**SPEC® CPU2017 Integer Rate Result**

**Lenovo Global Technology**

ThinkSystem ST50  
(3.70 GHz, Intel Xeon E-2176G)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
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<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>Not Run</td>
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**CPU2017 License:** 9017  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

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<tr>
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<tbody>
<tr>
<td>Nov-2018</td>
<td>Nov-2018</td>
<td>Aug-2018</td>
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</table>

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon E-2176G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.</td>
<td>4700</td>
</tr>
<tr>
<td>Nominal</td>
<td>3700</td>
</tr>
<tr>
<td>Enabled</td>
<td>6 cores, 1 chip, 2 threads/core</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>12 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 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
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**Software**

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux Server release 7.5 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.2.199 of Intel C/C++</td>
</tr>
<tr>
<td>Fortran:</td>
<td>Compiler for Linux:</td>
</tr>
<tr>
<td>Compiler for Linux:</td>
<td>Fortran: Version 18.0.2.199 of Intel Fortran</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Lenovo BIOS Version ITE101U released Sep-2018</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Other:</td>
<td>jemalloc memory allocator V5.0.1</td>
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**Copies**

<table>
<thead>
<tr>
<th>SPECrate2017_int_base (40.5)</th>
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<tbody>
<tr>
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<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>500.perlbench_r 12 35.4</td>
</tr>
<tr>
<td>502.gcc_r 12 35.8</td>
</tr>
<tr>
<td>505.mcf_r 12 45.3</td>
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<tr>
<td>520.omnetpp_r 12 19.5</td>
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<tr>
<td>523.xalancbmk_r 12 37.4</td>
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<tr>
<td>525.x264_r 12 90.7</td>
</tr>
<tr>
<td>531.deepsjeng_r 12 39.4</td>
</tr>
<tr>
<td>541.leela_r 12 36.4</td>
</tr>
<tr>
<td>548.exchange2_r 12 85.3</td>
</tr>
<tr>
<td>557.xz_r 12 25.7</td>
</tr>
</tbody>
</table>

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

ThinkSystem ST50
(3.70 GHz, Intel Xeon E-2176G)

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

SPECrate2017_int_base = 40.5
SPECrate2017_int_peak = Not Run

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

Results Table

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<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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</thead>
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<tr>
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<td>542</td>
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<tr>
<td>502.gcc_r</td>
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<td>475</td>
<td>35.8</td>
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<td>35.9</td>
<td>479</td>
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</tr>
<tr>
<td>505.mcf_r</td>
<td>12</td>
<td>416</td>
<td>46.6</td>
<td>431</td>
<td>45.0</td>
<td>428</td>
<td>45.3</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>12</td>
<td>808</td>
<td>19.5</td>
<td>808</td>
<td>19.5</td>
<td>818</td>
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<tr>
<td>523.xalancbmk_r</td>
<td>12</td>
<td>332</td>
<td>38.2</td>
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<td>37.4</td>
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<tr>
<td>525.x264_r</td>
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<td>90.9</td>
<td>232</td>
<td>90.6</td>
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<tr>
<td>531.deepsjeng_r</td>
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<td>349</td>
<td>39.4</td>
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<td>541.leela_r</td>
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<td>36.2</td>
<td>546</td>
<td>36.4</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>12</td>
<td>369</td>
<td>85.2</td>
<td>369</td>
<td>85.3</td>
<td>364</td>
<td>86.3</td>
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<tr>
<td>557.xz_r</td>
<td>12</td>
<td>501</td>
<td>25.9</td>
<td>504</td>
<td>25.7</td>
<td>504</td>
<td>25.7</td>
</tr>
</tbody>
</table>

SPECrate2017_int_base = 40.5
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.
Lenovo Global Technology
ThinkSystem ST50
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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 Fri Nov 2 22:39:45 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-2176G CPU @ 3.70GHz
1 "physical id"s (chips)
12 "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 : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2176G CPU @ 3.70GHz
Stepping: 10
CPU MHz: 1795.574
CPU max MHz: 4700.0000
CPU min MHz: 800.0000
BogoMIPS: 7392.00
Virtualization: VT-x

(Continued on next page)
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Platform Notes (Continued)

L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11

Flags: fpu vme de pse tsc msr pae 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 movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch epb intel_pt ssbd ibpb stibp tpr_shadow vni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsave xgetbv1 dtherm ida arat pln pts hwp hwp_notify hwp_act_window hwp_epp spec_ctrl intel_stibp flush_l1d

/proc/cpuinfo cache data
  cache size: 12288 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 4 5 6 7 8 9 10 11
  node 0 size: 65371 MB
  node 0 free: 61779 MB
  node distances:
    node 0
    0: 10

From /proc/meminfo
  MemTotal: 65807636 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)
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Copyright 2017-2018 Standard Performance Evaluation Corporation

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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 2 16:03

SPEC is set to: /home/cpu2017-1.0.5-ic18.0u2
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda2      xfs   381G  338G   43G  89% /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)
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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:
icc -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)
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</tbody>
</table>

### 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:

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-CFL-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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