# SPEC CPU®2017 Integer Rate Result

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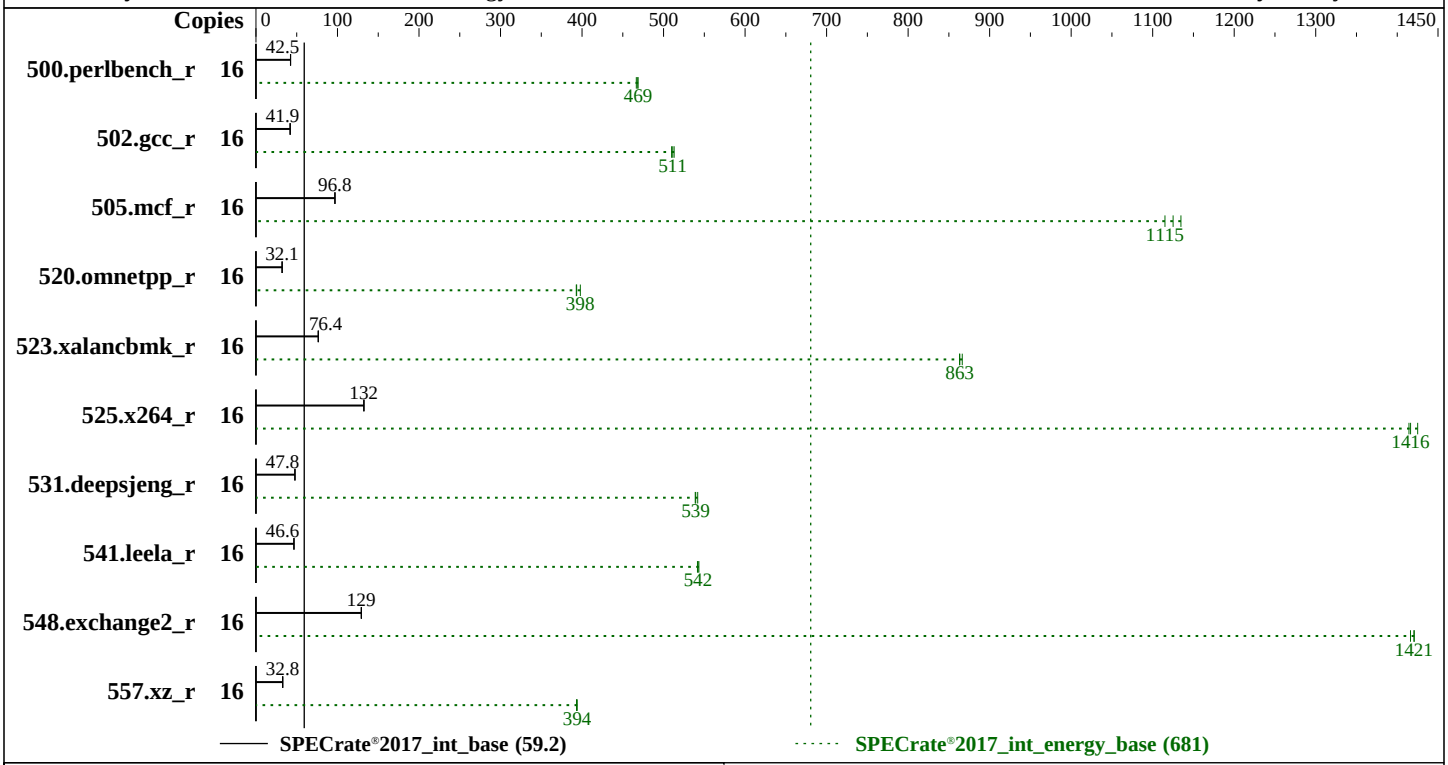
## Lenovo Global Technology

## ThinkSystem SR250 V2
## (3.20 GHz, Intel Xeon E-2388G)

| | |
|---|---|
| SPECrate®2017_int_base = | 59.2 |
| SPECrate®2017_int_energy_base = | 681 |
| SPECrate®2017_int_peak = | Not Run |
| SPECrate®2017_int_energy_peak = | Not Run |

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test Date:** Feb-2022
**Hardware Availability:** Apr-2022
**Software Availability:** May-2021




