



# SPEC CPU®2017 Integer Speed Result

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## Lenovo Global Technology

ThinkSystem SR860 V4  
(2.70 GHz, Intel Xeon 6728P)

SPECspeed®2017\_int\_base = 14.8

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 9017

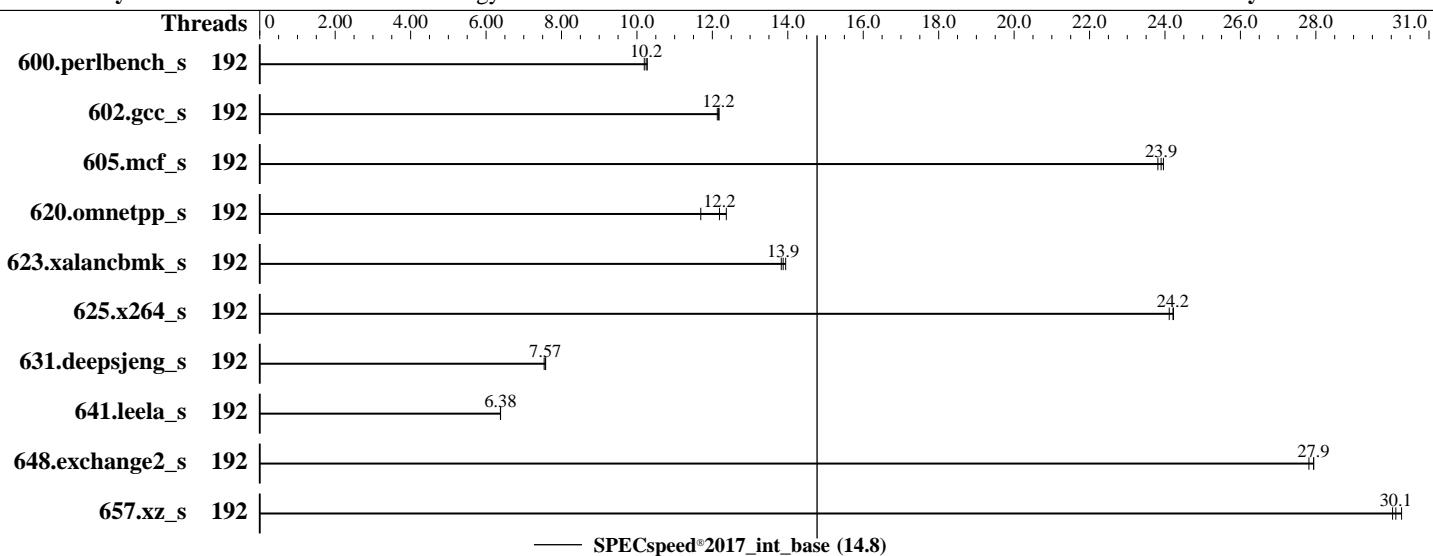
Test Date: Sep-2025

Test Sponsor: Lenovo Global Technology

Hardware Availability: Nov-2025

Tested by: Lenovo Global Technology

Software Availability: Jun-2025



### Hardware

CPU Name: Intel Xeon 6728P  
Max MHz: 4100  
Nominal: 2700  
Enabled: 96 cores, 4 chips, 2 threads/core  
Orderable: 2,4 chips  
Cache L1: 64 KB I + 48 KB D on chip per core  
L2: 2 MB I+D on chip per core  
L3: 144 MB I+D on chip per chip  
Other: None  
Memory: 2 TB (32 x 64 GB 2Rx4 PC5-6400B-R)  
Storage: 1 x 1.92 TB NVME SSD  
Other: CPU Cooling: Air

### Software

OS: SUSE Linux Enterprise Server 15 SP7  
Compiler: Kernel 6.4.0-150700.51-default  
C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;  
Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;  
Parallel: Yes  
Firmware: Lenovo BIOS Version RVE103X 1.10 released Jul-2025  
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  
Power Management: BIOS set to prefer performance at the cost of additional power usage



