SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECrate2017_int_base = 1000

ThinkSystem SR950
(2.70 GHz, Intel Xeon Platinum 8280)

SPECrate2017_int_peak = Not Run

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

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018

Benchmark	Copies	Result
500.perlbench_r	336	818
502.gcc_r	336	689
505.mcf_r	336	1300
520.omnetpp_r	336	620
523.xalancbmk_r	336	1040
525.x264_r	336	2140
531.deepsjeng_r	336	891
541.leela_r	336	866
548.exchange2_r	336	1920
557.xz_r	336	688

Scale: 0 100 200 300 400 500 600 700 800 900 1000 1150 1300 1450 1600 1750 1900 2150

——— SPECrate2017_int_base (1000)

Hardware

CPU Name: Intel Xeon Platinum 8280
 Max MHz.: 4000
 Nominal: 2700
Enabled: 168 cores, 6 chips, 2 threads/core
Orderable: 2,4,6,8 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 38.5 MB I+D on chip per chip
 Other: None
Memory: 2304 GB (72 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 960 GB tmpfs
Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP4 (x86_64)
 Kernel 4.12.14-94.41-default
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++
 Compiler Build 20181018 for Linux;
 Fortran: Version 19.0.1.144 of Intel Fortran
 Compiler Build 20181018 for Linux
Parallel: No
Firmware: Lenovo BIOS Version PSE121C 1.50 released Jan-2019
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None

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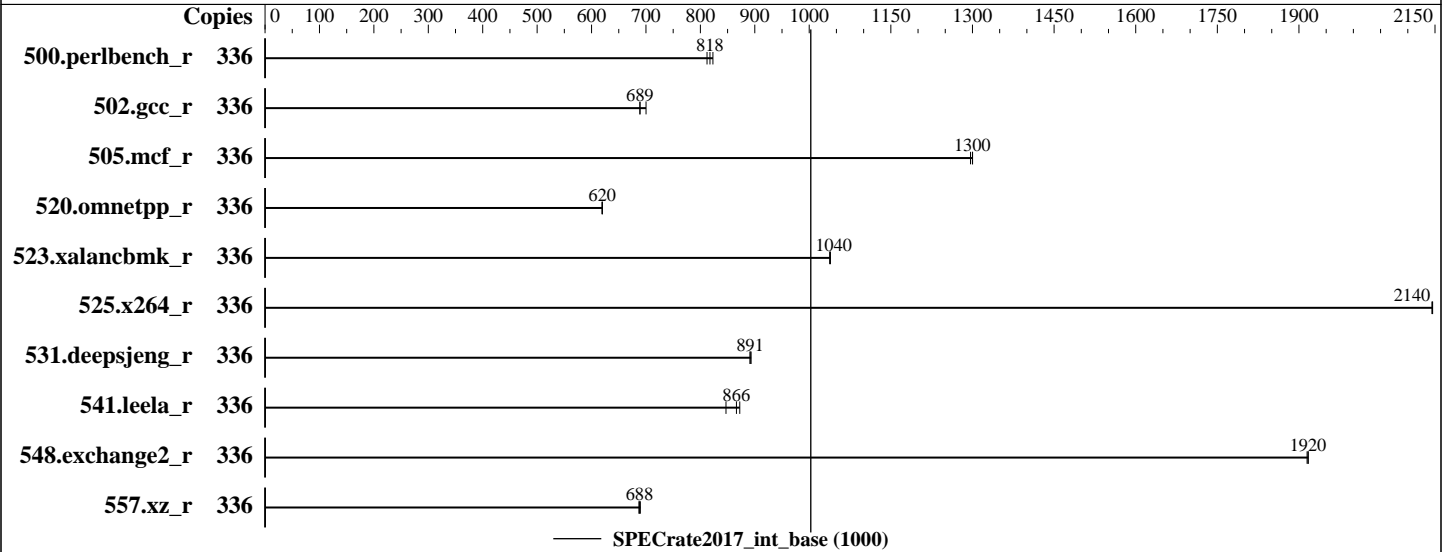SPECrate2017_int_peak = Not Run

