SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

ThinkEdge SE450
(2.30 GHz, Intel Xeon Silver 4310T)

SPECrate®2017_int_base = 73.0

SPECrate®2017_int_peak = Not Run
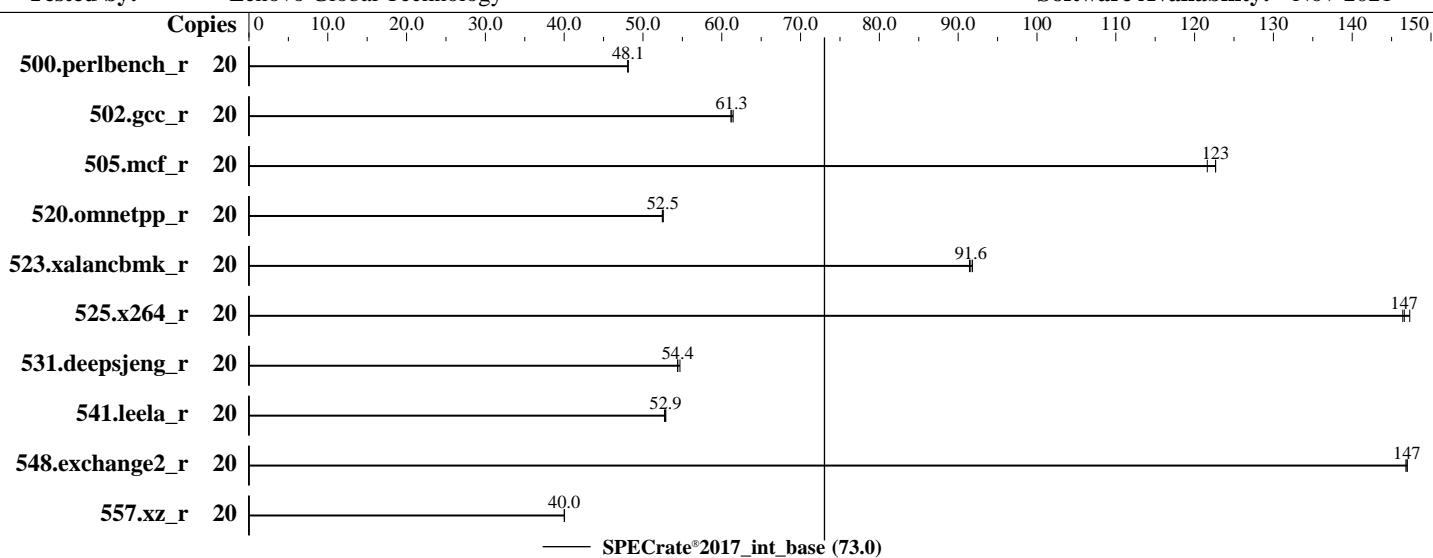
CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Jun-2022
Hardware Availability: Apr-2022
Software Availability: Nov-2021

Benchmark	Copies	Result
500.perlbench_r	20	48.1
502.gcc_r	20	61.3
505.mcf_r	20	123
520.omnetpp_r	20	52.5
523.xalancbmk_r	20	91.6
525.x264_r	20	147
531.deepsjeng_r	20	54.4
541.leela_r	20	52.9
548.exchange2_r	20	147
557.xz_r	20	40.0

Scale: Copies 0 to 150

SPECrate®2017_int_base (73.0)

