



# SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR630 V3  
(2.10 GHz, Intel Xeon Platinum 8468H)

SPECspeed®2017\_int\_base = 14.8

SPECspeed®2017\_int\_peak = Not Run

CPU2017 License: 9017

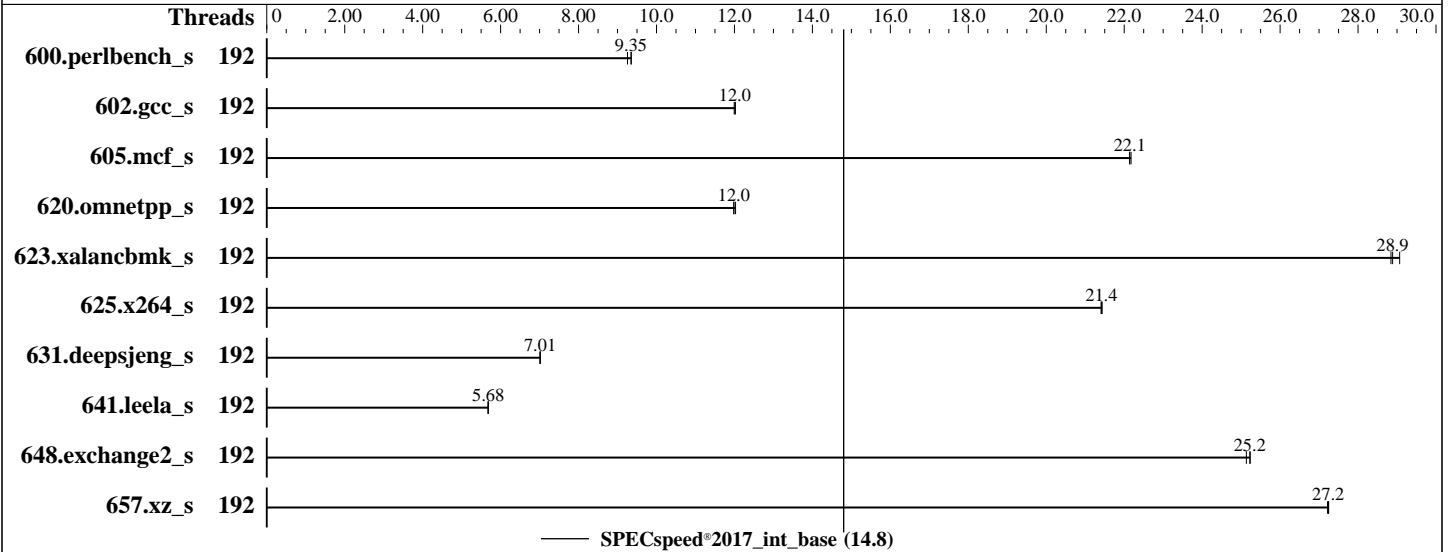
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Mar-2023

Hardware Availability: Feb-2023

Software Availability: Dec-2022



### Hardware

CPU Name: Intel Xeon Platinum 8468H  
 Max MHz: 3800  
 Nominal: 2100  
 Enabled: 96 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 2 MB I+D on chip per core  
 L3: 105 MB I+D on chip per chip  
 Other: None  
 Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86\_64)  
 Kernel 5.14.21-150400.22-default  
 Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;  
 Fortran: Version 2023.0 of Intel Fortran Compiler Classic for Linux;  
 C/C++: Version 2023.0 of Intel C/C++ Compiler Classic for Linux  
 Parallel: Yes  
 Firmware: Lenovo BIOS Version ESE109L 1.10 released Jan-2023  
 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 and OS 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     | <b>190</b> | <b>9.35</b> | 192         | 9.26        | 190        | 9.35        |         |         |       |         |       |         |       |  |  |
| 602.gcc_s       | 192     | 332        | 12.0        | 331         | 12.0        | <b>331</b> | <b>12.0</b> |         |         |       |         |       |         |       |  |  |
| 605.mcf_s       | 192     | 213        | 22.1        | <b>213</b>  | <b>22.1</b> | 213        | 22.2        |         |         |       |         |       |         |       |  |  |
| 620.omnetpp_s   | 192     | <b>136</b> | <b>12.0</b> | 136         | 12.0        | 136        | 12.0        |         |         |       |         |       |         |       |  |  |
| 623.xalancbmk_s | 192     | 48.7       | 29.1        | <b>49.1</b> | <b>28.9</b> | 49.1       | 28.8        |         |         |       |         |       |         |       |  |  |
| 625.x264_s      | 192     | 82.4       | 21.4        | <b>82.3</b> | <b>21.4</b> | 82.3       | 21.4        |         |         |       |         |       |         |       |  |  |
| 631.deepsjeng_s | 192     | 204        | 7.02        | 204         | 7.01        | <b>204</b> | <b>7.01</b> |         |         |       |         |       |         |       |  |  |
| 641.leela_s     | 192     | <b>300</b> | <b>5.68</b> | 300         | 5.68        | 300        | 5.68        |         |         |       |         |       |         |       |  |  |
| 648.exchange2_s | 192     | 117        | 25.1        | 117         | 25.2        | <b>117</b> | <b>25.2</b> |         |         |       |         |       |         |       |  |  |
| 657.xz_s        | 192     | <b>227</b> | <b>27.2</b> | 227         | 27.2        | 227        | 27.2        |         |         |       |         |       |         |       |  |  |

SPECspeed®2017\_int\_base = 14.8

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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.

