SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

$SPECrate^{®}2017\_int\_base = \quad 172$

ThinkSystem SR630 V3
(2.90 GHz, Intel Xeon Gold 5415+)

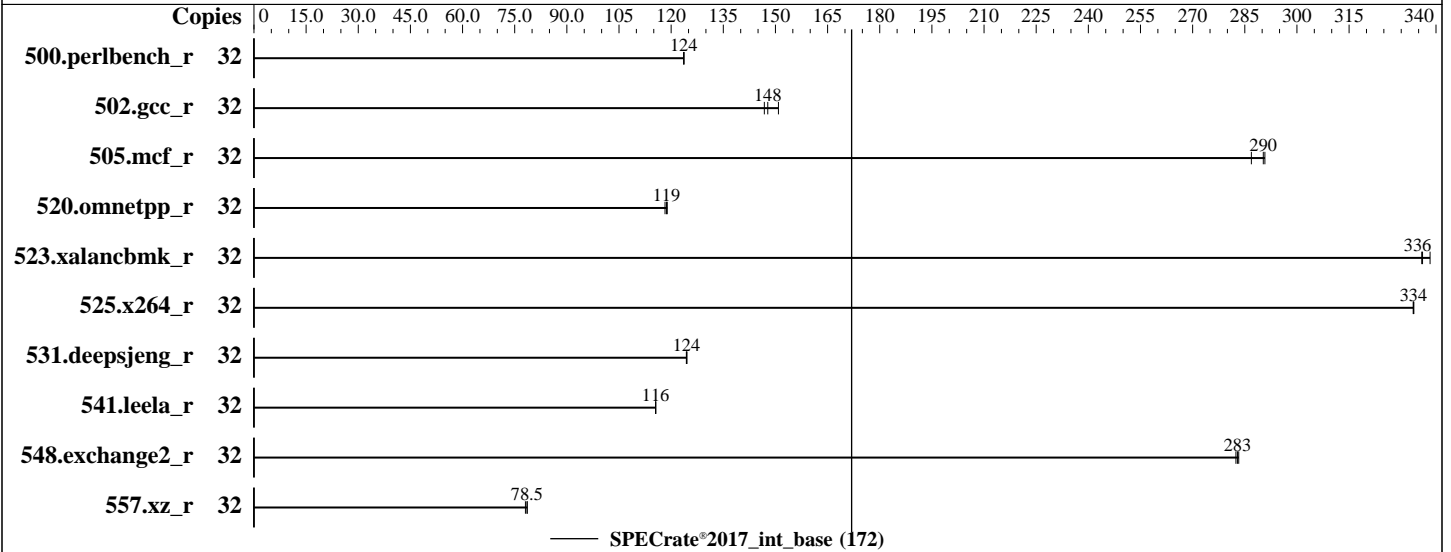$SPECrate^{®}2017\_int\_peak =$ Not Run

CPU2017 License: 9017	**Test Date:** Jan-2023
Test Sponsor: Lenovo Global Technology	**Hardware Availability:** Feb-2023
Tested by: Lenovo Global Technology	**Software Availability:** Jun-2022

Copies — scale 0, 15.0, 30.0, 45.0, 60.0, 75.0, 90.0, 105, 120, 135, 150, 165, 180, 195, 210, 225, 240, 255, 270, 285, 300, 315, 340

Benchmark	Copies	Value
500.perlbench_r	32	124
502.gcc_r	32	148
505.mcf_r	32	290
520.omnetpp_r	32	119
523.xalancbmk_r	32	336
525.x264_r	32	334
531.deepsjeng_r	32	124
541.leela_r	32	116
548.exchange2_r	32	283
557.xz_r	32	78.5

—— SPECrate®2017_int_base (172)

Hardware

CPU Name: Intel Xeon Gold 5415+
 Max MHz: 4100
 Nominal: 2900
Enabled: 16 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: 22.5 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R, running at 4400)
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 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel: No
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: 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	32	412	124	**412**	**124**	412	124							
502.gcc_r	32	300	151	309	147	**307**	**148**							
505.mcf_r	32	**178**	**290**	180	287	178	291							
520.omnetpp_r	32	353	119	**354**	**119**	355	118							
523.xalancbmk_r	32	101	336	**101**	**336**	99.9	338							
525.x264_r	32	168	333	**168**	**334**	168	334							
531.deepsjeng_r	32	**295**	**124**	294	125	295	124							
541.leela_r	32	459	116	459	116	**459**	**116**							
548.exchange2_r	32	297	282	**296**	**283**	296	283							
557.xz_r	32	440	78.6	**440**	**78.5**	443	78.1							
**SPECrate®2017_int_base = **	**172**													
**SPECrate®2017_int_peak = **	**Not Run**													

