### SPEC CPU®2017 Floating Point Rate Result

**Tyrone Systems**

(Test Sponsor: Netweb)

**DIT400TR-28RL**

(2.20 GHz, Intel Xeon Silver 4210)

---

**SPECraté®2017 fp_base = 117**

**SPECraté®2017 fp_peak = 118**

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</table>

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### Hardware

- **CPU Name:** Intel Xeon Silver 4210
- **Max MHz:** 3200
- **Nominal:** 2200
- **Enabled:** 20 cores, 2 chips, 2 threads/core
- **Orderable:** 1, 2 (chip)s
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 13.75 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933P-R, running at 2400)
- **Storage:** 1 x 480 GB SSD
- **Other:** None

---

### Software

- **OS:** CentOS Linux release 7.7.1908 (Core)
- **Compiler:** 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
- **Parallel:** No
- **Firmware:** Version V8.101 released Aug-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Power Management:** None
## Results Table

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</tr>
</tbody>
</table>

**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"

**Environment Variables Notes**

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"

**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
runcpu command invoked through numactl i.e.:

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

Tyrone Systems
(Test Sponsor: Netweb)
DIT400TR-28RL
(2.20 GHz, Intel Xeon Silver 4210)

SPECrate®2017_fp_base = 117
SPECrate®2017_fp_peak = 118

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

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

General Notes (Continued)

numactl --interleave=all runcpu <etc>
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.

Platform Notes

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on NODE2 Tue Oct 8 20:02:48 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 4210 CPU @ 2.20GHz
 2 "physical id"s (chips)
 40 "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 : 10
siblings : 20
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210 CPU @ 2.20GHz
Stepping: 7
CPU MHz: 999.963

(Continued on next page)
Tyrone Systems
(Test Sponsor: Netweb)
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(2.20 GHz, Intel Xeon Silver 4210)

SPEC CPU®2017 Floating Point Rate Result
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SPECrate®2017_fp_peak = 118

Platform Notes (Continued)

CPU max MHz: 3200.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9,20-29
NUMA node1 CPU(s): 10-19,30-39
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
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 epb cat_l3 cdq_l3 intel_pt ssbd mba ibrs stibp ibrs_enhanced tpr_shadow vnumi flexpriority ept
vpid fsgsbase tsc_adjust bmon hle avx2 smep bmi2 erdms invpcid rtm cmx mpzx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
pts hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear spec_ctrl
intel_stibp flush_l1d arch_capabilities

/proc/cpuinfo cache data

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.

From /proc/meminfo

MemTotal: 394864496 kB

From /proc/meminfo

HugePages_Total: 0

From /etc/*release* /etc/*version*
centos-release: CentOS Linux release 7.7.1908 (Core)

(Continued on next page)
Tyrone Systems
(Test Sponsor: Netweb)
DIT400TR-28RL
(2.20 GHz, Intel Xeon Silver 4210)

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<th>CPU2017 License: 006042</th>
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<td>Hardware Availability: Sep-2019</td>
</tr>
<tr>
<td>Tested by: Netweb</td>
<td>Software Availability: Aug-2019</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

- centos-release-upstream: Derived from Red Hat Enterprise Linux 7.7 (Source)
- 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 NODE2 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 10:00

SPEC is set to: /home/cpu2017
```
Filesystem  Type   Size  Used Avail Use% Mounted on
/dev/mapper/centos-home  xfs  392G  101G  292G  26%  /home
```

From /sys/devices/virtual/dmi/id
- BIOS: American Megatrends Inc. V8.101 08/02/2019
- Vendor: Tyrone Systems
- Product: TP12XH-L2I
- 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.

- Memory:
  - 12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(Continued on next page)
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Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C                  | 519.1bm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(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++                 | 508.namd_r(base, peak) 510.parest_r(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. |
| icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |

==============================================================================
| C++, C               | 511.povray_r(base, peak) 526.blender_r(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, |
| Version 19.0.4.243 Build 20190416                          |
| icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |

==============================================================================
| C++, C, Fortran      | 507.cactuBSSN_r(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. |
| icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC. |
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CPU2017 License: 006042  Test Date: Oct-2019
Test Sponsor: Netweb  Hardware Availability: Sep-2019
Tested by: Netweb  Software Availability: Aug-2019

### 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.

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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Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel(R)
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<th>521.wrf_r(base, peak) 527.cam4_r(base, peak)</th>
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Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.243 Build 20190416

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**ifort:** 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,
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.

---

### Base Compiler Invocation

**C benchmarks:**

```shell
icc -m64 -std=c11
```

**C++ benchmarks:**

```shell
icpc -m64
```

**Fortran benchmarks:**

```shell
ifort -m64
```

**Benchmarks using both Fortran and C:**

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

(Continued on next page)
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Base Compiler Invocation (Continued)

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

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

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_LP64 -funsigchar
527.cam4_r: -DSPEC_LP64 -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=4

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

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-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=4 -auto
-nostandard-realloc-lhs -align array32byte

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

**Tyrone Systems**  
(Test Sponsor: Netweb)  
DIT400TR-28RL  
(2.20 GHz, Intel Xeon Silver 4210)  

<table>
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<th>SPECrate®2017_fp_base = 117</th>
<th>SPECrate®2017_fp_peak = 118</th>
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<td><strong>CPU2017 License:</strong> 006042</td>
<td><strong>Test Date:</strong> Oct-2019</td>
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<td><strong>Test Sponsor:</strong> Netweb</td>
<td><strong>Hardware Availability:</strong> Sep-2019</td>
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<tr>
<td><strong>Tested by:</strong> Netweb</td>
<td><strong>Software Availability:</strong> Aug-2019</td>
</tr>
</tbody>
</table>

**Base Optimization Flags (Continued)**

Benchmarks using both C and C++:
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
- -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- -ffinite-math-only -qopt-mem-layout-trans=4 -auto  
- -nostandard-realloc-lhs -align array32byte

**Peak Compiler Invocation**

**C benchmarks:**

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

**C++ benchmarks:**

```
icpc -m64
```

**Fortran benchmarks:**

```
ifort -m64
```

Benchmarks using both Fortran and C:

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

Benchmarks using both C and C++:

```
icpc -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:

```
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512  
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4
```

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

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Peak Optimization Flags (Continued)

538.imagick_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

544.nab_r: Same as 538.imagick_r

C++ benchmarks:

508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

510.parest_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:

-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

526.blender_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:

-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

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Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

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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