SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

$SPECrate^{®}2017_int_base = $ 298

ThinkSystem SR850 V2
(3.90 GHz, Intel Xeon Platinum 8356H)

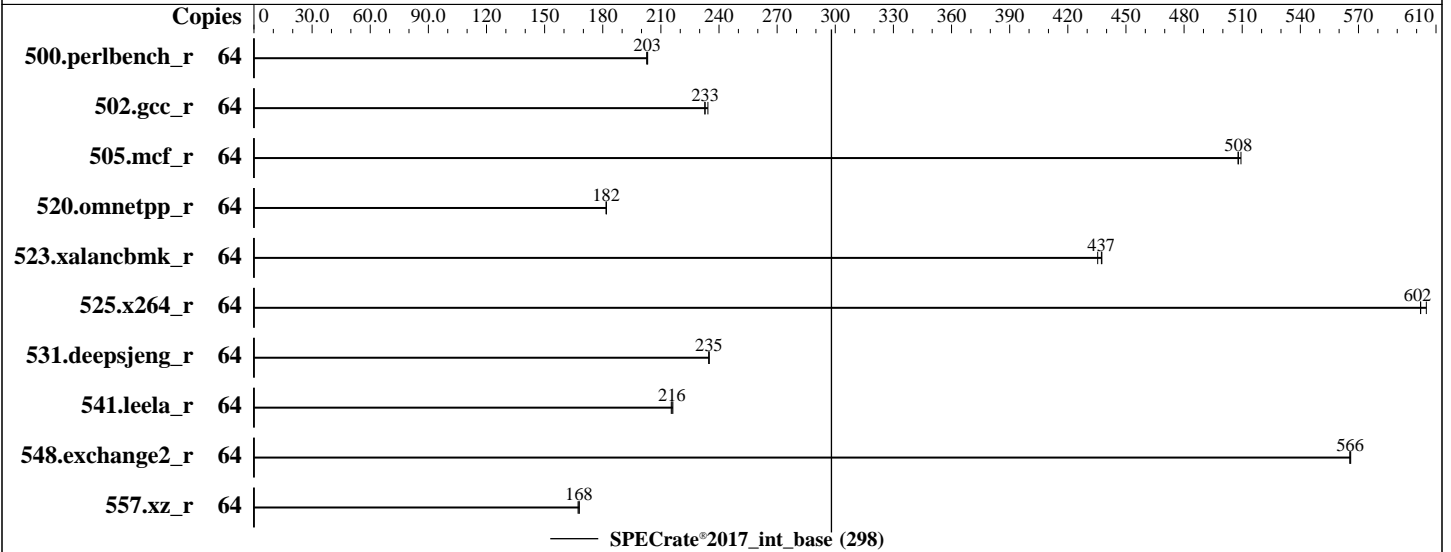$SPECrate^{®}2017_int_peak = $ Not Run

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Dec-2020

Hardware Availability: Nov-2020

Software Availability: Aug-2020

Copies

Benchmark	Copies	Value
500.perlbench_r	64	203
502.gcc_r	64	233
505.mcf_r	64	508
520.omnetpp_r	64	182
523.xalancbmk_r	64	437
525.x264_r	64	602
531.deepsjeng_r	64	235
541.leela_r	64	216
548.exchange2_r	64	566
557.xz_r	64	168

—— SPECrate®2017_int_base (298)

Hardware

CPU Name: Intel Xeon Platinum 8356H
  Max MHz: 4400
  Nominal: 3900
Enabled: 32 cores, 4 chips, 2 threads/core
Orderable: 2,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
  L2: 1 MB I+D on chip per core
  L3: 35.75 MB I+D on chip per chip
  Other: None
Memory: 1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.2
  (Ootpa)
  Kernel 4.18.0-193.el8.x86_64
Compiler: C/C++: Version 19.1.2.275 of Intel C/C++
  Compiler for Linux;
  Fortran: Version 19.1.2.275 of Intel Fortran
  Compiler for Linux
Parallel: No
Firmware: Lenovo BIOS Version M5E107I 1.01 released Nov-2020
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 prefer performance at the cost of additional power usage

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CPU2017 License: 9017	**Test Date:** Dec-2020
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Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	64	501	203	503	203	**502**	**203**							
502.gcc_r	64	390	233	387	234	**389**	**233**							
505.mcf_r	64	203	509	**204**	**508**	204	508							
520.omnetpp_r	64	462	182	**462**	**182**	462	182							
523.xalancbmk_r	64	155	435	**155**	**437**	154	438							
525.x264_r	64	185	605	186	602	**186**	**602**							
531.deepsjeng_r	64	312	235	**312**	**235**	312	235							
541.leela_r	64	492	215	490	216	**491**	**216**							
548.exchange2_r	64	296	566	296	566	**296**	**566**							
557.xz_r	64	413	167	**412**	**168**	412	168							
SPECrate®2017_int_base =		**298**												
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 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/cpu2017-1.1.0-ic19.1u2/lib/intel64:/home/cpu2017-1.1.0-ic19.1u2/l
     ib/ia32:/home/cpu2017-1.1.0-ic19.1u2/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 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

(Continued on next page)

