**Supermicro SuperServer 6029U-TR4 (X11DPU, Intel Xeon Silver 4116)**

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OS:</strong> SUSE Linux Enterprise Server 12 SP3 (x86_64)</td>
<td><strong>CPU Name:</strong> Intel Xeon Silver 4116</td>
</tr>
<tr>
<td><strong>Kernel 4.4.114-94.11-default</strong></td>
<td><strong>Max MHz.:</strong> 3000</td>
</tr>
<tr>
<td><strong>Compiler:</strong> C/C++: Version 18.0.2.199 of Intel C/C++</td>
<td><strong>Nominal:</strong> 2100</td>
</tr>
<tr>
<td><strong>Compiler for Linux:</strong> Fortran: Version 18.0.2.199 of Intel Fortran</td>
<td><strong>Enabled:</strong> 24 cores, 2 chips</td>
</tr>
<tr>
<td><strong>Compiler for Linux</strong></td>
<td><strong>Orderable:</strong> 1.2 chips</td>
</tr>
<tr>
<td><strong>Parallel:</strong> Yes</td>
<td><strong>Cache L1:</strong> 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td><strong>Firmware:</strong> Supermicro BIOS version 2.1a released Aug-2018</td>
<td><strong>L2:</strong> 1 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>File System:</strong> xfs</td>
<td><strong>L3:</strong> 16.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td><strong>System State:</strong> Run level 3 (multi-user)</td>
<td><strong>Other:</strong> None</td>
</tr>
<tr>
<td><strong>Base Pointers:</strong> 64-bit</td>
<td>Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)</td>
</tr>
<tr>
<td><strong>Peak Pointers:</strong> 64-bit</td>
<td>Storage: 1 x 200 GB SATA III SSD</td>
</tr>
<tr>
<td><strong>Other:</strong> jemalloc memory allocator library V5.0.1</td>
<td>Other: None</td>
</tr>
</tbody>
</table>
SPEC CPU2017 Floating Point Speed Result

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Supermicro
SuperServer 6029U-TR4 (X11DPU , Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 75.9
SPECspeed2017_fp_peak = 76.4

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>603.bwaves_s</td>
<td>24</td>
<td>158</td>
<td>372</td>
<td>158</td>
<td>373</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>24</td>
<td>172</td>
<td>96.9</td>
<td>161</td>
<td>103</td>
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<td>628.pop2_s</td>
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<td>638.imagick_s</td>
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<td>649.fotonik3d_s</td>
<td>24</td>
<td>137</td>
<td>66.6</td>
<td>135</td>
<td>67.3</td>
<td>135</td>
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<tr>
<td>654.roms_s</td>
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<td>81.1</td>
<td>194</td>
<td>81.4</td>
<td>193</td>
<td>81.6</td>
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</tbody>
</table>

SPECspeed2017_fp_base = 75.9
SPECspeed2017_fp_peak = 76.4

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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
SPEC CPU2017 Floating Point Speed Result

Supermicro
SuperServer 6029U-TR4 (X11DPU, Intel Xeon Silver 4116)

SPECspeed2017_fp_peak = 76.4
SPECspeed2017_fp_base = 75.9

CPU2017 License: 001176
Test Sponsor: Supermicro
Test Date: Oct-2018
Tested by: Supermicro
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
ADDCC Sparing = Disable
Patrol Scrub = Disable
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcd8f2999c33df64985e45859ea9
running on linux-ima8 Wed Oct 24 01:13:54 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 4116 CPU @ 2.10GHz
    2 "physical id"s (chips)
    24 "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 : 12
    siblings : 12
    physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
    physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

From lscpu:

    Architecture:          x86_64
    CPU op-mode(s):        32-bit, 64-bit
    Byte Order:            Little Endian
    CPU(s):                24
    On-line CPU(s) list:   0-23
    Thread(s) per core:    1
    Core(s) per socket:    12
    Socket(s):             2
    NUMA node(s):          2
    Vendor ID:             GenuineIntel
    CPU family:            6
    Model:                 85
    Model name:            Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
    Stepping:              4
    CPU MHz:               800.000
    CPU max MHz:           2101.0000
    CPU min MHz:           800.0000
    BogoMIPS:              4200.02
    Virtualization:        VT-x
    L1d cache:             32K
    L1i cache:             32K

(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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Supermicro
SuperServer 6029U-TR4 (X11DPU , Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 75.9
SPECspeed2017_fp_peak = 76.4

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

Platform Notes (Continued)

L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0-11
NUMA node1 CPU(s): 12-23
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 rdtsscp
lm constant_tsc art arch_perfmon pebs bts rep_good ntopology nonstop_tsc
aperfmpref eagerfpu nni pclmulqdq dtst64 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 invpd_single pln pts
dtherm intel_pt rsb_ctxtsw spec_ctrl retpoline kaiser tpr_shadow vinpcidורי pln pts
ept vpid fsgsb tsc_adjust bni hle avx2 smep bmi2 erms invpct rmt qm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavexc xgetbv1 qem_11c qem_occup_11c pkp ospke

/platform/cpuinfo cache data
cache size : 16896 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
node 0 size: 192093 MB
node 0 free: 186726 MB
node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
node 1 size: 193517 MB
node 1 free: 191490 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 394865340 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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Supermicro
SuperServer 6029U-TR4 (X11DPU, Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 75.9
SPECspeed2017_fp_peak = 76.4

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

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 23 18:46

SPEC is set to: /home/cpu2017
/dev/sda4    xfs   145G   50G   95G  35% /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. 2.1a 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.
==============================================================================
CC   619.lbm_s(peak)
==============================================================================
icc (ICC) 18.0.2 20180210

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## SPEC CPU2017 Floating Point Speed Result

**Supermicro**

SuperServer 6029U-TR4 (X11DPU, Intel Xeon Silver 4116)

### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>75.9</td>
<td>76.4</td>
</tr>
</tbody>
</table>

### Compiler Version Notes (Continued)

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

```plaintext
FC 607.cactusSSN_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.
```

```plaintext
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.
```

```plaintext
FC 603.bwaves_s(peak) 649.fotonik3d_s(peak)

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

```plaintext
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.
```

```plaintext
CC 621.wrf_s(peak) 628.pop2_s(peak)

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.
```
SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

Supermicro
SuperServer 6029U-TR4 (X11DPU, Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 75.9
SPECspeed2017_fp_peak = 76.4

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<thead>
<tr>
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<th>Test Sponsor</th>
<th>Test Date</th>
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<tr>
<td>001176</td>
<td>Supermicro</td>
<td>Oct-2018</td>
</tr>
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<table>
<thead>
<tr>
<th>Hardware Availability</th>
<th>Software Availability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-2017</td>
<td>Mar-2018</td>
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</tbody>
</table>

<table>
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<tbody>
<tr>
<td></td>
<td>Supermicro</td>
</tr>
</tbody>
</table>

Base 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

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

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

Benchmarks using both Fortran 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

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SuperServer 6029U-TR4 (X11DPU , Intel Xeon Silver 4116)

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

Test Date: Oct-2018
Hardware Availability: Jul-2017
Software Availability: Mar-2018

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

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

649.fotonik3d_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=3
-qopenmp -nostandard-realloc-lhs

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

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.