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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	336	**654**	**818**	650	823	659	812							
502.gcc_r	336	**690**	**689**	680	700	691	689							
505.mcf_r	336	418	1300	**418**	**1300**	419	1300							
520.omnetpp_r	336	711	620	712	619	**711**	**620**							
523.xalancbmk_r	336	342	1040	**342**	**1040**	342	1040							
525.x264_r	336	274	2150	**274**	**2140**	274	2140							
531.deepsjeng_r	336	432	891	431	893	**432**	**891**							
541.leela_r	336	**642**	**866**	638	872	657	847							
548.exchange2_r	336	**459**	**1920**	460	1910	459	1920							
557.xz_r	336	526	690	**527**	**688**	528	687							

SPECrate2017_int_base =	**1000**
SPECrate2017_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"
Tmpfs filesystem can be set with:
 mount -t tmpfs -o size=960g tmpfs /home

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"
 Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.5
 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>
Yes: 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.

(Continued on next page)

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Test Date: Mar-2019
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General Notes (Continued)

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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4)
is mitigated in the system as tested and documented.

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance
Trusted Execution Technology set to Enable
DCU Streamer Prefetcher set to Disable
SNC set to Enable
Patrol Scrub set to Disable
Stale AtoS set to Enable
 Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on sles12sp4 Sat Mar 30 04:42:52 2019

 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 8280 CPU @ 2.70GHz
       6  "physical id"s (chips)
       336 "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 : 28
       siblings  : 56
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 4: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 6: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30

 From lscpu:
```

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CPU2017 License: 9017		**Test Date:**	Mar-2019
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Apr-2019
Tested by:	Lenovo Global Technology	**Software Availability:**	Dec-2018

Platform Notes (Continued)

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                336
On-line CPU(s) list:   0-335
Thread(s) per core:    2
Core(s) per socket:    28
Socket(s):             6
NUMA node(s):          12
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Platinum 8280 CPU @ 2.70GHz
Stepping:              6
CPU MHz:               2700.000
CPU max MHz:           4000.0000
CPU min MHz:           1000.0000
BogoMIPS:              5400.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              39424K
NUMA node0 CPU(s):     0-3,7-9,14-17,21-23,168-171,175-177,182-185,189-191
NUMA node1 CPU(s):     4-6,10-13,18-20,24-27,172-174,178-181,186-188,192-195
NUMA node2 CPU(s):     28-31,35-37,42-45,49-51,196-199,203-205,210-213,217-219
NUMA node3 CPU(s):     32-34,38-41,46-48,52-55,200-202,206-209,214-216,220-223
NUMA node4 CPU(s):     56-59,63-65,70-73,77-79,224-227,231-233,238-241,245-247
NUMA node5 CPU(s):     60-62,66-69,74-76,80-83,228-230,234-237,242-244,248-251
NUMA node6 CPU(s):     84-87,91-93,98-101,105-107,252-255,259-261,266-269,273-275
NUMA node7 CPU(s):     88-90,94-97,102-104,108-111,256-258,262-265,270-272,276-279
NUMA node8 CPU(s):
112-115,119-121,126-129,133-135,280-283,287-289,294-297,301-303
NUMA node9 CPU(s):
116-118,122-125,130-132,136-139,284-286,290-293,298-300,304-307
NUMA node10 CPU(s):
140-143,147-149,154-157,161-163,308-311,315-317,322-325,329-331
NUMA node11 CPU(s):
144-146,150-153,158-160,164-167,312-314,318-321,326-328,332-335
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 cdp_l3 invpcid_single ssbd
mba ibrs ibpb stibp 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
```