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
    "/home/cpu2017-1.1.8-ic2022.1/lib/intel64:/home/cpu2017-1.1.8-ic2022.1/lib/ia32:/home/cpu2017-1.1.8-ic
    2022.1/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

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Hardware Availability: Feb-2023
Software Availability: Jun-2022

General Notes

```
 Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
 memory using Red Hat Enterprise Linux 8.4
 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>
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

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
SNC set to SNC2
LLC Prefetch set to Disabled
UPI Link Disable set to Disabled 1 Link
C-state set to Legacy

 Sysinfo program /home/cpu2017-1.1.8-ic2022.1/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost Wed Jan 11 02:00:41 2023

 SUT (System Under Test) info as seen by some common utilities.
 For more information on this section, see
    https://www.spec.org/cpu2017/Docs/config.html#sysinfo

 From /proc/cpuinfo
    model name : Intel(R) Xeon(R) Gold 5415+
       2  "physical id"s (chips)
       32 "processors"
    cores, siblings (Caution: counting these is hw and system dependent. The following
    excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
       cpu cores : 8
       siblings  : 16
       physical 0: cores 0 1 2 3 4 5 6 7
       physical 1: cores 0 1 2 3 4 5 6 7

 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):                    32
      On-line CPU(s) list:       0-31
      Vendor ID:                 GenuineIntel
      Model name:                Intel(R) Xeon(R) Gold 5415+
      CPU family:                6
      Model:                     143
      Thread(s) per core:        2
      Core(s) per socket:        8
      Socket(s):                 2
      Stepping:                  8
      BogoMIPS:                  5800.00
```

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CPU2017 License: 9017　　　　　　　　　　　　　　　　**Test Date:**　　Jan-2023
Test Sponsor:　Lenovo Global Technology　　　　　　**Hardware Availability:** Feb-2023
Tested by:　　　Lenovo Global Technology　　　　　　**Software Availability:**　Jun-2022

Platform Notes (Continued)

```
    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:                 768 KiB (16 instances)
  L1i cache:                 512 KiB (16 instances)
  L2 cache:                  32 MiB (16 instances)
  L3 cache:                  45 MiB (2 instances)
  NUMA node(s):              4
  NUMA node0 CPU(s):         0-3,16-19
  NUMA node1 CPU(s):         4-7,20-23
  NUMA node2 CPU(s):         8-11,24-27
  NUMA node3 CPU(s):         12-15,28-31
  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

From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
    L1d      48K     768K  12 Data            1    64      1              64
    L1i      32K     512K   8 Instruction     1    64      1              64
    L2        2M      32M  16 Unified         2  2048      1              64
    L3     22.5M      45M  15 Unified         3 24576      1              64

/proc/cpuinfo cache data
   cache size : 23040 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0 1 2 3 16 17 18 19
  node 0 size: 128685 MB
  node 0 free: 128182 MB
  node 1 cpus: 4 5 6 7 20 21 22 23
  node 1 size: 128987 MB
  node 1 free: 128623 MB
  node 2 cpus: 8 9 10 11 24 25 26 27
  node 2 size: 129021 MB
```

(Continued on next page)

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Hardware Availability: Feb-2023

Software Availability: Jun-2022

Platform Notes (Continued)

```
  node 2 free: 128793 MB
  node 3 cpus: 12 13 14 15 28 29 30 31
  node 3 size: 129001 MB
  node 3 free: 128708 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

From /proc/meminfo
   MemTotal:       528073604 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP4"
      VERSION_ID="15.4"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp4"

uname -a:
   Linux localhost 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

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):                   Not affected
CVE-2018-3620 (L1 Terminal Fault):                Not affected
Microarchitectural Data Sampling:                 Not affected
CVE-2017-5754 (Meltdown):                         Not affected
CVE-2018-3639 (Speculative Store Bypass):         Mitigation: Speculative Store
                                                  Bypass disabled via prctl and
                                                  seccomp
CVE-2017-5753 (Spectre variant 1):                Mitigation: usercopy/swapgs
                                                  barriers and __user pointer
                                                  sanitization
CVE-2017-5715 (Spectre variant 2):                Mitigation: Enhanced IBRS, IBPB:
                                                  conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):          Not affected

run-level 3 Jan 11 01:29

SPEC is set to: /home/cpu2017-1.1.8-ic2022.1
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       xfs   894G   25G  870G   3% /

From /sys/devices/virtual/dmi/id
   Vendor:          Lenovo
   Product:         ThinkSystem SR630 V3 MB,EGS,DDR5,NY,1U
   Product Family:  ThinkSystem
   Serial:          1234567890
```

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Platform Notes (Continued)

```
 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:
     2x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800, configured at 4400
     14x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800, configured at 4400

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

 (End of data from sysinfo program)
```

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
```

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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 -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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-N.html
  http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.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-N.xml
  http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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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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