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

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General Notes (Continued)

```
 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
C-States set to Legacy
Adjacent Cache Prefetcher set to Disabled
DCU Streamer Prefetcher set to Disabled
SNC set to Enabled
LLC dead line alloc set to Disable

 Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
 running on localhost.localdomain Sun Dec 27 10:02:27 2020

 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) Platinum 8356H CPU @ 3.90GHz
       4  "physical id"s (chips)
       64 "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 1 2 3 6 13 18 28 29
       physical 1: cores 2 6 8 10 12 17 19 28
       physical 2: cores 3 6 10 13 17 18 28 29
       physical 3: cores 1 2 3 5 6 10 20 29

 From lscpu:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      CPU(s):              64
      On-line CPU(s) list: 0-63
```

(Continued on next page)

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CPU2017 License: 9017		**Test Date:**	Dec-2020
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Nov-2020
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Platform Notes (Continued)

```
      Thread(s) per core:   2
      Core(s) per socket:   8
      Socket(s):            4
      NUMA node(s):         8
      Vendor ID:            GenuineIntel
      CPU family:           6
      Model:                85
      Model name:           Intel(R) Xeon(R) Platinum 8356H CPU @ 3.90GHz
      Stepping:             11
      CPU MHz:              2627.134
      CPU max MHz:          4400.0000
      CPU min MHz:          1200.0000
      BogoMIPS:             7800.00
      Virtualization:       VT-x
      L1d cache:            32K
      L1i cache:            32K
      L2 cache:             1024K
      L3 cache:             36608K
      NUMA node0 CPU(s):    0-2,5,32-34,37
      NUMA node1 CPU(s):    3,4,6,7,35,36,38,39
      NUMA node2 CPU(s):    8,10,11,13,40,42,43,45
      NUMA node3 CPU(s):    9,12,14,15,41,44,46,47
      NUMA node4 CPU(s):    16,18,20,21,48,50,52,53
      NUMA node5 CPU(s):    17,19,22,23,49,51,54,55
      NUMA node6 CPU(s):    24-26,29,56-58,61
      NUMA node7 CPU(s):    27,28,30,31,59,60,62,63
      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 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 cdp_l3
    invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
    flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
    cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
    avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
    cqm_mbm_local avx512_bf16 dtherm ida arat pln pts hwp hwp_act_window hwp_epp
    hwp_pkg_req pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

 /proc/cpuinfo cache data
    cache size : 36608 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 8 nodes (0-7)
   node 0 cpus: 0 1 2 5 32 33 34 37
   node 0 size: 193123 MB
```

(Continued on next page)

Lenovo Global Technology

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ThinkSystem SR850 V2
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SPECrate®2017_int_peak = Not Run

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Platform Notes (Continued)

```
   node 0 free: 192982 MB
   node 1 cpus: 3 4 6 7 35 36 38 39
   node 1 size: 193533 MB
   node 1 free: 193427 MB
   node 2 cpus: 8 10 11 13 40 42 43 45
   node 2 size: 193533 MB
   node 2 free: 193277 MB
   node 3 cpus: 9 12 14 15 41 44 46 47
   node 3 size: 193533 MB
   node 3 free: 193387 MB
   node 4 cpus: 16 18 20 21 48 50 52 53
   node 4 size: 193533 MB
   node 4 free: 193392 MB
   node 5 cpus: 17 19 22 23 49 51 54 55
   node 5 size: 193533 MB
   node 5 free: 193315 MB
   node 6 cpus: 24 25 26 29 56 57 58 61
   node 6 size: 193533 MB
   node 6 free: 193374 MB
   node 7 cpus: 27 28 30 31 59 60 62 63
   node 7 size: 193505 MB
   node 7 free: 193356 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  20  20  20  20  20  20
     1:  11  10  20  20  20  20  20  20
     2:  20  20  10  11  20  20  20  20
     3:  20  20  11  10  20  20  20  20
     4:  20  20  20  20  10  11  20  20
     5:  20  20  20  20  11  10  20  20
     6:  20  20  20  20  20  20  10  11
     7:  20  20  20  20  20  20  11  10

 From /proc/meminfo
    MemTotal:       1584980344 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.2 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.2"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
```

(Continued on next page)

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Platform Notes (Continued)

```
     ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

 uname -a:
   Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
   x86_64 x86_64 x86_64 GNU/Linux


Kernel self-reported vulnerability status:

 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
 tsx_async_abort:                      Not affected

 run-level 3 Dec 27 10:00

 SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   838G   35G  803G   5% /home

 From /sys/devices/virtual/dmi/id
    BIOS:    Lenovo M5E107I-1.01 11/02/2020
    Vendor:  Lenovo
    Product: ThinkSystem SR850 V2
    Product Family: ThinkSystem
    Serial:  1234567890

 Additional information from dmidecode 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:
    48x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

 (End of data from sysinfo program)
Memory on this system run at 2933 MHz due to CPU limitation.
```

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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) C Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
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) C++ Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

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`

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Base Portability Flags (Continued)

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:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc
```

C++ benchmarks:
```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc
```

Fortran benchmarks:
```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/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-ic19.1u1-official-linux64_revA.html
  http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.html

You can also download the XML flags sources by saving the following links:
  http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
  http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Cooperlake-A.xml

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-12-26 21:02:26-0500.
Report generated on 2021-01-19 16:57:40 by CPU2017 PDF formatter v6255.
Originally published on 2021-01-19.