# SPEC® CPU2017 Integer Rate Result

**Fujitsu**

PRIMERGY RX2540 M4, Intel Xeon Bronze 3104, 1.70GHz

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>33.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>35.2</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 19

**Test Sponsor:** Fujitsu

**Test Date:** Mar-2018

**Hardware Availability:** Jul-2017

**Tested by:** Fujitsu

**Software Availability:** Feb-2018

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate2017_int_base</th>
<th>SPECrate2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>12</td>
<td>33.0</td>
<td>35.2</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>12</td>
<td>32.2</td>
<td>36.6</td>
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<tr>
<td>505.mcf_r</td>
<td>12</td>
<td>38.7</td>
<td>38.7</td>
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<tr>
<td>520.omnetpp_r</td>
<td>12</td>
<td>24.4</td>
<td>38.7</td>
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<tr>
<td>523.xalancbmk_r</td>
<td>12</td>
<td>24.9</td>
<td>36.1</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>12</td>
<td>68.5</td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>12</td>
<td>28.2</td>
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<tr>
<td>541.leela_r</td>
<td>12</td>
<td>23.1</td>
<td>25.2</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>12</td>
<td>64.3</td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>12</td>
<td>22.3</td>
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</tbody>
</table>

## Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon Bronze 3104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.</td>
<td>1700</td>
</tr>
<tr>
<td>Nominal</td>
<td>1700</td>
</tr>
<tr>
<td>Enabled</td>
<td>12 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable</td>
<td>1,2 chips</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>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>8.25 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>384 GB (24 x 16 GB 2Rx4 PC4-2666V-R, running at 2133)</td>
</tr>
<tr>
<td>Storage</td>
<td>384 GB tmpfs</td>
</tr>
<tr>
<td>Other</td>
<td>1 x SATA HDD, 1000 GB, 7200 RPM, used for swap</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>OS</th>
<th>SUSE Linux Enterprise Server 12 SP2</th>
</tr>
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<tbody>
<tr>
<td>Compiler</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Fujitsu BIOS Version V5.0.0.12 R1.17.0 for D3384-A1x. Released Feb-2018</td>
</tr>
<tr>
<td>File System</td>
<td>tmpfs</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>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator library V5.0.1</td>
</tr>
</tbody>
</table>
SPEC CPU2017 Integer Rate Result

Fujitsu
PRIMERGY RX2540 M4, Intel Xeon Bronze 3104, 1.70GHz

SPECrate2017_int_base = 33.8
SPECrate2017_int_peak = 35.2

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
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<td>500.perlbench_r</td>
<td>12</td>
<td>684</td>
<td>27.9</td>
<td>682</td>
<td>28.0</td>
<td>687</td>
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<td>502.gcc_r</td>
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<td>32.2</td>
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<td>32.2</td>
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<td>557.xz_r</td>
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<td>22.3</td>
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<td>12</td>
<td>583</td>
</tr>
</tbody>
</table>

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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"
Set Kernel Boot Parameter: nohz_full=1-11
Set CPU frequency governor to maximum performance with:
cpupower -c all frequency-set -g performance
Set tmpfs filesystem with:
mkdir /home/memory
mount -t tmpfs -o size=384g,rw tmpfs /home/memory
Process tuning settings:
  echo 0 > /proc/sys/kernel/numa_balancing
cpu idle state set with:
cpupower idle-set -d 1

General Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/memory/speccpu/lib/ia32:/home/memory/speccpu/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/memory/speccpu/je5.0.1-32:/home/memory/speccpu/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

(Continued on next page)
Fujitsu
PRIMERGY RX2540 M4, Intel Xeon Bronze 3104, 1.70GHz

SPECrate2017_int_base = 33.8
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General Notes (Continued)

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>

jemalloc:
configured and built at default for 32bit (i686) and 64bit (x86_64) targets;
built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;

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.

