## SPEC® CPU2017 Integer Rate Result

### Supermicro
SuperWorkstation 5039C-T (X11SCA , Intel Core i9-9900K)

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</table>

### Hardware
- **CPU Name:** Intel Core i9-9900K
- **Max MHz.:** 5000
- **Nominal:** 3600
- **Enabled:** 8 cores, 1 chip, 2 threads/core
- **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:** 16 MB I+D on chip per chip
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
- **Storage:** 1 x 200 GB SATA III SSD

### Software
- **OS:** SUSE Linux Enterprise Server 12 SP3 (x86_64)
- **Compiler:** C/C++: Version 18.0.2.199 of Intel C/C++
- **Fortran:** Version 18.0.2.199 of Intel Fortran
- **Firmware:** Version 1.0a released Sep-2018
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-bit
- **Other:** jemalloc memory allocator library V5.0.1

### Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>C</th>
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<tbody>
<tr>
<td>perlbench_r</td>
<td>16</td>
<td>48.6</td>
<td>58.6</td>
</tr>
<tr>
<td>gcc_r</td>
<td>16</td>
<td>41.8</td>
<td>54.6</td>
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<tr>
<td>mcf_r</td>
<td>16</td>
<td>50.0</td>
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<tr>
<td>omnetpp_r</td>
<td>16</td>
<td>19.8</td>
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</tr>
<tr>
<td>xalancbmk_r</td>
<td>16</td>
<td>46.2</td>
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<tr>
<td>x264_r</td>
<td>16</td>
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<tr>
<td>deepsjeng_r</td>
<td>16</td>
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<tr>
<td>leela_r</td>
<td>16</td>
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<tr>
<td>exchange2_r</td>
<td>16</td>
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<tr>
<td>xz_r</td>
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### Results 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 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/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/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.  
Jemalloc, a general purpose malloc implementation

(Continued on next page)
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**CPU2017 License:** 001176  
**Test Date:** Dec-2018  
**Test Sponsor:** Supermicro  
**Tested by:** Supermicro  
**Test Date:** Dec-2018  
**Hardware Availability:** Oct-2018  
**Software Availability:** Mar-2018

#### General Notes (Continued)

- built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

#### Platform Notes

- **Sysinfo program** /home/cpu2017/bin/sysinfo  
  - Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
  - running on linux-65nv Tue Dec 25 13:48:20 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) Core(TM) i9-9900K CPU @ 3.60GHz  
    - 1 "physical id"s (chips)  
    - 16 "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 : 8  
  - siblings : 16  
  - physical 0: cores 0 1 2 3 4 5 6 7

- From lscpu:
  - Architecture: x86_64  
  - CPU op-mode(s): 32-bit, 64-bit  
  - Byte Order: Little Endian  
  - CPU(s): 16  
  - On-line CPU(s) list: 0-15  
  - Thread(s) per core: 2  
  - Core(s) per socket: 8  
  - Socket(s): 1  
  - NUMA node(s): 1  
  - Vendor ID: GenuineIntel  
  - CPU family: 6  
  - Model: 158  
  - Model name: Intel(R) Core(TM) i9-9900K CPU @ 3.60GHz  
  - Stepping: 12  
  - CPU MHz: 4863.817  
  - CPU max MHz: 5000.0000  
  - CPU min MHz: 800.0000  
  - BogoMIPS: 7199.88  
  - Virtualization: VT-x  
  - L1d cache: 32K  
  - L1i cache: 32K  
  - L2 cache: 256K

(Continued on next page)
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Platform Notes (Continued)

L3 cache: 16384K
NUMA node0 CPU(s): 0-15
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 xtrr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch idap arat epb invpcid_single pln pts
dtherm hwp hwp_notify hwp_act_window hwp_epp intel_pt rsb_ctxs w spec_ctrl retpol ine
kaiser tpr_shadow vnni flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep
bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsavec xgetbv1

/propcpuinfo cache data
  cache size : 16384 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 12 13 14 15
  node 0 size: 64281 MB
  node 0 free: 63763 MB
  node distances:
    node 0
    0: 10

From /proc/meminfo
  MemTotal: 65824708 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 3
    # 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-SP3"
    VERSION_ID="12.3"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp3"

  uname -a:

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

Linux linux-65nv 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)  
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: Barriers  
- CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

run-level 3 Dec 25 10:57

SPEC is set to: /home/cpu2017

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 145G 28G 117G 20% /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 American Megatrends Inc. 1.0a 09/27/2018  
- Memory: 4x Micron 18ADF2G72AZ-2G6H1R 16 GB 2 rank 2667

(End of data from sysinfo program)

### Compiler Version Notes

```
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.
******************************************************************************

******************************************************************************
 CC  500.perlbench_r(peak) 502.gcc_r(peak) 505.mcf_r(peak) 525.x264_r(peak)
      557.xz_r(peak)
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******************************************************************************

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 CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
      541.leela_r(base)
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### Compiler Version Notes (Continued)

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

```
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak) 541.leela_r(peak)
```

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

```
FC 548.exchange2_r(base)
```

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

```
FC 548.exchange2_r(peak)
```

```
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
```

(Continued on next page)
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| SPECrate2017_int_base | 51.0 |
| SPECrate2017_int_peak | 55.3 |

- **CPU2017 License:** 001176
- **Test Sponsor:** Supermicro
- **Tested by:** Supermicro

#### Base Portability Flags (Continued)

- 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:**
  - `-Wl,-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:**
  - `-Wl,-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:**
  - `-Wl,-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`

#### Peak Compiler Invocation

- **C benchmarks (except as noted below):**
  - `icc -m64 -std=c11`
  - `502.gcc_r: icc -m32 -std=c11 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin`

- **C++ benchmarks (except as noted below):**
  - `icpc -m64`
  - `523.xalancbmk_r: icpc -m32 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin`

- **Fortran benchmarks:**
  - `ifort -m64`
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-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

502.gcc_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: basepeak = yes

520.omnetpp_r: basepeak = yes

C++ benchmarks:

523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3

(Continued on next page)
Peak Optimization Flags (Continued)

541.leela_r (continued):
-L/usr/local/jemalloc

Fortran benchmarks:

548.exchange2_r: basepeak = yes

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/Supermicro-Platform-Settings-V1.2-SKL-revD.xml