SPEC CPU®2017 Floating Point Rate Result

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
Tyrone Camarero DS400TOG-424RT2
(2.10 GHz, Intel Xeon Gold 5218R)

SPECrater®2017_fp_base = 226
SPECrater®2017_fp_peak = 229

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

Hardware
CPU Name: Intel Xeon Gold 5218R
Max MHz: 4000
Nominal: 2100
Enabled: 40 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: 27.5 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
Storage: 1 x 480 GB SATA SSD
Other: None

Software
OS: CentOS Linux release 8.2.2004 (Core) 4.18.0-193.el8.x86_64
Compiler: C/C++: Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux;
Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux
Parallel: No
Firmware: Version 3.3 released Feb-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage

Test Date: Jan-2021
Hardware Availability: Aug-2020
Software Availability: Jun-2020

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>90.5</td>
<td>1402</td>
<td>90.7</td>
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</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux

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/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"
# SPEC CPU®2017 Floating Point Rate Result

## Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

**Tyrone Camarero DS400TOG-424RT2**  
(2.10 GHz, Intel Xeon Gold 5218R)

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<td>229</td>
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</tbody>
</table>

| CPU2017 License:       | 006042                |
| Test Sponsor:          | Netweb Pte Ltd        |
| Tested by:             | Tyrone Systems        |
| Test Date:             | Jan-2021              |
| Hardware Availability: | Aug-2020              |
| Software Availability: | Jun-2020              |

### General Notes

- Binaries compiled on a system with 2x Intel Cascade Lake CPU 4214R + 384 GB RAM memory using Centos 8.2 x86_64
- 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>`
- 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.
- jemalloc, a general purpose malloc implementation
  - built with the Centos 8.2 x86_64, and the system compiler gcc 4.8.5

### Platform Notes

- BIOS Settings:
  - Power Technology = Custom
  - Power Performance Tuning = BIOS Controls EPB
  - ENERGY_PERF_BIAS_CFG mode = Maximum Performance
  - SNC = Enable
  - Stale AtoS = Disable
  - IMC Interleaving = 1-way Interleave
  - Patrol Scrub = Disable

- Sysinfo program `/home/cpu2017/bin/sysinfo`
- Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
- running on localhost.localdomain Sat Jan 30 20:24:58 2021

- 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) Gold 5218R CPU @ 2.10GHz`
  - `2 "physical id"s (chips)`
  - `80 "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 : 20
    - siblings : 40
    - physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

(Continued on next page)
Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
Tyrone Camarero DS400TOG-424RT2
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SPECrate\textsuperscript{2017\_fp\_base} = 226
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CPU2017 License: 006042
Test Sponsor: Netweb Pte Ltd
Tested by: Tyrone Systems

Platform Notes (Continued)

physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 80
On-line CPU(s) list: 0-79
Thread(s) per core: 2
Core(s) per socket: 2
Socket(s): 20
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 3452.367
CPU max MHz: 4000.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s): 0-2, 5, 6, 10-12, 15, 16, 40-42, 45, 46, 50-52, 55, 56
NUMA node1 CPU(s): 3, 4, 7-9, 13, 14, 17-19, 43, 44, 47-49, 53, 54, 57-59
NUMA node2 CPU(s): 20-22, 25, 26, 30-32, 35, 36, 60-62, 65, 66, 70-72, 75, 76
NUMA node3 CPU(s): 23, 24, 27-29, 33, 34, 37-39, 63, 64, 67-69, 73, 74, 77-79
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdelgb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrr pdcm pcid 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 cdp_l3 invpcid single intel_pmm ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rtit aovx512f aovx512dq rdseed adx smap clflushopt clwb intel_pt aovx512cd aovx512bw aovx512vl xsaves xsaveopt xsavec xgetbv1 xsavec qm_occup_llc qm_mbb_total qm_mbb_local dtherm ida arat pln pts pku ospke aovx512_vni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data
cache size : 28160 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
## Platform Notes (Continued)

physical chip.

available: 4 nodes (0-3)
- node 0 cpus: 0 1 2 5 6 10 11 12 15 16 40 41 42 45 46 50 51 52 55 56
- node 0 size: 95353 MB
- node 0 free: 84549 MB
- node 1 cpus: 3 4 7 8 9 13 14 17 18 19 43 44 47 48 49 53 54 57 58 59
- node 1 size: 96763 MB
- node 1 free: 87601 MB
- node 2 cpus: 20 21 22 25 26 30 31 32 35 36 60 61 62 65 66 70 71 72 75 76
- node 2 size: 96735 MB
- node 2 free: 87761 MB
- node 3 cpus: 23 24 27 28 29 33 34 37 38 39 63 64 67 68 69 73 74 77 78 79
- node 3 size: 96762 MB
- node 3 free: 87161 MB

node distances:
- node 0 1 2 3
- 0: 10 11 21 21
- 1: 11 10 21 21
- 2: 21 21 10 11
- 3: 21 21 11 10

From /proc/meminfo

<table>
<thead>
<tr>
<th>MemTotal</th>
<th>394870504 kB</th>
</tr>
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<tbody>
<tr>
<td>HugePages_Total</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

