# SPEC® CPU2017 Floating Point Rate Result

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## Supermicro
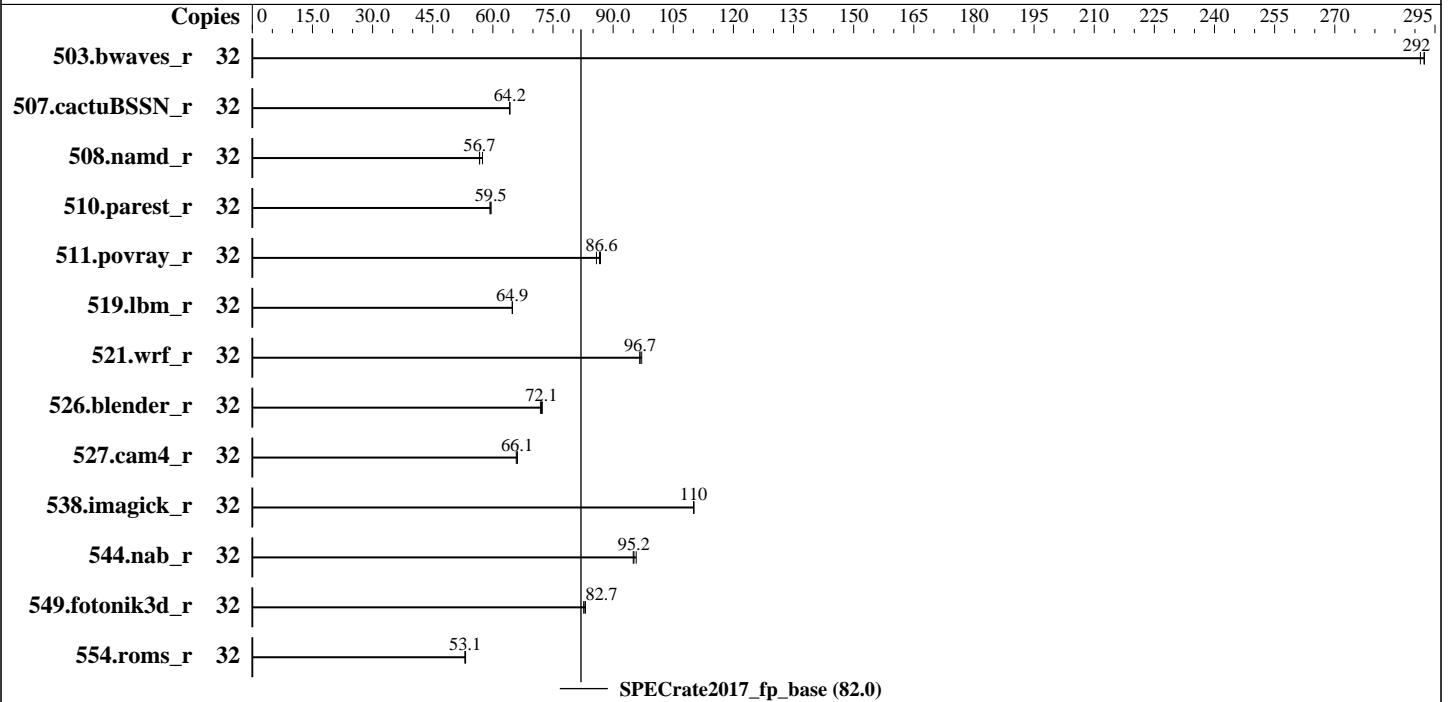
SuperServer 7049P-TR
(X11DPi-N, Intel Xeon Silver 4110)

SPECrate2017_fp_base =   82.0

SPECrate2017_fp_peak =  Not Run

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

**Test Date:** Mar-2018
**Hardware Availability:** Jul-2017
**Software Availability:** Sep-2017

| Copies | | |
|---|---|---|
| 503.bwaves_r | 32 | 292 |
| 507.cactuBSSN_r | 32 | 64.2 |
| 508.namd_r | 32 | 56.7 |
| 510.parest_r | 32 | 59.5 |
| 511.povray_r | 32 | 86.6 |
| 519.lbm_r | 32 | 64.9 |
| 521.wrf_r | 32 | 96.7 |
| 526.blender_r | 32 | 72.1 |
| 527.cam4_r | 32 | 66.1 |
| 538.imagick_r | 32 | 110 |
| 544.nab_r | 32 | 95.2 |
| 549.fotonik3d_r | 32 | 82.7 |
| 554.roms_r | 32 | 53.1 |

SPECrate2017_fp_base (82.0)

## Hardware

CPU Name:   Intel Xeon Silver 4110
 Max MHz.:   3000
 Nominal:   2100
Enabled:   16 cores, 2 chips, 2 threads/core
Orderable:   1,2 chips
Cache L1:   32 KB I + 32 KB D on chip per core
 L2:   1 MB I+D on chip per core
 L3:   11 MB I+D on chip per chip
 Other:   None
Memory:   384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage:   1.9 TB  SATA 3 SSD
Other:   None

## Software

OS:   SUSE Linux Enterprise Server 12 SP2
   4.4.114-92.64-default
Compiler:   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
Parallel:   No
Firmware:   Supermicro BIOS version 2.0b released Feb-2018
File System:   xfs
System State:   Run level 3 (multi-user)
Base Pointers:   64-bit
Peak Pointers:   64-bit
Other:   None

