## SPEC CPU®2017 Floating Point Speed Result

**Supermicro**

SuperWorkstation 5039A-i (X11SRA, Intel Xeon W-2295)

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### Threads

<table>
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<tr>
<th>Benchmark</th>
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<th>SPECspeed®2017_fp_base</th>
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<td>18</td>
<td>73.2</td>
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</tr>
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<td>18</td>
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<td>74.8</td>
</tr>
<tr>
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</tr>
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<tr>
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<td>18</td>
<td>74.7</td>
<td>74.8</td>
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<tr>
<td>644.nab_s</td>
<td>36</td>
<td>74.6</td>
<td>74.7</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>18</td>
<td>74.6</td>
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<tr>
<td>654.roms_s</td>
<td>18</td>
<td>74.7</td>
<td>74.8</td>
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### Hardware

- **CPU Name:** Intel Xeon W-2295
- **Max MHz:** 4600
- **Nominal:** 3000
- **Enabled:** 18 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 24.75 MB I+D on chip per chip
- **Memory:** 128 GB (4 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
- **Storage:** 1 x 2 TB SATA III, 7200 RPM
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP4 (x86_64)
- **Kernel:** 4.12.14-95.29-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.0.4.227 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.0 released Sep-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
- **Power Management:** --
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Supermicro
SuperWorkstation 5039A-i (X11SRA , Intel Xeon W-2295)

SPECspeed®2017_fp_base = 73.2
SPECspeed®2017_fp_peak = 74.1

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

Test Date: Sep-2019
Hardware Availability: Oct-2019
Software Availability: Aug-2019

Results Table

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<tr>
<th>Benchmark</th>
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<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<td>603.bwaves_s</td>
<td>18</td>
<td>310</td>
<td>190</td>
<td>311</td>
<td>190</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>18</td>
<td>167</td>
<td>100</td>
<td>166</td>
<td>100</td>
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<tr>
<td>619.ibm_s</td>
<td>18</td>
<td>138</td>
<td>37.8</td>
<td>138</td>
<td>37.8</td>
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<tr>
<td>621.wrf_s</td>
<td>18</td>
<td>138</td>
<td>95.6</td>
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<td>193</td>
<td>74.9</td>
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<td>18</td>
<td>124</td>
<td>141</td>
<td>124</td>
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<td>248</td>
<td>36.8</td>
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<td>36.8</td>
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<tr>
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<td>18</td>
<td>339</td>
<td>46.5</td>
<td>339</td>
<td>46.5</td>
</tr>
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</table>

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9–7900X 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

NA: 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.
Supermicro
SuperWorkstation 5039A-i (X11SRA , Intel Xeon W-2295)

**SPEC CPU®2017 Floating Point Speed Result**

**SPECspeed®2017_fp_base = 73.2**

**SPECspeed®2017_fp_peak = 74.1**

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**Platform Notes**

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbee6e46a485a0011
running on linux Sun Sep 22 15:34:39 2019

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) W-2295 CPU @ 3.00GHz
  "physical id"s (chips)
    36 "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 : 18
    siblings : 36
    physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) W-2295 CPU @ 3.00GHz
Stepping: 7
CPU MHz: 3000.000
CPU max MHz: 4800.0000
CPU min MHz: 1200.0000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-35
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
```

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Supermicro
SuperWorkstation 5039A-i (X11SRA , Intel Xeon W-2295)  SPECspeed®2017_fp_base = 73.2
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Platform Notes (Continued)

aperfmpcrmp pni pclmulqdq dtes64 monitor ds_cpi vmx smx est tm2 ssse3 sdbg fma cx16 xtrp pdcmc pcdmc dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cd p_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept_vpid fsqgbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdr_la avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsaveoptions cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req avx512_vnni md_clear flush_l1d arch_capabilities

/proc/cpuinfo cache data
  cache size : 25344 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 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35
  node 0 size: 128367 MB
  node 0 free: 91379 MB
  node distances:
  node 0
  0: 10

From /proc/meminfo
  MemTotal: 131448716 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
  SUSE Linux Enterprise Server 12 SP4

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 4
    # 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-SP4"
      VERSION_ID="12.4"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp4"

(Continued on next page)
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Test Date: Sep-2019
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Platform Notes (Continued)

uname -a:
Linux linux 4.12.14-95.29-default #1 SMP Thu Aug 1 15:34:33 UTC 2019 (47e48a4) x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
via prctl and seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user
pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Sep 21 08:17

SPEC is set to: /home/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 1.8T 103G 1.7T 6% /home

From /sys/devices/virtual/dmi/id
 BIOS: American Megatrends Inc. 2.0 09/20/2019
 Vendor: Supermicro
 Product: Super Server
 Serial: 0123456789

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.
Memory:
  4x Hynix HMA84GR7CJR4N-XN 32 GB 2 rank 3200, configured at 2934
  4x NO DIMM NO DIMM

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C  | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
   | 644.nab_s(base, peak)
==============================================================================

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Specification and results as of Sep-2019

Supermicro
SuperWorkstation 5039A-i (X11SRA, Intel Xeon W-2295) (Continued)

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

Compiler Version Notes (Continued)

Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++, C, Fortran | 607.cactuBSSN_s(base, peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
654.roms_s(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_s(base, peak)
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
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Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

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**Base Compiler Invocation (Continued)**

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

**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 byteorder
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:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
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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 Compiler Invocation

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard-realloc-lhs

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-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=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

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

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**Test Date:** Sep-2019  
**Hardware Availability:** Oct-2019  
**Software Availability:** Aug-2019  

**Peak Optimization Flags (Continued)**

627.cam4_s:  
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

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

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-nostandard-realloc-lhs

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:  