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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	192	173	10.3	174	10.2	<u>173</u>	<u>10.2</u>							
602.gcc_s	192	<u>327</u>	<u>12.2</u>	327	12.2	328	12.1							
605.mcf_s	192	<u>198</u>	<u>23.9</u>	197	24.0	198	23.8							
620.omnetpp_s	192	<u>134</u>	<u>12.2</u>	139	11.7	132	12.4							
623.xalancbmk_s	192	<u>102</u>	<u>13.9</u>	102	13.8	102	13.9							
625.x264_s	192	72.8	24.2	<u>72.9</u>	<u>24.2</u>	73.2	24.1							
631.deepsjeng_s	192	189	7.58	<u>189</u>	<u>7.57</u>	190	7.54							
641.leela_s	192	<u>267</u>	<u>6.38</u>	267	6.38	267	6.38							
648.exchange2_s	192	<u>105</u>	<u>27.9</u>	105	27.9	106	27.8							
657.xz_s	192	204	30.3	<u>205</u>	<u>30.1</u>	206	30.0							

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

## 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:

```
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-ic2024.1/lib/intel64:/home/cpu2017-1.1.9-ic2024.1/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

## General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM

memory using Redhat Enterprise Linux 8.0

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
```

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>



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## Platform Notes

BIOS configuration:

Workload Profile set to General Computing - Peak Frequency and then set it to Custom  
CPU P-state Control set to Cooperative With Legacy  
Page Policy set to Adaptive

```
Sysinfo program /home/cpu2017-1.1.9-ic2024.1/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Sep 11 23:23:52 2025
```

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 254 (254.24+suse.148.g83b9060b6e)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
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 localhost 6.4.0-150700.51-default #1 SMP PREEMPT_DYNAMIC Wed Apr 30 21:35:43 UTC 2025 (6930611)
x86_64 x86_64 x86_64 GNU/Linux
```

```
2. w
23:23:53 up 3 min, 1 user, load average: 0.11, 0.18, 0.09
USER      TTY      FROM          LOGIN@        IDLE      JCPU      PCPU WHAT
```

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

```
4. ulimit -a
core file size          (blocks, -c) unlimited
data seg size           (kbytes, -d) unlimited
scheduling priority     (-e) 0
file size               (blocks, -f) unlimited
pending signals          (-i) 8255272
max locked memory       (kbytes, -l) 8192
```

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## Platform Notes (Continued)

```
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) 8255272
virtual memory        (kbytes, -v) unlimited
file locks             (-x) unlimited
```

```
-----  
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize=42
sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
sshd: root [priv]
sshd: root@notty
/bin/bash ./02.remote_local_SPECCpu_1.01.sh
sh Run542-compliant-ic2024.1-lin-sapphirerapids-speedint-base-smt-on-20240308.sh
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2024.1-lin-sapphirerapids-speed-20240308.cfg --define cores=96 --tune base -o all --define
  intspeedaffinity --define smt-on --define drop_caches intspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
  ic2024.1-lin-sapphirerapids-speed-20240308.cfg --define cores=96 --tune base --output_format all --define
  intspeedaffinity --define smt-on --define drop_caches --nopower --runmode speed --tune base --size
  refspeed intspeed --nopreenv --note-preenv --logfile
  $SPEC/tmp/CPU2017.628/templogs/preenv.intspeed.628.0.log --lognum 628.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2024.1
```

