## Lenovo Global Technology

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

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base</th>
<th>26.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

### Copyright 2017-2018 Standard Performance Evaluation Corporation

### Lenovo Global Technology

**CPU2017 License:** 9017  **Test Date:** Nov-2018

**Test Sponsor:** Lenovo Global Technology  **Hardware Availability:** Nov-2018

**Tested by:** Lenovo Global Technology  **Software Availability:** Aug-2018

### Hardware

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

<table>
<thead>
<tr>
<th>OS:</th>
<th>SUSE Linux Enterprise Server 15 (x86_64)</th>
</tr>
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<tbody>
<tr>
<td>Compiler:</td>
<td>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</td>
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<tr>
<td>Parallel:</td>
<td>No</td>
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<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version ISE105E 1.01 released Oct-2018</td>
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<tr>
<td>File System:</td>
<td>btrfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
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<tr>
<td>Peak Pointers:</td>
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<tr>
<td>Other:</td>
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## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>503.bwaves_r</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

### 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"

### General Notes

Environment variables set by runcpu before the start of the run:

```
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"
```

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.

(Continued on next page)
**Lenovo Global Technology**

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

<table>
<thead>
<tr>
<th>SPECrate2017_fp_base = 26.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_fp_peak = Not Run</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Lenovo Global Technology</th>
<th>Lenovo Global Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU2017 License:</strong> 9017</td>
<td><strong>Test Date:</strong> Nov-2018</td>
</tr>
<tr>
<td><strong>Test Sponsor:</strong> Lenovo Global Technology</td>
<td><strong>Hardware Availability:</strong> Nov-2018</td>
</tr>
<tr>
<td><strong>Tested by:</strong> Lenovo Global Technology</td>
<td><strong>Software Availability:</strong> Aug-2018</td>
</tr>
</tbody>
</table>

**General Notes (Continued)**

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  
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 Wed Nov 14 20:39:09 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:           3200.000
```
Lenovo Global Technology
ThinkSystem ST250
(3.20 GHz, Intel Xeon E-2104G)

| SPECrate2017_fp_base | 26.5 |
| SPECrate2017_fp_peak | Not Run |

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

Platform Notes (Continued)

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

Flags: 
- fpu
- vme
- de
- pse
- mce
- cmov
- pat
- pse36
- clflush
- dts
- acpi
- mmmx
- fxsr
- sse
- sse2
- ss
- ht
- tm
- pbe
- syscall
- nx
- pdelgb
- rdtscp
- tsc
- known_freq
- x2apic
- movbe
- popcnt
- tsc_known_freq
- pni
- pclmulqdq
- dtes64
- monitor
- ds_cpl
- vmx
- smx
- est
- tm
- pbe
- syscall
- nx
- pdelgb
- rdtscp
- tsc
- known_freq
- x2apic
- movbe
- popcnt
- tsc_known_freq
- pni
- pclmulqdq
- dtes64
- monitor
- ds_cpl
- vmx
- smx
- est
- tm
- pbe

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.

meminfo

From /proc/cpuinfo

From /proc/meminfo

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

(Continued on next page)
Lenovo Global Technology

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

SPECrate2017_fp_base = 26.5
SPECrate2017_fp_peak = Not Run

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

Platform Notes (Continued)

uname -a:
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Mitigation: PTI
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
Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda2      btrfs  895G   18G  876G   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 -[ISE105E-1.01]- 10/11/2018
Memory:
    4x Micron 18ASF2G72AZ-2G6D1 16 GB 2 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CC  511.povray_r(base) 526.blender_r(base)

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST250
(3.20 GHz, Intel Xeon E-2104G)

SPECrates:
SPECrate2017_fp_base = 26.5
SPECrate2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Nov-2018
Hardware Availability: Nov-2018
Tested by: Lenovo Global Technology
Software Availability: Aug-2018

Compiler Version Notes (Continued)

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

==============================================================================
FC 507.cactuBSSN_r(base)
==============================================================================
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
FC 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
==============================================================================
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
CC 521.wrf_r(base) 527.cam4_r(base)
==============================================================================
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
icc (ICC) 18.0.2 20180210
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
**Lenovo Global Technology**

**ThinkSystem ST250**

(3.20 GHz, Intel Xeon E-2104G)

<table>
<thead>
<tr>
<th>Spec CPU2017 Floating Point Rate Result</th>
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<td>Lenovo Global Technology</td>
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<td>Test Sponsor: Lenovo Global Technology</td>
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<td>Tested by: Lenovo Global Technology</td>
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</tbody>
</table>

| CPU2017 License: 9017                   |
| Test Date: Nov-2018                    |
| Hardware Availability: Nov-2018        |
| Software Availability: Aug-2018        |

**Base Compiler Invocation (Continued)**

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

**Base Portability Flags**

503.bwaves_r: -DSPEC_LP64
507.caCTuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.llvm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
Lenovo Global Technology
ThinkSystem ST250
(3.20 GHz, Intel Xeon E-2104G)

SPECrate2017_fp_base = 26.5
SPECrate2017_fp_peak = Not Run

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

Test Date: Nov-2018
Hardware Availability: Nov-2018
Software Availability: Aug-2018

Base Optimization Flags (Continued)

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs

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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