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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 503.bwaves_r | 32 | 1101 | 291 | 1098 | 292 | **1098** | **292** | | | | | | | |
| 507.cactuBSSN_r | 32 | 631 | 64.2 | 632 | 64.1 | **631** | **64.2** | | | | | | | |
| 508.namd_r | 32 | **536** | **56.7** | 537 | 56.7 | 529 | 57.4 | | | | | | | |
| 510.parest_r | 32 | 1412 | 59.3 | **1408** | **59.5** | 1406 | 59.5 | | | | | | | |
| 511.povray_r | 32 | 871 | 85.8 | 860 | 86.9 | **863** | **86.6** | | | | | | | |
| 519.lbm_r | 32 | 520 | 64.8 | 520 | 64.9 | **520** | **64.9** | | | | | | | |
| 521.wrf_r | 32 | 738 | 97.1 | 742 | 96.6 | **741** | **96.7** | | | | | | | |
| 526.blender_r | 32 | **676** | **72.1** | 678 | 71.9 | 674 | 72.3 | | | | | | | |
| 527.cam4_r | 32 | **847** | **66.1** | 850 | 65.8 | 847 | 66.1 | | | | | | | |
| 538.imagick_r | 32 | 723 | 110 | 723 | 110 | **723** | **110** | | | | | | | |
| 544.nab_r | 32 | **566** | **95.2** | 562 | 95.8 | 567 | 95.0 | | | | | | | |
| 549.fotonik3d_r | 32 | 1508 | 82.7 | **1507** | **82.7** | 1501 | 83.1 | | | | | | | |
| 554.roms_r | 32 | 959 | 53.0 | 956 | 53.2 | **957** | **53.1** | | | | | | | |
| SPECrate2017_fp_base = | | **82.0** | | | | | | | | | | | | |
| SPECrate2017_fp_peak = | | **Not Run** | | | | | | | | | | | | |

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"

## General Notes

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH = "/home/cpu2k17/lib/ia32:/home/cpu2k17/lib/intel64:/home/cpu2k17/je5.0.1-32:/home/cpu2k17/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
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>

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

**(Continued on next page)**

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## General Notes (Continued)

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 Settings:
CPU Virtualization = Disable
SNC = Enable
Stale AtoS = Enable
LLC dead line alloc = Disable
IMC Interleaving = 1-way Interleave
Patrol Scrub = Disable
 Sysinfo program /home/cpu2k17/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on linux-itxo Fri Mar  9 00:37:15 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) Silver 4110 CPU @ 2.10GHz
       2  "physical id"s (chips)
       32 "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
       physical 1: 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):                32
      On-line CPU(s) list:   0-31
      Thread(s) per core:    2
      Core(s) per socket:    8
      Socket(s):             2
      NUMA node(s):          2
      Vendor ID:             GenuineIntel
```

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**Test Sponsor:**      Supermicro                           **Hardware Availability:** Jul-2017
**Tested by:**         Supermicro                           **Software Availability:** Sep-2017

### Platform Notes (Continued)

```
        CPU family:            6
        Model:                 85
        Model name:            Intel(R) Xeon(R) Silver 4110 CPU @ 2.10GHz
        Stepping:              4
        CPU MHz:               2101.000
        CPU max MHz:           2101.0000
        CPU min MHz:           800.0000
        BogoMIPS:              4200.01
        Virtualization:        VT-x
        L1d cache:             32K
        L1i cache:             32K
        L2 cache:              1024K
        L3 cache:              11264K
        NUMA node0 CPU(s):     0-7,16-23
        NUMA node1 CPU(s):     8-15,24-31
        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 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 invpcid_single pln pts
    dtherm intel_pt rsb_ctxsw 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 xgetbv1 cqm_llc cqm_occup_llc

 /proc/cpuinfo cache data
    cache size : 11264 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 16 17 18 19 20 21 22 23
    node 0 size: 193043 MB
    node 0 free: 186214 MB
    node 1 cpus: 8 9 10 11 12 13 14 15 24 25 26 27 28 29 30 31
    node 1 size: 193518 MB
    node 1 free: 188518 MB
    node distances:
    node   0   1
      0:  10  21
      1:  21  10

 From /proc/meminfo
    MemTotal:       395840084 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB
```

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## Platform Notes (Continued)

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

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      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-itxo 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 8 18:51 last=5

SPEC is set to: /home/cpu2k17
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda4       xfs   1.8T   35G  1.7T   2% /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. 2.0b 02/28/2018
  Memory:
   12x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2400
   4x NO DIMM NO DIMM

(End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
  CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
```

**(Continued on next page)**

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## Compiler Version Notes (Continued)

```
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
  CXXC 508.namd_r(base) 510.parest_r(base)
--------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
  CC   511.povray_r(base) 526.blender_r(base)
--------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
  FC   507.cactuBSSN_r(base)
--------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
  FC   503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
--------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------


================================================================================
  CC   521.wrf_r(base) 527.cam4_r(base)
--------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------------
```

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## Base Compiler Invocation

C benchmarks:
`icc`

C++ benchmarks:
`icpc`

Fortran benchmarks:
`ifort`

Benchmarks using both Fortran and C:
`ifort icc`

Benchmarks using both C and C++:
`icpc icc`

Benchmarks using Fortran, C, and C++:
`icpc icc ifort`

## Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

## Base Optimization Flags

C benchmarks:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`
`-ffinite-math-only -qopt-mem-layout-trans=3`

C++ benchmarks:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch`

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# Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-ffinite-math-only -qopt-mem-layout-trans=3
```

Fortran benchmarks:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte
```

Benchmarks using both C and C++:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte
```

# Base Other Flags

C benchmarks:
```
-m64 -std=c11
```

C++ benchmarks:
```
-m64
```

Fortran benchmarks:
```
-m64
```

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

Benchmarks using both C and C++:
```
-m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
-m64 -std=c11
```

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The flags files that were used to format this result can be browsed at

`http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html`
`http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-SKL-revB.html`

You can also download the XML flags sources by saving the following links:

`http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml`
`http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-SKL-revB.xml`

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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