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E-2388G |
| Max MHz: | 5100 |
| Nominal: | 3200 |
| Enabled: | 8 cores, 1 chip, 2 threads/core |
| Orderable: | 1 chip |
| Cache L1: | 32 KB I + 48 KB D on chip per core |
| L2: | 512 KB I+D on chip per core |
| L3: | 16 MB I+D on chip per chip |
| Other: | None |
| Memory: | 32 GB (2 x 16 GB 2Rx8 PC4-3200AA-E) |
| Storage: | 1 x 960 GB SATA SSD |
| Other: | None |

### Software

| | |
|---|---|
| OS: | Red Hat Enterprise Linux release 8.4 (Ootpa)<br>Kernel 4.18.0-305.el8.x86_64 |
| Compiler: | C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;<br>Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux; |
| Parallel: | No |
| Firmware: | Lenovo BIOS Version TQE101Q 1.00 released Dec-2021 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | Not Applicable |
| Other: | None |
| Power Management: | BIOS set to balance power and performance |

### Power

| | |
|---|---|
| Max. Power (W): | 106.14 |
| Idle Power (W): | 37.17 |
| Min. Temperature (C): | 21.63 |
| Elevation (m): | 43 |
| Line Standard: | 220 V / 50 Hz / 1 phase / 3 wires |
| Provisioning: | Line-powered |

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### Power Settings

Management FW: Version 0.90 of TGBT33E
Memory Mode: Normal

### Power-Relevant Hardware

Power Supply: 1 x 450 W (non-redundant)
Details: ThinkSystem 450W Platinum Hot-Swap Power Supply 4P57A12649
Backplane: 8 x 2.5-inch HDD back plane
Other Storage: None
Storage Model #s: 4XB7A17089
NICs Installed: 1 x Broadcom 2-port BCM5720 embeded @ 1 Gb
NICs Enabled (FW/OS): 2 / 1
NICs Connected/Speed: 1 @ 1 Gb
Other HW Model #s: 4 x system fans

### Power Analyzer

Power Analyzer: WIN:9888
Hardware Vendor: YOKOGAWA, Inc.
Model: YokogawaWT310E
Serial Number: C3UD17024E
Input Connection: Default
Metrology Institute: CNAS
Calibration By: GRG METROLOGY & TEST (BEIJING) CO., LTD.
Calibration Label: J202110137471A-0002
Calibration Date: 21-Oct-2021
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: Connected to PSU1
Current Ranges Used: 1A
Voltage Range Used: 300V

### Temperature Meter

Temperature Meter: WIN:9889
Hardware Vendor: Digi International, Inc.
Model: DigiWATCHPORT_H
Serial Number: W62330963
Input Connection: USB
PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: 50 mm in front of SUT main intake

## Base Results Table

| Benchmark | Copies | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power | Seconds | Ratio | Energy (kJ) | Energy Ratio | Average Power | Maximum Power |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 500.perlbench_r | 16 | **599** | **42.5** | **58.9** | **469** | **98.3** | **106** | 599 | 42.5 | 59.1 | 468 | 98.6 | 106 | 602 | 42.3 | 59.2 | 467 | 98.4 | 105 |
| 502.gcc_r | 16 | 538 | 42.1 | 48.0 | 513 | 89.2 | 103 | 541 | 41.8 | 48.3 | 510 | 89.1 | 104 | **540** | **41.9** | **48.1** | **511** | **89.1** | **103** |
| 505.mcf_r | 16 | **267** | **96.8** | **25.4** | **1120** | **95.0** | **104** | 267 | 96.8 | 24.9 | 1130 | 93.4 | 98.8 | 267 | 97.0 | 25.1 | 1130 | 94.3 | 98.2 |
| 520.omnetpp_r | 16 | 652 | 32.2 | 57.8 | 393 | 88.6 | 92.0 | **653** | **32.1** | **57.1** | **398** | **87.4** | **92.6** | 656 | 32.0 | 57.9 | 393 | 88.2 | 92.2 |
| 523.xalancbmk_r | 16 | 221 | 76.5 | 21.1 | 866 | 95.6 | 102 | 221 | 76.4 | 21.2 | 863 | 95.9 | 102 | **221** | **76.4** | **21.2** | **863** | **95.9** | **102** |
| 525.x264_r | 16 | 212 | 132 | 21.3 | 1430 | 101 | 104 | **212** | **132** | **21.4** | **1420** | **101** | **104** | 211 | 133 | 21.5 | 1410 | 102 | 105 |
| 531.deepsjeng_r | 16 | 383 | 47.9 | 36.8 | 542 | 96.0 | 97.5 | 384 | 47.8 | 37.0 | 539 | 96.4 | 97.8 | **384** | **47.8** | **36.9** | **539** | **96.3** | **98.2** |
| 541.leela_r | 16 | 568 | 46.6 | 52.9 | 542 | 93.1 | 96.5 | **568** | **46.6** | **52.9** | **542** | **93.0** | **96.5** | 568 | 46.6 | 52.8 | 543 | 92.8 | 96.6 |
| 548.exchange2_r | 16 | 324 | 129 | 32.0 | 1420 | 98.7 | 100 | 325 | 129 | 32.1 | 1420 | 98.9 | 100 | **324** | **129** | **32.0** | **1420** | **98.6** | **99.8** |
| 557.xz_r | 16 | **526** | **32.8** | **47.7** | **394** | **90.5** | **95.8** | 525 | 32.9 | 47.8 | 393 | 90.9 | 96.4 | 528 | 32.7 | 47.7 | 393 | 90.4 | 95.8 |