/sbin/tuned-adm active

Current active profile: throughput-performance

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

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

- centos-release: CentOS Linux release 8.2.2004 (Core)
- centos-release-upstream: Derived from Red Hat Enterprise Linux 8.2 (Source)
- os-release:
  - NAME="CentOS Linux"
  - VERSION="8 (Core)"
  - ID="centos"
  - ID_LIKE="rhel fedora"
  - VERSION_ID="8"
  - PLATFORM_ID="platform:el8"
  - PRETTY_NAME="CentOS Linux 8 (Core)"
  - ANSI_COLOR="0;31"
- redhat-release: CentOS Linux release 8.2.2004 (Core)
- system-release: CentOS Linux release 8.2.2004 (Core)
- system-release-cpe: cpe:/o:centos:centos:8
Platform Notes (Continued)

uname -a:
    Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri May 8 10:59:10 UTC 2020
    x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):
KVM: Vulnerable
CVE-2018-3620 (L1 Terminal Fault):
Not affected
Microarchitectural Data Sampling:
Not affected
CVE-2017-5754 (Meltdown):
Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass):
Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2):
Mitigation: Clear CPU buffers; SMT vulnerable
CVE-2020-0543 (Special Register Buffer Data Sampling):
No status reported
CVE-2019-11135 (TSX Asynchronous Abort):
Mitigation: Clear CPU buffers; SMT vulnerable

run-level 3 Jan 30 11:29

SPEC is set to: /home/cpu2017

From /sys/devices/virtual/dmi/id
Vendor:         Tyrone Systems
Product:        Tyrone Camarero DS400TOG-424RT2
Product Family: SMC X11
Serial:         A309085X0907231

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 NO DIMM NO DIMM
12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2666

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 3.3
BIOS Date: 02/21/2020
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**Platform Notes (Continued)**

BIOS Revision: 5.14

(End of data from sysinfo program)

**Compiler Version Notes**

```
C
| 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
```

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

```
C++
| 508.namd_r(base, peak) 510.parest_r(base, peak)
```

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

```
C++, C
| 511.povray_r(base) 526.blender_r(base, peak)
```

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
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```
C++, C
| 511.povray_r(peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
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(Continued on next page)
Compiler Version Notes (Continued)

C++, C          | 511.povray_r(base) 526.blender_r(base, peak)

---

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C++, C          | 511.povray_r(peak)

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---

C++, C, Fortran | 507.cactuBSSN_r(base, peak)

---

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NextGen Build 20200304
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---

Fortran, C      | 521.wrf_r(base) 527.cam4_r(base, peak)

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
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### Compiler Version Notes (Continued)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
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---

**Base Compiler Invocation**

C benchmarks:  
`icc`

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

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:
- `m64 -qnextgen -std=c11`
- `Wl, -plugin-opt=-x86-branches-within-32B-boundaries -Wl, -z, muldefs`
- `fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse`
- `funroll-loops -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-64/lib`
- `ljemalloc`

C++ benchmarks:
- `m64 -qnextgen -Wl, -plugin-opt=-x86-branches-within-32B-boundaries`

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

C++ benchmarks (continued):
-\(-w1,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:
-\(-m64 -w1,-plugin-opt=-x86-branches-within-32B-boundaries -w1,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries -L/usr/local/je5.0.1-64/lib
-ljemalloc

Benchmarks using both Fortran and C:
-\(-m64 -qnextgen -std=c11
-\(-w1,-plugin-opt=-x86-branches-within-32B-boundaries -w1,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/je5.0.1-64/lib -ljemalloc

Benchmarks using both C and C++:
-\(-m64 -qnextgen -std=c11
-\(-w1,-plugin-opt=-x86-branches-within-32B-boundaries -w1,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-\(-funroll-loops -qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-64/lib
-ljemalloc

Benchmarks using Fortran, C, and C++:
-\(-m64 -qnextgen -std=c11
-\(-w1,-plugin-opt=-x86-branches-within-32B-boundaries -w1,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-\(-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/je5.0.1-64/lib -ljemalloc

Peak Compiler Invocation

C benchmarks:
\texttt{icc}

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

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: basepeak = yes

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: -m64 -qnextgen
-W1,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/je5.0.1-64/lib
-ljemalloc

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

Fortran benchmarks:

503.bwaves_r: -m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries 
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -O3 -ipo 
-no-pref-div -qopt-prefetch -ffinite-math-only 
-qopt-multiple-gather-scatter-by-shuffles 
-qopt-mem-layout-trans=4 -nomem-aligned -mbranch-within-32B-boundaries 
-align array32byte -auto -mbranches-within-32B-boundaries 
-L/usr/local/je5.0.1-64/lib -ljemalloc

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3 
-ipo -no-pref-div -qopt-prefetch -ffinite-math-only 
-qopt-multiple-gather-scatter-by-shuffles 
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries 
-nostandard-realloc-lhs -align array32byte -auto 
-L/usr/local/je5.0.1-64/lib -ljemalloc

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3 
-ipo -no-pref-div -qopt-prefetch -ffinite-math-only 
-qopt-multiple-gather-scatter-by-shuffles 
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries 
-L/usr/local/je5.0.1-64/lib -ljemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes
**SPEC CPU®2017 Floating Point Rate Result**

<table>
<thead>
<tr>
<th><strong>Tyrone Systems</strong></th>
<th><strong>SPECrate®2017_fp_base = 226</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Test Sponsor: Netweb Pte Ltd)</td>
<td><strong>SPECrate®2017_fp_peak = 229</strong></td>
</tr>
<tr>
<td>Tyrone Camarero DS400TOG-424RT2 (2.10 GHz,Intel Xeon Gold 5218R)</td>
<td></td>
</tr>
</tbody>
</table>

**CPU2017 License:** 006042
**Test Sponsor:** Netweb Pte Ltd
**Tested by:** Tyrone Systems

**Test Date:** Jan-2021
**Hardware Availability:** Aug-2020
**Software Availability:** Jun-2020

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

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