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Platform Notes (Continued)

```
     clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
     cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke
     avx512_vnni flush_l1d arch_capabilities

  /proc/cpuinfo cache data
    cache size : 39424 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 12 nodes (0-11)
    node 0 cpus: 0 1 2 3 7 8 9 14 15 16 17 21 22 23 168 169 170 171 175 176 177 182 183 184
    185 189 190 191
    node 0 size: 193117 MB
    node 0 free: 192322 MB
    node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 172 173 174 178 179 180 181 186 187
    188 192 193 194 195
    node 1 size: 193528 MB
    node 1 free: 192919 MB
    node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 196 197 198 199 203 204 205 210
    211 212 213 217 218 219
    node 2 size: 193528 MB
    node 2 free: 189698 MB
    node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 200 201 202 206 207 208 209 214
    215 216 220 221 222 223
    node 3 size: 193528 MB
    node 3 free: 192947 MB
    node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79 224 225 226 227 231 232 233 238
    239 240 241 245 246 247
    node 4 size: 193528 MB
    node 4 free: 192942 MB
    node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83 228 229 230 234 235 236 237 242
    243 244 248 249 250 251
    node 5 size: 193500 MB
    node 5 free: 192382 MB
    node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107 252 253 254 255 259 260 261
    266 267 268 269 273 274 275
    node 6 size: 193528 MB
    node 6 free: 192942 MB
    node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111 256 257 258 262 263 264
    265 270 271 272 276 277 278 279
    node 7 size: 193528 MB
    node 7 free: 192946 MB
    node 8 cpus: 112 113 114 115 119 120 121 126 127 128 129 133 134 135 280 281 282 283
    287 288 289 294 295 296 297 301 302 303
    node 8 size: 193528 MB
    node 8 free: 183739 MB
    node 9 cpus: 116 117 118 122 123 124 125 130 131 132 136 137 138 139 284 285 286 290
```

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

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Platform Notes (Continued)

```
   291 292 293 298 299 300 304 305 306 307
   node 9 size: 193528 MB
   node 9 free: 192939 MB
   node 10 cpus: 140 141 142 143 147 148 149 154 155 156 157 161 162 163 308 309 310 311
   315 316 317 322 323 324 325 329 330 331
   node 10 size: 193528 MB
   node 10 free: 192935 MB
   node 11 cpus: 144 145 146 150 151 152 153 158 159 160 164 165 166 167 312 313 314 318
   319 320 321 326 327 328 332 333 334 335
   node 11 size: 193526 MB
   node 11 free: 192928 MB
   node distances:
   node    0    1    2    3    4    5    6    7    8    9   10   11
     0:   10   11   21   21   31   31   21   21   21   21   20   20
     1:   11   10   21   21   31   31   21   21   21   21   20   20
     2:   21   21   10   11   21   21   31   31   31   31   20   20
     3:   21   21   11   10   21   21   31   31   31   31   20   20
     4:   31   31   21   21   10   11   21   21   31   31   20   20
     5:   31   31   21   21   11   10   21   21   31   31   20   20
     6:   21   21   31   31   21   21   10   11   31   31   20   20
     7:   21   21   31   31   21   21   11   10   31   31   20   20
     8:   21   21   31   31   31   31   31   31   10   11   20   20
     9:   21   21   31   31   31   31   31   31   11   10   20   20
    10:   20   20   20   20   20   20   20   20   20   20   10   20
    11:   20   20   20   20   20   20   20   20   20   20   20   10

 From /proc/meminfo
    MemTotal:       2377629848 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    SuSE-release:
       SUSE Linux Enterprise Server 12 (x86_64)
       VERSION = 12
       PATCHLEVEL = 4
       # This file is deprecated and will be removed in a future service pack or release.
       # Please check /etc/os-release for details about this release.
    os-release:
       NAME="SLES"
       VERSION="12-SP4"
       VERSION_ID="12.4"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

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Platform Notes (Continued)

```
  uname -a:
     Linux sles12sp4 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
     x86_64 x86_64 x86_64 GNU/Linux

  Kernel self-reported vulnerability status:

  CVE-2017-5754 (Meltdown):           Not affected
  CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
  CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
  IBPB, IBRS_FW

  run-level 3 Mar 30 00:09

  SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
     Filesystem      Type   Size  Used Avail Use% Mounted on
     tmpfs           tmpfs  960G  8.3G  952G   1% /home

  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.
    BIOS Lenovo -[PSE121C-1.50]- 01/16/2019
    Memory:
     24x NO DIMM NO DIMM
     72x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

  (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
  CC   500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
       557.xz_r(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
  CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
       541.leela_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
```

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------

==========================================================================
  FC  548.exchange2_r(base)
--------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

C++ benchmarks:
`icpc -m64`

Fortran benchmarks:
`ifort -m64`

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:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
`-qopt-mem-layout-trans=4`
`-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64`
`-lqkmalloc`

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Base Optimization Flags (Continued)

C++ benchmarks:
```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

Fortran benchmarks:
```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.xml

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

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