# SPEC CPU®2017 Floating Point Speed Result

## Tyrone Systems
*Test Sponsor: Netweb Pte Ltd*
*DIT400TR-55R/55RL (2.10 GHz, Intel Xeon Silver 4216)*

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Feb-2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Sep-2019</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Aug-2019</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_fp_base = 110

<table>
<thead>
<tr>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>110</td>
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</table>

### SPECspeed®2017_fp_peak = 114

<table>
<thead>
<tr>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>114</td>
</tr>
</tbody>
</table>

---

## CPU2017 License: 006042

## Test Sponsor: Netweb Pte Ltd

## Tested by: Netweb

---

<table>
<thead>
<tr>
<th>Threads</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
</tr>
<tr>
<td>619.ibm_s</td>
<td>32</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Silver 4216</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3200</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2100</td>
</tr>
<tr>
<td>Enabled:</td>
<td>32 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1, 2 (chip)s</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>22 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB SSD</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>CentOS Linux release 7.7.1908 (Core) 3.10.0-1062.el7.x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 19.0.4.243 of Intel C/C++ Compiler Build 20190416 for Linux; Fortran: Version 19.0.4.243 of Intel Fortran Compiler Build 20190416 for Linux</td>
</tr>
<tr>
<td>Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware:</td>
<td>Version V8.101 released Aug-2019</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
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<tr>
<td>Other:</td>
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<tr>
<td>Power Management:</td>
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## SPECspeed2017_fp_base (110) (81,9) |

## SPECspeed2017_fp_peak (114) (82,0)
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>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>138</td>
<td>429</td>
<td>139</td>
<td>424</td>
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<td>427</td>
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<td>426</td>
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<td>427</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>135</td>
<td>123</td>
<td>136</td>
<td>123</td>
<td>136</td>
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<td>124</td>
<td>135</td>
<td>123</td>
<td>136</td>
<td>123</td>
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<td>619.lbm_s</td>
<td>32</td>
<td>64.2</td>
<td>81.6</td>
<td>63.9</td>
<td>82.0</td>
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<td>32</td>
<td>63.7</td>
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<td>63.9</td>
<td>82.0</td>
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<tr>
<td>621.wrf_s</td>
<td>32</td>
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<td>101</td>
<td>129</td>
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<td>627.cam4_s</td>
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<td>70.2</td>
<td>127</td>
<td>70.0</td>
<td>126</td>
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<td>628.pop2_s</td>
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<tr>
<td>644.nab_s</td>
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<td>649.fotonik3d_s</td>
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<td>134</td>
<td>117</td>
<td>135</td>
<td>117</td>
<td>134</td>
</tr>
</tbody>
</table>

Compiler Notes
SPEC has learned that this result, which used an evaluation compiler, was submitted contrary to the compiler license terms. Intel has granted a one-time license waiver for this result.

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/ia32:/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
Filesyste 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.

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

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
DIT400TR-55R/55RL
(2.10 GHz, Intel Xeon Silver 4216)

SPECspeed®2017_fp_base = 110
SPECspeed®2017_fp_peak = 114

CPU2017 License: 006042
Test Sponsor: Netweb Pte Ltd
Tested by: Netweb

Test Date: Feb-2020
Hardware Availability: Sep-2019
Software Availability: Aug-2019

General Notes (Continued)
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

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed6e6e46a485a0011
running on NODE6 Thu Oct 10 08:06:43 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) Silver 4216 CPU @ 2.10GHz
  2 "physical id"s (chips)
  64 "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 : 16
  siblings : 32
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz
Stepping: 7
CPU MHz: 799.932
CPU max MHz: 3200.000
CPU min MHz: 800.000
BogoMIPS: 4200.00

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

- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 22528K
- **NUMA node 0 CPU(s):** 0-15, 32-47
- **NUMA node 1 CPU(s):** 16-31, 48-63
- **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 x86Legacy gitcode

```
/proc/cpuinfo cache data
  cache size : 22528 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 14 15 32 33 34 35 36 37 38 39 40 41 42 43
44 45 46 47
node 0 size: 195228 MB
node 0 free: 162705 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 1 size: 196608 MB
node 1 free: 169769 MB
node distances:
  node 0 1
  0: 10 21
  1: 21 10
```

From `/proc/meminfo`

```
MemTotal: 394671656 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

From `/etc/*release* /etc/*version*`

- `centos-release: CentOS Linux release 7.7.1908 (Core)`
- `centos-release-upstream: Derived from Red Hat Enterprise Linux 7.7 (Source)`

(Continued on next page)
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Tested by: Netweb

Platform Notes (Continued)

os-release:
   NAME="CentOS Linux"
   VERSION="7 (Core)"
   ID="centos"
   ID_LIKE="rhel fedora"
   VERSION_ID="7"
   PRETTY_NAME="CentOS Linux 7 (Core)"
   ANSI_COLOR="0;31"
   CPE_NAME="cpe:/o:centos:centos:7"
redhat-release: CentOS Linux release 7.7.1908 (Core)
system-release: CentOS Linux release 7.7.1908 (Core)
system-release-cpe: cpe:/o:centos:centos:7

uname -a:
Linux NODE6 3.10.0-1062.el7.x86_64 #1 SMP Wed Aug 7 18:08:02 UTC 2019 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: Load fences, __user pointer
   sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full retpoline, IBPB

run-level 3 Oct 8 17:25

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/centos-home xfs 392G 196G 197G 50% /home

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. V8.101 08/02/2019
Vendor: Tyrone Systems
Product: DIT400TR-55R
Serial: empty

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.

(End of data from sysinfo program)
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Tested by: Netweb

Test Date: Feb-2020
Hardware Availability: Sep-2019
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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, |
| Version 19.0.4.243 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |
-----------------------------------------------

==============================================================================
| C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
| Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.243 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |
| Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, |
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| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |
| Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, |
| Version 19.0.4.243 Build 20190416 |
| Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |
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==============================================================================
| 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, |
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| ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |
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| 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, |
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</tbody>
</table>

**Compiler Version Notes (Continued)**

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.  
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.

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**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 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:
-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

(Continued on next page)
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Assessment Summary

CPU2017 License: 006042
Test Sponsor: Netweb Pte Ltd
Tested by: Netweb

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- 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

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

Fortran benchmarks:

(Continued on next page)
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DIT400TR-55R/55RL
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SPECspeed®2017_fp_base = 110
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**CPU2017 License:** 006042
**Test Date:** Feb-2020
**Test Sponsor:** Netweb Pte Ltd
**Hardware Availability:** Sep-2019
**Tested by:** Netweb
**Software Availability:** Aug-2019

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### Peak Optimization Flags (Continued)

- **603.bwaves_s:** `-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
  -DSPEC_OPENMP -02 -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) -02 -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`

- **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`

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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:


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