```
-----  
6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) 6728P
vendor_id       : GenuineIntel
cpu family     : 6
model          : 173
stepping        : 1
microcode       : 0x10003d0
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs bhi
cpu cores       : 24
siblings        : 48
4 physical ids (chips)
192 processors (hardware threads)
physical id 0: core ids 0-23
physical id 1: core ids 0-23
physical id 2: core ids 0-23
physical id 3: core ids 0-23
physical id 0: apicids 0-47
physical id 1: apicids 128-175
physical id 2: apicids 256-303
physical id 3: apicids 384-431
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 2.40.4:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
```

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## Platform Notes (Continued)

Address sizes:	52 bits physical, 57 bits virtual
Byte Order:	Little Endian
CPU(s):	192
On-line CPU(s) list:	0-191
Vendor ID:	GenuineIntel
Model name:	Intel(R) Xeon(R) 6728P
CPU family:	6
Model:	173
Thread(s) per core:	2
Core(s) per socket:	24
Socket(s):	4
Stepping:	1
CPU(s) scaling MHz:	20%
CPU max MHz:	4100.0000
CPU min MHz:	800.0000
BogoMIPS:	5400.00
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 xtTopology nonstop_tsc cpuid aperf fmpf perf tsc_known_freq pn1 pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrr 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_13 cat_12 cdp_13 intel_ppin cdp_12 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid cq_m rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cq_m_llc cq_m_occup_llc cq_m_mb_m_total cq_m_mb_m_local split_lock_detect user_shstk avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req hfi vnmi avx512vbm1 umip pkru ospke waitpkg avx512_vbm12 gini vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpocntdq 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
Virtualization:	VT-x
L1d cache:	4.5 MiB (96 instances)
L1i cache:	6 MiB (96 instances)
L2 cache:	192 MiB (96 instances)
L3 cache:	576 MiB (4 instances)
NUMA node(s):	4
NUMA node0 CPU(s):	0-23,96-119
NUMA node1 CPU(s):	24-47,120-143
NUMA node2 CPU(s):	48-71,144-167
NUMA node3 CPU(s):	72-95,168-191
Vulnerability Gather data sampling:	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
Vulnerability Spectre v2:	Mitigation: Enhanced / Automatic IBRS; IBPB conditional; RSB filling; PBRSB-eIBRS Not affected; BHI BHI_DIS_S
Vulnerability Srbds:	Not affected

(Continued on next page)



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## Platform Notes (Continued)

Vulnerability Tsx async abort: Not affected

```
From lscpu --cache:
  NAME ONE-SIZE ALL-SIZE WAYS TYPE      LEVEL    SETS PHY-LINE COHERENCY-SIZE
  L1d     48K     4.5M 12 Data          1       64      1        64
  L1i     64K     6M   16 Instruction  1       64      1        64
  L2      2M     192M 16 Unified       2      2048      1        64
  L3     144M    576M 16 Unified       3     147456      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: 0-23,96-119
node 0 size: 515681 MB
node 0 free: 514593 MB
node 1 cpus: 24-47,120-143
node 1 size: 516082 MB
node 1 free: 514934 MB
node 2 cpus: 48-71,144-167
node 2 size: 516082 MB
node 2 free: 514694 MB
node 3 cpus: 72-95,168-191
node 3 size: 515998 MB
node 3 free: 514866 MB
node distances:
node   0   1   2   3
  0: 10  21  21  21
  1: 21  10  21  21
  2: 21  21  10  21
  3: 21  21  21  10
```

-----  
9. /proc/meminfo

```
MemTotal: 2113377544 kB
```

-----  
10. who -r
run-level 3 Sep 11 23:21

-----  
11. Systemd service manager version: systemd 254 (254.24+suse.148.g83b9060b6e)
Default Target Status
multi-user running

-----  
12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ irqbalance issue-generator
 kbdsettings klog lvm2-monitor nsqd nvmefc-boot-connections nvmf-autoconnect postfix
 purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4
 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemdr-mount-fs
disabled autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
 chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
 firewalld fsidd gpm grub2-once haveged ipmi ipmievfd issue-add-ssh-keys kexec-load lunmask
 man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd serial-getty@
 smartd\_generate\_opts snmpd snmptrapd systemd-boot-check-no-failures systemd-confext
 systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd udisks2
indirect systemd-userdbd wickedd

(Continued on next page)



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## Platform Notes (Continued)