Platform Notes

BIOS configuration:
DCU Streamer Prefetcher = Disabled
Override OS Energy Performance = Enabled
Energy Performance = Performance
Package C State limit = C0
LLC Dead Line Alloc = Disabled
Stale AtoS = Enabled
Sub NUMA Clustering = Disabled
IMC Interleaving = 2-way
Fan Control = Full
Sysinfo program /home/memory/speccpu/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-RX2540M4 Thu Mar 22 15:04:09 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) Bronze 3104 CPU @ 1.70GHz
    2 "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

(Continued on next page)
SPEC CPU2017 Integer Rate Result

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spec

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CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Platform Notes (Continued)

siblings : 6
physical 0: cores 0 1 2 3 4 5
physical 1: 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: 1
Core(s) per socket: 6
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3104 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1128.121
CPU max MHz: 1700.0000
CPU min MHz: 800.0000
BogoMIPS: 3392.02
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0-5
NUMA node1 CPU(s): 6-11
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 dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch arat epb invpcid_single pln pts dtcm hwp hwp_act_window hwp_epp hwp_pkg_req intel_pt rsb_ctxsx spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority ept_vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xsaves vfpoffset mmcall cmov_xmm_cx16 mmxAFFINITY

(cache data)

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)

(Continued on next page)
Platform Notes (Continued)

node 0 cpus: 0 1 2 3 4 5
node 0 size: 192540 MB
node 0 free: 183089 MB
node 1 cpus: 6 7 8 9 10 11
node 1 size: 193383 MB
node 1 free: 193003 MB
node distances:
  node 0 1
  0:  10 21
  1: 21 10

From /proc/meminfo
MemTotal:       395186180 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2

From /etc/*release* /etc/*version*
SuSE-release:
  VERSION = 12
  PATCHLEVEL = 2
  # 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-SP2"
    VERSION_ID="12.2"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
Linux linux-RX2540M4 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018
c6ce5db x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 22 14:57
SPEC is set to: /home/memory/speccpu
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 384G 8.9G 376G 3% /home/memory

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow
## Platform Notes (Continued)

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 FUJITSU // American Megatrends Inc. V5.0.0.12 R1.17.0 for D3384-A1x**

02/08/2018

Memory:

24x Samsung M393A2G40EB2-CTD 16 GB 2 rank 2666, configured at 2133

(End of data from sysinfo program)

## Compiler Version Notes

---------------------------------------------------------------------
CC  500.perlbench_r(base)  502.gcc_r(base)  505.mcf_r(base, peak)
    525.x264_r(base, peak)  557.xz_r(base, peak)
---------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------------

---------------------------------------------------------------------
CC  500.perlbench_r(peak)  502.gcc_r(peak)
---------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------------

---------------------------------------------------------------------
CXXC 520.omnetpp_r(base)  523.xalancbmk_r(base)  531.deepsjeng_r(base)
    541.leela_r(base)
---------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------------

---------------------------------------------------------------------
CXXC 520.omnetpp_r(peak)  523.xalancbmk_r(peak)  531.deepsjeng_r(peak)
    541.leela_r(peak)
---------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---------------------------------------------------------------------

---------------------------------------------------------------------
FC  548.exchange2_r(base, peak)
---------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811

(Continued on next page)
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Test Date: Mar-2018
Hardware Availability: Jul-2017
Software Availability: Feb-2018

Compiler Version Notes (Continued)
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Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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-AVX512 -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-AVX512 -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-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
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Test Date: Mar-2018
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Base Other Flags

C benchmarks:
- m64 -std=c11

C++ benchmarks:
- m64

Fortran benchmarks:
- m64

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -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

Peak Optimization Flags

C benchmarks:
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib

(Continued on next page)
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<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>Mar-2018</td>
<td><strong>Test Date:</strong></td>
</tr>
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</tr>
<tr>
<td>Feb-2018</td>
<td><strong>Software Availability:</strong></td>
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</tbody>
</table>

### Peak Optimization Flags (Continued)

500.perlbench_r (continued):
- `-ljemalloc`

502.gcc_r: `-L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32`  
- `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo`  
- `-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3`  
- `-L/usr/local/je5.0.1-32/lib -ljemalloc`

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

525.x264_r: `basepeak = yes`

557.xz_r: Same as 505.mcf_r

### C++ benchmarks:

520.omnetpp_r: `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo`  
- `-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3`  
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

523.xalancbmk_r: `-L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32`  
- `-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo`  
- `-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3`  
- `-L/usr/local/je5.0.1-32/lib -ljemalloc`

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

### Fortran benchmarks:

548.exchange2_r: `basepeak = yes`

### Peak Other Flags

**C benchmarks (except as noted below):**
- `-m64 -std=c11`

502.gcc_r: `-m32 -std=c11`

**C++ benchmarks (except as noted below):**
- `-m64`

(Continued on next page)
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CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

---

Peak Other Flags (Continued)

523.xalancbmk_r: -m32

Fortran benchmarks:

- m64

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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/Fujitsu-Platform-Settings-V1.2-SKL-RevE.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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