**SPEC® CPU2017 Integer Speed Result**

**Lenovo Global Technology**

ThinkSystem ST250
(3.20 GHz, Intel Xeon E-2104G)

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Hardware Availability:** Nov-2018

**Software Availability:** Aug-2018

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_int_base =</th>
<th>SPECspeed2017_int_peak =</th>
</tr>
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<tbody>
<tr>
<td>4</td>
<td>7.11</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Software**

- **OS:** SUSE Linux Enterprise Server 15 (x86_64)
- **Kernel:** 4.12.14-25.13-default
- **Compiler:** C/C++: Version 18.0.2.199 of Intel C/C++
- **Compiler for Linux:** Fortran: Version 18.0.2.199 of Intel Fortran
- **Compiler for Linux:**
- **Parallel:** Yes
- **Firmware:** Lenovo BIOS Version ISE105E 1.01 released Oct-2018
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:**

**Hardware**

- **CPU Name:** Intel Xeon E-2104G
- **Max MHz.:** 3200
- **Nominal:** 3200
- **Enabled:** 4 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 256 KB I+D on chip per core
- **L3:** 8 MB I+D on chip per chip
- **Other:** None
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None
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## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
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<td>620.omnetpp_s</td>
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<td>5.29</td>
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<td>5.33</td>
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<tr>
<td>623.xalancbmk_s</td>
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<td>631.deepsjeng_s</td>
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<td>4.79</td>
<td>299</td>
<td>4.79</td>
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<td></td>
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<tr>
<td>641.leela_s</td>
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<td>648.exchange2_s</td>
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<td>11.6</td>
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<td>11.6</td>
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<td></td>
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<td>657.xz_s</td>
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<td>7.54</td>
<td>820</td>
<td>7.54</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited" 

## General Notes

Environment variables set by runcpu before the start of the run:  
KMP_AFFINITY = "granularity=fine,scatter"  
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic18.0u2/lib/ia32:/home/cpu2017-1.0.5-ic18.0u2/lib/intel64"  
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/cpu2017-1.0.5-ic18.0u2/je5.0.1-32:/home/cpu2017-1.0.5-ic18.0u2/je5.0.1-64"  
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-6700K 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  
```  
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.  
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.  
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Hardware Availability: Nov-2018
Software Availability: Aug-2018

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
CPU P-state Control set to Legacy
Sysinfo program /home/cpu2017-1.0.5-ic18.0u2/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-nnmv Thu Nov 15 10:11:09 2018

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-2104G CPU @ 3.20GHz
  1 "physical id"'s (chips)
  4 "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 : 4
siblings : 4
physical 0: cores 0 1 2 3

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 4
On-line CPU(s) list: 0-3
Thread(s) per core: 1
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2104G CPU @ 3.20GHz
Stepping: 10
CPU MHz: 3200.000
CPU max MHz: 3200.0000
CPU min MHz: 800.0000
BogoMIPS: 6384.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-3

(Continued on next page)
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**SPECspeed2017_int_base = 7.11**

**SPECspeed2017_int_peak = Not Run**

**Platform Notes (Continued)**

Flags:
- fpu
- vme
- de
- pse
- tsc
- msr
- pae
- mce
- cmov
- pat
- pse36
- clflush
- dts
- acpi
- mmx
- fxsr
- sse
- sse2
- ss
- ht
- tm
- pbe
- syscall
- nx
- pdpe1gb
- rdscp
- lm
- constant_tsc
- art
- arch_perfmon
- pebs
- bts
- rep_good
- nopl
- xtopology
- nonstop_tsc
- cpuid
- aperf
- mperf
- tsc_known_freq
- pni
- pclmulqdq
- dtes64
- monitor
- ds_cpl
- vmx
- smx
- est
- tm2
- ssse3
- sdbg
- fma
- cx16
- xtpre
- pdcm
- pcid
- sse4_1
- sse4_2
- x2apic
- movbe
- popcnt
- tsc_deadline_timer
- aes
- xsave
- avx
- f16c
- rdrand
- lahf_lm
- abm
- 3nowprefetch
- cpuid
- fault
- epb
- invpcid_single
- pt
- ssbd
- ibrs
- ibpb
- stibp
- tpr_shadow
- vmprior
- ipt
- vpid
- ems
- invpcid
- rtm
- mpx
- rdseed
- adx
- smap
- clflushopt
- intel_pt
- xsaveopt
- xsave
- xgetbv1
- xsavec
- xss
- dtherm
- arat
- pln
- pts
- hwp
- hwp_notify
- hwp_act_window
- hwp_epp
- flush_lld

```
/proc/cpuinfo cache data
cache size : 8192 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
- node 0 size: 64367 MB
- node 0 free: 62085 MB
- node distances:
  - node 0
    - 0: 10

From `/proc/meminfo`

- MemTotal: 65912688 KB
- HugePages_Total: 0
- Hugepagesize: 2048 KB

From `/etc/*release* /etc/*version*`

```
os-release:
  NAME="SLES"
  VERSION="15"
  VERSION_ID="15"
  PRETTY_NAME="SUSE Linux Enterprise Server 15"
  ID="sles"
  ID_LIKE="suse"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:15"
```

```
uname -a:
  x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

**CVE-2017-5754 (Meltdown):**

Mitigation: PTI

(Continued on next page)
**Platform Notes (Continued)**

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 Nov 14 18:00

SPEC is set to: /home/cpu2017-1.0.5-ic18.0u2

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 -[ISE105E-1.01]- 10/11/2018
Memory:
  4x Micron 18ASF2G72AZ-2G6D1 16 GB 2 rank 2666

(End of data from sysinfo program)

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**Compiler Version Notes**

```
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)

icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)

icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

FC 648.exchange2_s(base)

ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-L/usr/local/je5.0.1-64/lib -ljemalloc
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The flags files that were used to format this result can be browsed at:

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-H.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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