SPEC® CPU2017 Integer Rate Result

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Lenovo Global Technology

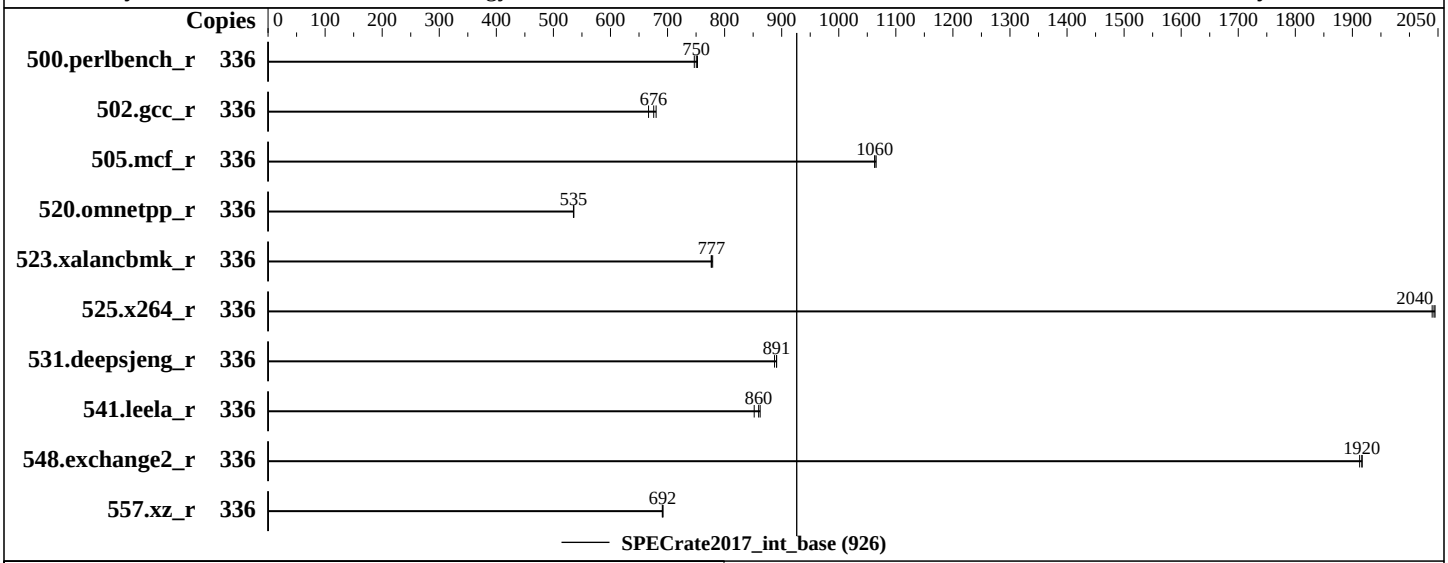
ThinkSystem SR950
(2.70 GHz, Intel Xeon Platinum 8280)

SPECrate2017_int_base = 926

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: Oct-2018



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 19.0.0.117 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.0.117 of Intel Fortran Compiler 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:	jemalloc memory allocator V5.0.1

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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	**713**	**750**	716	747	711	752							
502.gcc_r	336	700	680	714	667	**704**	**676**							
505.mcf_r	336	511	1060	510	1070	**511**	**1060**							
520.omnetpp_r	336	**823**	**535**	824	535	823	536							
523.xalancbmk_r	336	457	776	455	779	**457**	**777**							
525.x264_r	336	**288**	**2040**	288	2040	288	2040							
531.deepsjeng_r	336	**432**	**891**	434	887	432	891							
541.leela_r	336	**647**	**860**	645	862	653	852							
548.exchange2_r	336	**459**	**1920**	459	1920	460	1910							
557.xz_r	336	525	691	**525**	**692**	524	692							

SPECrate2017_int_base = 926

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/lib/ia32:/home/cpu2017-1.0.5-ic19/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic19/je5.0.1-32:/home/cpu2017-1.0.5-ic19/je5.0.1-64"
 Binaries compiled on a system with 1x Intel Core i9-799X 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)
```

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General Notes (Continued)

```
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (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.
 jemalloc, a general purpose malloc implementation
 built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

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/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on sles12sp4 Thu Mar 14 00:05:21 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
```

(Continued on next page)

Platform Notes (Continued)

```
       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:
      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
```

(Continued on next page)

Platform Notes (Continued)

```
      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
      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: 193116 MB
   node 0 free: 192675 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: 193112 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: 193322 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: 193333 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: 193340 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: 193528 MB
   node 5 free: 193324 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: 176644 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: 193500 MB
   node 7 free: 193310 MB
   node 8 cpus: 112 113 114 115 119 120 121 126 127 128 129 133 134 135 280 281 282 283
```

(Continued on next page)

Platform Notes (Continued)

```
   287 288 289 294 295 296 297 301 302 303
   node 8 size: 193528 MB
   node 8 free: 193218 MB
   node 9 cpus: 116 117 118 122 123 124 125 130 131 132 136 137 138 139 284 285 286 290
   291 292 293 298 299 300 304 305 306 307
   node 9 size: 193528 MB
   node 9 free: 193071 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: 193230 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: 193234 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:       2377628460 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"
```

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Platform Notes (Continued)

```
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp4"

 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 14 00:02

 SPEC is set to: /home/cpu2017-1.0.5-ic19
    Filesystem     Type   Size  Used Avail Use% Mounted on
    tmpfs          tmpfs  960G   11G  950G   2% /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 19.0.0.117 Build 20180804
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)
```


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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
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=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

C++ benchmarks:
```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

Fortran benchmarks:
```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic19.0-official-linux64.2019-01-15.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-ic19.0-official-linux64.2019-01-15.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-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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