## 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-ic2023.0/lib/intel64:/home/cpu2017-1.1.9-ic2023.0/je5.0.1-64"  
MALLOCONF = "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

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### General Notes (Continued)

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>

### Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode

SNC set to SNC2

C-state set to Legacy

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo

Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197

running on test1 Fri Mar 10 18:03:44 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+suse.124.g2bc0b2c447)
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 test1 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222) x86_64
   x86_64 x86_64 GNU/Linux
-----
```

2. w

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### Platform Notes (Continued)

```
18:03:44 up 3 min, 1 user, load average: 0.04, 0.09, 0.04
USER      TTY      FROM          LOGIN@      IDLE        JCPU        PCPU        WHAT
root      tty1     -             18:03      6.00s      0.81s      0.00s      -bash
```

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)            | 2062425   |
| 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)            | 2062425   |
| virtual memory       | (kbytes, -v)    | unlimited |
| file locks           | (-x)            | unlimited |

5. sysinfo process ancestry  
/usr/lib/systemd/systemd --switched-root --system --deserialize 30  
login -- root  
-bash  
-bash  
runcpu --nobuild --action validate --define default-platform-flags -c  
ic2023.0-lin-sapphirerapids-speed-20221201.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  
ic2023.0-lin-sapphirerapids-speed-20221201.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/CPU2017.233/templogs/preenv.intspeed.233.0.log --lognum 233.0 --from\_runcpu 2  
specperl \$SPEC/bin/sysinfo  
\$SPEC = /home/cpu2017-1.1.9-ic2023.0

6. /proc/cpuinfo

|                                   |  |
|-----------------------------------|--|
| model name                        | : Intel(R) Xeon(R) Platinum 8468H                |
| vendor_id                         | : GenuineIntel                                   |
| cpu family                        | : 6  |
| model                             | : 143  |
| stepping                          | : 8  |
| microcode                         | : 0x2b000161                                     |
| bugs                              | : spectre_v1 spectre_v2 spec_store_bypass swapgs |
| cpu cores                         | : 48   |
| siblings                          | : 96   |
| 2 physical ids (chips)            |  |
| 192 processors (hardware threads) |  |
| physical id 0: core ids 0-47      |  |
| physical id 1: core ids 0-47      |  |
| physical id 0: apicids 0-95       |  |

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### Platform Notes (Continued)

physical id 1: apicids 128-223

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):                192
On-line CPU(s) list:  0-191
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Platinum 8468H
CPU family:            6
Model:                 143
Thread(s) per core:   2
Core(s) per socket:   48
Socket(s):             2
Stepping:              8
BogoMIPS:              4200.00
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 intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced
                      tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle
                      avx2 smep bmi2 erms invpcid rtm 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 avx512_fp16 amx_tile flush_l1d arch_capabilities
Virtualization:       VT-x
L1d cache:            4.5 MiB (96 instances)
L1i cache:            3 MiB (96 instances)
L2 cache:             192 MiB (96 instances)
L3 cache:             210 MiB (2 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 Itlb multihit: Not affected
Vulnerability L1tf:   Not affected
Vulnerability Mds:    Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs 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

```

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### Platform Notes (Continued)

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  | 32K      | 3M       | 8    | Instruction | 1     | 64     | 1        | 64             |
| L2   | 2M       | 192M     | 16   | Unified     | 2     | 2048   | 1        | 64             |
| L3   | 105M     | 210M     | 15   | Unified     | 3     | 114688 | 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: 128641 MB
node 0 free: 127441 MB
node 1 cpus: 24-47,120-143
node 1 size: 129011 MB
node 1 free: 128615 MB
node 2 cpus: 48-71,144-167
node 2 size: 129011 MB
node 2 free: 128648 MB
node 3 cpus: 72-95,168-191
node 3 size: 128965 MB
node 3 free: 128636 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: 528005420 kB

10. who -r

run-level 3 Mar 10 18:01

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)

```

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@ haveged irqbalance iscsi
issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled autofsd autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
firewalld gpm grub2-once haveged-switch-root ipmi ipmievd iscsi-init iscsid iscsiuiio
issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nmb rdisc
rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd
systemd-boot-check-no-failures systemd-network-generator systemd-sysext
systemd-time-wait-sync systemd-timesyncd
generated ntp_sync
indirect wickedd

```

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### Platform Notes (Continued)

```

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=f976c541-a329-4c54-ba84-4be16556ee18
splash=silent
mitigations=auto
quiet
security=apparmor

```

```

14. cpupower frequency-info
analyzing CPU 0:
Unable to determine current policy
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

```

```

18. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP4

```

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### Platform Notes (Continued)

-----  
19. Disk information

SPEC is set to: /home/cpu2017-1.1.9-ic2023.0  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda2 xfs 894G 96G 798G 11% /

-----  
20. /sys/devices/virtual/dmideid

Vendor: Lenovo  
Product: ThinkSystem SR630 V3  
Product Family: ThinkSystem  
Serial: 1234567890

-----  
21. dmidecode

Additional information from dmidecode 3.2 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:  
1x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800  
5x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800  
10x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

-----  
22. BIOS

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

BIOS Vendor: Lenovo  
BIOS Version: ESE109L-1.10  
BIOS Date: 01/07/2023  
BIOS Revision: 1.10  
Firmware Revision: 1.0

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

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

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.  
-----





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## 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:

```
-m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:

```
-m64 -std=c++14 -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
```

Fortran benchmarks:

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



# SPEC CPU®2017 Integer Speed Result

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## Lenovo Global Technology

ThinkSystem SR630 V3  
(2.10 GHz, Intel Xeon Platinum 8468H)

SPECspeed®2017\_int\_base = 14.8

SPECspeed®2017\_int\_peak = Not Run

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Mar-2023

**Hardware Availability:** Feb-2023

**Software Availability:** Dec-2022

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-Eaglestream-0.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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-0.xml>

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

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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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