20
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                    60
vm.watermark_boost_factor       15000
vm.watermark_scale_factor       10
vm.zone_reclaim_mode            0

```

16. /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

```

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Platform Notes (Continued)

17. /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

```

18. OS release

```

From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 16.0

```

19. Disk information

SPEC is set to: /cpu2017-1.1.9

```

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 877G 20G 813G 3% /

```

20. /sys/devices/virtual/dmi/id

```

Vendor: Epsilon Sp. z o.o.
Product: eterio 220 RC3
Product Family: Not specified
Serial: 02501356

```

21. dmidecode

Additional information from dmidecode 3.6 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:

16x Samsung M321R8GA0PB2-CCPWF 64 GB 2 rank 6400, configured at 4000

22. BIOS

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

```

BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 06.09.01
BIOS Date: 08/18/2025

```

Compiler Version Notes

```

C | 500.perlbench_r(base, peak) 502.gcc_r(base, peak) 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 2025.2.0 Build 20250605
 Copyright (C) 1985-2025 Intel Corporation. All rights reserved.

```

C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_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 2025.2.0 Build 20250605

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Compiler Version Notes (Continued)

Copyright (C) 1985-2025 Intel Corporation. All rights reserved.

Fortran | 548.exchange2_r(base, peak)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2025.2.0 Build 20250605
Copyright (C) 1985-2025 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
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 -xsaphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/intel-compilers/compiler/2025.2/lib -lqkmalloc

C++ benchmarks:

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

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Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fdelayed-template-parsing
-L/home/specdev/intel-compilers/compiler/2025.2/lib -lqkmalloc
```

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/home/specdev/intel-compilers/compiler/2025.2/lib -lqkmalloc
```

Peak Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -w -std=c11 -m64 -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
-fno-strict-overflow -fno-strict-aliasing
-L/home/specdev/intel-compilers/compiler/2025.2/lib
-lqkmalloc
```

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

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SPECrate®2017_int_base = 344

eterio 220 RC3 (2.00 GHz, Intel Xeon Silver 4416+)

SPECrate®2017_int_peak = 350

CPU2017 License: 9081

Test Sponsor: Epsilon IT Sp. z o.o.

Tested by: Epsilon IT Sp. z o.o.

Test Date: Mar-2026

Hardware Availability: Dec-2023

Software Availability: Jan-2026

Peak Optimization Flags (Continued)

502.gcc_r: basepeak = yes

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/home/specdev/intel-compilers/compiler/2025.2/lib
-lqkmalloc
```

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/Intel-ic2025-official-linux64.html>

<http://www.spec.org/cpu2017/flags/Epsilon-Platform-Flags-RevA-Feb-2026-For-Intel-Processors.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic2025-official-linux64.xml>

<http://www.spec.org/cpu2017/flags/Epsilon-Platform-Flags-RevA-Feb-2026-For-Intel-Processors.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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