Hardware

CPU Name: Intel Xeon Silver 4310T
 Max MHz: 3400
 Nominal: 2300
Enabled: 10 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 1.25 MB I+D on chip per core
 L3: 15 MB I+D on chip per chip
 Other: None
Memory: 256 GB (8 x 32 GB 2Rx4 PC4-3200AA-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.5
 (Ootpa)
 Kernel 4.18.0-348.el8.x86_64
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;
 Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux
Parallel: No
Firmware: Lenovo BIOS Version CME104I 1.01 released Mar-2022
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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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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	20	663	48.1	662	48.1	**662**	**48.1**							
502.gcc_r	20	**462**	**61.3**	463	61.2	461	61.4							
505.mcf_r	20	**263**	**123**	266	122	263	123							
520.omnetpp_r	20	**500**	**52.5**	500	52.5	499	52.6							
523.xalancbmk_r	20	231	91.4	230	91.8	**231**	**91.6**							
525.x264_r	20	238	147	**239**	**147**	239	146							
531.deepsjeng_r	20	**421**	**54.4**	421	54.4	419	54.7							
541.leela_r	20	**626**	**52.9**	626	52.9	628	52.7							
548.exchange2_r	20	356	147	357	147	**357**	**147**							
557.xz_r	20	**540**	**40.0**	539	40.1	540	40.0							
SPECrate®2017_int_base =		**73.0**												
SPECrate®2017_int_peak =		**Not Run**												

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)
```

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Hardware Availability: Apr-2022

Software Availability: Nov-2021

General Notes (Continued)

```
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
SNC set to Enabled

 Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revB/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on localhost.localdomain Wed Jun 15 22:21:46 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) Silver 4310T CPU @ 2.30GHz
       1  "physical id"s (chips)
       20 "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 : 10
       siblings  : 20
       physical 0: cores 0 1 2 3 4 5 6 7 8 9

 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):              20
       On-line CPU(s) list: 0-19
       Thread(s) per core:  2
       Core(s) per socket:  10
       Socket(s):           1
       NUMA node(s):        1
       Vendor ID:           GenuineIntel
       BIOS Vendor ID:      Intel(R) Corporation
       CPU family:          6
       Model:               106
       Model name:          Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz
       BIOS Model name:     Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz
```

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Platform Notes (Continued)

```
        Stepping:              6
        CPU MHz:               2300.000
        BogoMIPS:              4600.00
        Virtualization:        VT-x
        L1d cache:             48K
        L1i cache:             32K
        L2 cache:              1280K
        L3 cache:              15360K
        NUMA node0 CPU(s):     0-19
        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 pni pclmulqdq dtes64 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 invpcid_single intel_ppin
    ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
    fsgsbase tsc_adjust sgx bmi1 hle 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 wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku
    ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
    avx512_vpopcntdq la57 rdpid sgx_lc fsrm md_clear pconfig flush_l1d arch_capabilities

  /proc/cpuinfo cache data
    cache size : 15360 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 16 17 18 19
    node 0 size: 257594 MB
    node 0 free: 256721 MB
    node distances:
    node   0
      0:  10

  From /proc/meminfo
    MemTotal:       263776652 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"
```

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Tested by: Lenovo Global Technology		**Software Availability:** Nov-2021

Platform Notes (Continued)

```
        VERSION="8.5 (Ootpa)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="8.5"
        PLATFORM_ID="platform:el8"
        PRETTY_NAME="Red Hat Enterprise Linux 8.5 (Ootpa)"
        ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.5 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8::baseos

  uname -a:
    Linux localhost.localdomain 4.18.0-348.el8.x86_64 #1 SMP Mon Oct 4 12:17:22 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
                                              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 Jun 15 22:20

  SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revB
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda4       xfs   819G   26G  793G   4% /home

  From /sys/devices/virtual/dmi/id
      Vendor:         Lenovo
      Product:        ThinkEdge SE450
      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
```

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Platform Notes (Continued)

```
 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
   Memory:
     8x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200, configured at 2666

 BIOS:
    BIOS Vendor:       Lenovo
    BIOS Version:      CME104I-1.01
    BIOS Date:         03/17/2022
    BIOS Revision:     1.1
    Firmware Revision: 1.10

 (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 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

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Base Compiler Invocation (Continued)

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`
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
```

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):

`-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-ICElake-J.html`
`http://www.spec.org/cpu2017/flags/Intel-ic2021-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-ICElake-J.xml`
`http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml`

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