## Lenovo Global Technology

**ThinkSystem ST50**  
(3.30 GHz, Intel Xeon E-2124)

**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

<table>
<thead>
<tr>
<th>Spec Test</th>
<th>Copies</th>
<th>Specrate2017_int_base</th>
<th>Specrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>4</td>
<td>20.5</td>
<td>Not Run</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>4</td>
<td>22.8</td>
<td></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>4</td>
<td>27.5</td>
<td></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>4</td>
<td>13.7</td>
<td></td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>4</td>
<td>23.8</td>
<td></td>
</tr>
<tr>
<td>525.x264_r</td>
<td>4</td>
<td>51.0</td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>4</td>
<td>21.3</td>
<td></td>
</tr>
<tr>
<td>541.leela_r</td>
<td>4</td>
<td>17.6</td>
<td></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>4</td>
<td>50.0</td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>4</td>
<td>13.8</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon E-2124  
- **Max MHz.:** 4300  
- **Nominal:** 3300  
- **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 480 GB SATA SSD  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux Server release 7.5 (Maipo)  
- **Kernel:** 3.10.0-862.11.6.el7.x86_64  
- **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:** Fortran Compiler  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version ITE101U released Sep-2018  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** Not Applicable  
- **Other:** jemalloc memory allocator V5.0.1
# SPEC CPU2017 Integer Rate Result

**Lenovo Global Technology**  
**ThinkSystem ST50 (3.30 GHz, Intel Xeon E-2124)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
</tbody>
</table>

**Test Details**

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

## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</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>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>4</td>
<td>314</td>
<td>20.3</td>
<td>311</td>
<td>20.5</td>
<td>310</td>
<td>20.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>4</td>
<td>249</td>
<td>22.8</td>
<td>249</td>
<td>22.8</td>
<td>249</td>
<td>22.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>4</td>
<td>235</td>
<td>27.6</td>
<td>236</td>
<td>27.3</td>
<td>235</td>
<td>27.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>4</td>
<td>382</td>
<td>13.7</td>
<td>382</td>
<td>13.7</td>
<td>382</td>
<td>13.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>523.xalanbmk_r</td>
<td>4</td>
<td>180</td>
<td>23.4</td>
<td>177</td>
<td>23.8</td>
<td>178</td>
<td>23.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>525.x264_r</td>
<td>4</td>
<td>137</td>
<td>51.0</td>
<td>137</td>
<td>51.1</td>
<td>137</td>
<td>51.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>4</td>
<td>215</td>
<td>21.3</td>
<td>215</td>
<td>21.3</td>
<td>216</td>
<td>21.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>541.leela_r</td>
<td>4</td>
<td>377</td>
<td>17.6</td>
<td>378</td>
<td>17.5</td>
<td>377</td>
<td>17.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>4</td>
<td>210</td>
<td>50.0</td>
<td>209</td>
<td>50.1</td>
<td>211</td>
<td>49.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>4</td>
<td>313</td>
<td>13.8</td>
<td>313</td>
<td>13.8</td>
<td>313</td>
<td>13.8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| SPECrate2017_int_base = 23.7 |
| 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 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.
- 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.

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

ThinkSystem ST50  
*(3.30 GHz, Intel Xeon E-2124)*  

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>23.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

**General Notes (Continued)**

jemalloc, a general purpose malloc implementation  
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

**Platform Notes**

BIOS configuration:  
ICE Performance Mode set to 4HD Cooling Mode  
Sysinfo program /home/cpu2017-1.0.5-ic18.0u2/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on st50 Thu Nov 22 18:19:31 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-2124 CPU @ 3.30GHz  
- 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-2124 CPU @ 3.30GHz  
- Stepping: 10  
- CPU MHz: 3899.816  
- CPU max MHz: 4300.0000  
- CPU min MHz: 800.0000  
- BogoMIPS: 6624.00  
- Virtualization: VT-x

*(Continued on next page)*
Lenovo Global Technology
ThinkSystem ST50
(3.30 GHz, Intel Xeon E-2124)

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

SPECrate2017_int_base = 23.7
SPECrate2017_int_peak = Not Run

Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-3
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
aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movctpor popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm lm_abm 3dnowprefetch epb intel_pt ssbd ibpb stibp
tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsave xsetbv1 dtherm ida
arat pln pts hwp hwp_notify hwp_act_window hwp_epp spec_ctrl intel_stibp flush_l1d

From /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)
ode 0 cpus: 0 1 2 3
node 0 size: 65412 MB
node 0 free: 52694 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65850808 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.5 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.5"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.5 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.5 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.5:ga:server

(Continued on next page)
Lenovo Global Technology

ThinkSystem ST50
(3.30 GHz, Intel Xeon E-2124)

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

SPECrate2017_int_base = 23.7
SPECrate2017_int_peak = Not Run

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

Platform Notes (Continued)

uname -a:
    Linux st50 3.10.0-862.11.6.el7.x86_64 #1 SMP Fri Aug 10 16:55:11 UTC 2018 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: Load fences, __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS (kernel)

run-level 3 Nov 22 11:07

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

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   381G   15G  367G   4% /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 ITE101U 09/12/2018
Memory:
    4x SK Hynix HMA82GU7CJR8N-VK 16 GB 2 rank 2667

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

*****************************************************************************
FC  548.exchange2_r(base)
*****************************************************************************

(Continued on next page)
Lenovo Global Technology
ThinkSystem ST50
(3.30 GHz, Intel Xeon E-2124)

SPECrater2017_int_base = 23.7
SPECrater2017_int_peak = Not Run

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

Compiler Version Notes (Continued)

ifort (IFORT) 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

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:
-W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -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

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

**ThinkSystem ST50**  
(3.30 GHz, Intel Xeon E-2124)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base = 23.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak = Not Run</td>
</tr>
</tbody>
</table>

**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)

Fortran benchmarks (continued):
- `-qopt-mem-layout-trans=3 -nostandard-realloc-lhs`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

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:

---

SPEC is a registered trademark of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2017 v1.0.5 on 2018-11-22 05:19:29-0500.  
Report generated on 2018-12-11 14:56:26 by CPU2017 PDF formatter v6067.  
Originally published on 2018-12-11.