```
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-6.4.0-150700.51-default
    root=UUID=50860560-ae42-405b-bae3-a2b14754d476
    splash=silent
    mitigations=auto
    quiet
    security=apparmor

-----
14. cpupower frequency-info
analyzing CPU 116:
    current policy: frequency should be within 800 MHz and 4.10 GHz.
                    The governor "powersave" may decide which speed to use
                    within this range.
    boost state support:
        Supported: yes
        Active: yes

-----
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+madvise [madvise] never
enabled          [always] madvise never
hpage_pmd_size  2097152
shmem_enabled   always within_size advise [never] deny force

-----
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
```

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## Platform Notes (Continued)

18. OS release  
From /etc/\*-release /etc/\*-version  
os-release SUSE Linux Enterprise Server 15 SP7

19. Disk information  
SPEC is set to: /home/cpu2017-1.1.9-ic2024.1  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/nvme0n1p3 xfs 1.8T 69G 1.7T 4% /

20. /sys/devices/virtual/dmi/id  
Vendor: Lenovo  
Product: ThinkSystem SR860 V4  
Product Family: ThinkSystem  
Serial: 9876543210

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:  
4x SK Hynix HMCG94AHBRA275N 64 GB 2 rank 6400  
7x SK Hynix HMCG94AHBRA277N 64 GB 2 rank 6400  
3x SK Hynix HMCG94AHBRA281N 64 GB 2 rank 6400  
2x SK Hynix HMCG94AHBRA283N 64 GB 2 rank 6400  
8x SK Hynix HMCG94AHBRA480N 64 GB 2 rank 6400  
3x SK Hynix HMCG94AHBRA481N 64 GB 2 rank 6400  
3x SK Hynix HMCG94AHBRA486N 64 GB 2 rank 6400  
2x SK Hynix HMCG94AHBRA487N 64 GB 2 rank 6400

22. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor: Lenovo  
BIOS Version: RVE103X-1.10  
BIOS Date: 07/17/2025  
BIOS Revision: 1.10  
Firmware Revision: 1.40

## Compiler Version Notes

=====

C | 600.perlbench\_s(base) 602.gcc\_s(base) 605.mcf\_s(base) 625.x264\_s(base) 657.xz\_s(base)

=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308  
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

=====

=====

C++ | 620.omnetpp\_s(base) 623.xalancbmk\_s(base) 631.deepsjeng\_s(base) 641.leela\_s(base)

=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308  
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## Compiler Version Notes (Continued)

=====  
Fortran | 648.exchange2\_s(base)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308  
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

## Base Portability Flags

600.perlbench\_s: -DSPEC\_LP64 -DSPEC\_LINUX\_X64  
602.gcc\_s: -DSPEC\_LP64  
605.mcf\_s: -DSPEC\_LP64  
620.omnetpp\_s: -DSPEC\_LP64  
623.xalancbmk\_s: -DSPEC\_LP64 -DSPEC\_LINUX  
625.x264\_s: -DSPEC\_LP64  
631.deepsjeng\_s: -DSPEC\_LP64  
641.leela\_s: -DSPEC\_LP64  
648.exchange2\_s: -DSPEC\_LP64  
657.xz\_s: -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 -fopenmp  
-DSPEC\_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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/jemalloc64-5.0.1/lib -ljemalloc

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## Lenovo Global Technology

ThinkSystem SR860 V4  
(2.70 GHz, Intel Xeon 6728P)

SPECspeed®2017\_int\_base = 14.8

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 9017

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Test Sponsor: Lenovo Global Technology

Hardware Availability: Nov-2025

Tested by: Lenovo Global Technology

Software Availability: Jun-2025

## Base Optimization Flags (Continued)

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -fno-  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Birchstream-F.html>  
<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html>

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

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Birchstream-F.xml>  
<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml>

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