## SPEC® CPU2017 Floating Point Speed Result

**Supermicro**

SuperServer 6029U-TR4 (X11DPU, Intel Xeon Gold 5120)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>87.6</td>
<td>87.9</td>
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</tbody>
</table>

**CPU2017 License:** 001176  
**Test Sponsor:** Supermicro  
**Tested by:** Supermicro  
**Test Date:** Nov-2018  
**Hardware Availability:** Jul-2017  
**Software Availability:** Mar-2018

### Hardware

- **CPU Name:** Intel Xeon Gold 5120  
- **Max MHz.:** 3200  
- **Nominal:** 2200  
- **Enabled:** 28 cores, 2 chips  
- **Orderable:** 1,2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 19.25 MB I+D on chip per core  
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)  
- **Storage:** 1 x 200 GB SATA III SSD  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP3 (x86_64)  
- **Kernel:** 4.4.114-94.11-default  
- **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  
- **Parallel:** Yes  
- **Firmware:** Supermicro BIOS version 2.1a released Aug-2018  
- **File System:** xfs  
- **System State:** Run level 3 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** jemalloc memory allocator library V5.0.1

### Benchmarks

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>28</td>
<td>117</td>
<td>117</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>28</td>
<td>38.2</td>
<td>41.4</td>
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<tr>
<td>619.lbm_s</td>
<td>28</td>
<td>64.6</td>
<td>67.1</td>
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<tr>
<td>621.wrf_s</td>
<td>28</td>
<td>53.6</td>
<td>57.1</td>
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<tr>
<td>627.cam4_s</td>
<td>28</td>
<td>52.0</td>
<td>52.1</td>
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<tr>
<td>628.pop2_s</td>
<td>28</td>
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<tr>
<td>638.imagick_s</td>
<td>28</td>
<td>70.8</td>
<td>72.9</td>
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<tr>
<td>644.nab_s</td>
<td>28</td>
<td>96.8</td>
<td>97.9</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td></td>
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Results Table

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<tr>
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<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
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SPECspeed2017_fp_base = 87.6
SPECspeed2017_fp_peak = 87.9

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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:
KMP_AFFINITY = "granularity=fine,compact"
OMP_STACKSIZE = "192M"

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.
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SuperServer 6029U-TR4 (X11DPU, Intel Xeon Gold 5120)

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Hardware Availability: Jul-2017
Software Availability: Mar-2018

Platform Notes

BIOS Settings:
Hyper-Threading [ALL] = Disable
LLC dead line alloc = Disable
SDDC Plus One = Disable
ADDDC Sparing = Disable
Patrol Scrub = Disable
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-ima8 Thu Nov 1 20:34:22 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) Gold 5120 CPU @ 2.20GHz
  2 "physical id"s (chips)
  28 "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 : 14
siblings : 14
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 28
On-line CPU(s) list: 0-27
Thread(s) per core: 1
Core(s) per socket: 14
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz
Stepping: 4
CPU MHz: 1000.000
CPU max MHz: 2201.0000
CPU min MHz: 1000.0000
BogoMIPS: 4399.98
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K

(Continued on next page)
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**Tested by:** Supermicro

**Software Availability:** Mar-2018

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**Platform Notes (Continued)**

- **L2 cache:** 1024K
- **L3 cache:** 19712K
- **NUMA node0 CPU(s):** 0-13
- **NUMA node1 CPU(s):** 14-27
- **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 ntopology nonstop_tsc aperfmpref 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 ida arat epb invvpidd_single pln pts dtherm intel_pt rsb_ctsw spec_ctrl retpoline kaiser tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pkp ospke

From `/proc/cpuinfo`
- **cache data**
  - **cache size:** 19712 KB

From `numactl --hardware`
- **WARNING:** a numactl 'node' might or might not correspond to a physical chip.
  - **available:** 2 nodes (0-1)
  - **node 0 cpus:** 0 1 2 3 4 5 6 7 8 9 10 11 12 13
  - **node 0 size:** 192093 MB
  - **node 0 free:** 190118 MB
  - **node 1 cpus:** 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  - **node 1 size:** 193517 MB
  - **node 1 free:** 186887 MB

From `/proc/meminfo`
- **MemTotal:** 394864780 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"**

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**Platform Notes (Continued)**

```
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:
    Linux linux-ima8 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 Oct 31 11:37

SPEC is set to: /home/cpu2017
```

```
<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>145G</td>
<td>10G</td>
<td>135G</td>
<td>7%</td>
<td>/home</td>
</tr>
</tbody>
</table>
```

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. 2.1a 08/23/2018
Memory:
    12x NO DIMM NO DIMM
    12x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400

(End of data from sysinfo program)

**Compiler Version Notes**

```
==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

(Continued on next page)
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Copyright 2017-2018 Standard Performance Evaluation Corporation

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Compiler Version Notes (Continued)

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

--------------------
FC 607.cactusBSSN_s(base, peak)
--------------------
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 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
--------------------
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

--------------------
CC 621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(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.

--------------------
CC 621.wrf_s(peak) 628.pop2_s(peak)
--------------------
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
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### Base Compiler Invocation

**C benchmarks:**

```bash
icc -m64 -std=c11
```

**Fortran benchmarks:**

```bash
ifort -m64
```

**Benchmarks using both Fortran and C:**

```bash
ifort -m64 icc -m64 -std=c11
```

**Benchmarks using Fortran, C, and C++:**

```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### Base Portability Flags

- `603.bwaves_s`: `-DSPEC_LP64`
- `607.cactuBSSN_s`: `-DSPEC_LP64`
- `619.lbm_s`: `-DSPEC_LP64`
- `621.wrf_s`: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `627.cam4_s`: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
- `628.pop2_s`: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl`
- `638.imagick_s`: `-DSPEC_LP64`
- `644.nab_s`: `-DSPEC_LP64`
- `649.fotonik3d_s`: `-DSPEC_LP64`
- `654.roms_s`: `-DSPEC_LP64`

### Base Optimization Flags

**C benchmarks:**

```bash
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc
```

**Fortran benchmarks:**

```bash
```

**Benchmarks using both Fortran and C:**

```bash
```

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

Benchmarks using Fortran, C, and C++:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11
Fortran benchmarks:
ifort -m64

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

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:
603.bwaves_s: basepeak = yes

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Peak Optimization Flags (Continued)

649.fotonik3d_s: basepeak = yes

654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: basepeak = yes

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: 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

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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 2018-11-01 08:34:21-0400.
Originally published on 2018-11-27.