**SPECrate®2017_int_base = 59.2**

**SPECrate®2017_int_energy_base = 681**

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

## Submit Notes

```
The taskset mechanism was used to bind copies to processors. The config file option 'submit'
was used to generate taskset 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-ic2021.1-revB/lib/intel64:/home/cpu2017-1.1.8-ic202
     1.1-revB/lib/ia32:/home/cpu2017-1.1.8-ic2021.1-revB/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

## General Notes

```
 Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
 memory using Red Hat Enterprise Linux 8.1
 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.
```

## Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Minimal Power

 Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost.localdomain Sun Feb 13 20:54:39 2022

 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) E-2388G CPU @ 3.20GHz
       1  "physical id"s (chips)
       16 "processors"
```

**(Continued on next page)**

## Platform Notes (Continued)

```
    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

 From lscpu from util-linux 2.32.1:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      CPU(s):              16
      On-line CPU(s) list: 0-15
      Thread(s) per core:  2
      Core(s) per socket:  8
      Socket(s):           1
      NUMA node(s):        1
      Vendor ID:           GenuineIntel
      BIOS Vendor ID:      Intel(R) Corporation
      CPU family:          6
      Model:               167
      Model name:          Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz
      BIOS Model name:     Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz
      Stepping:            1
      CPU MHz:             2772.286
      BogoMIPS:            6384.00
      Virtualization:      VT-x
      L1d cache:           48K
      L1i cache:           32K
      L2 cache:            512K
      L3 cache:            16384K
      NUMA node0 CPU(s):   0-15
      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 sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
      aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
      ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
      fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx avx512f avx512dq rdseed adx
      smap avx512ifma clflushopt intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
      xsavec xgetbv1 xsaves dtherm arat pln pts avx512vbmi umip pku ospke avx512_vbmi2
      gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrm md_clear
      flush_l1d arch_capabilities

 /proc/cpuinfo cache data
```

**(Continued on next page)**

## Platform Notes (Continued)

```
    cache size : 16384 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  node 0 size: 32069 MB
  node 0 free: 31364 MB
  node distances:
  node   0
    0:  10

From /proc/meminfo
   MemTotal:       32838840 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sbin/tuned-adm active
    Current active profile: throughput-performance

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux"
      VERSION="8.4 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.4"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
      ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
   Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
   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
```

**(Continued on next page)**

## Platform Notes (Continued)

```
                                                  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 Feb 13 20:32

 SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   790G  103G  688G  13% /home

 From /sys/devices/virtual/dmi/id
     Vendor:         Lenovo
     Product:        ThinkSystem SR250 V2
     Product Family: ThinkSystem
     Serial:         1234567890

 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 SK Hynix HMA82GU7DJR8N-XN 16 GB 2 rank 3200

 BIOS:
    BIOS Vendor:       Lenovo
    BIOS Version:      TQE101Q-1.00
    BIOS Date:         12/29/2021
    BIOS Revision:     1.0
    Firmware Revision: 0.90

 (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)
------------------------------------------------------------------------------
```

**(Continued on next page)**

## Compiler Version Notes (Continued)

```
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 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 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
  Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

## 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

**(Continued on next page)**

# Base Portability Flags (Continued)

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
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/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
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/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-ic2021-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-RocketB-A.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-RocketB-A.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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