## SPEC CPU®2017 Floating Point Speed Result

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

**Tyrone Camarero DS400TOG-424RT2**
(2.60 GHz, Intel Xeon Gold 6240)

**SPECspeed®2017_fp_base = 121**
**SPECspeed®2017_fp_peak = 124**

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Feb-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Netweb Pte Ltd</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2020</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Aug-2020</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Tyrone Systems</td>
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<tr>
<td>CPU2017 License:</td>
<td>006042</td>
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<td>SPECspeed®2017_fp_base:</td>
<td>121</td>
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<tr>
<td>SPECspeed®2017_fp_peak:</td>
<td>124</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6240
- **Max MHz:** 3900
- **Nominal:** 2600
- **Enabled:** 36 cores, 2 chips, 2 threads/core
- **Orderable:** 1.2 (chip)s
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 24.75 MB I+D on chip per chip
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)
- **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 for Linux Build 20200306;
  Fortran: Version 19.1.1.217 of Intel Fortran Compiler for Linux Build 20200306;
- **Parallel:** Yes
- **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

### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
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<td>654.roms_s</td>
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### Results Table

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<tr>
<th>Benchmark</th>
<th>Threads</th>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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"

### 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/intel64:/home/cpu2017/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"

### General Notes

Binaries compiled on a system with 2x Intel Cascade Lake CPU 4214R + 384GB 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 numacll i.e.:
- numacll --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.

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

Tyrone Systems  
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero DS400TOG-424RT2  
(2.60 GHz, Intel Xeon Gold 6240)

SPECspeed®2017_fp_base = 121
SPECspeed®2017_fp_peak = 124

General Notes (Continued)

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 Thu Feb 11 16:29:32 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 6240 CPU @ 2.60GHz
   2  "physical id"s (chips)
    72 "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 : 18
siblings : 36
physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 72
On-line CPU(s) list: 0-71
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6

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SPECspeed®2017_fp_peak = 124

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

Platform Notes (Continued)

Model: 85
Model name: Intel(R) Xeon(R) Gold 6240 CPU @ 2.60GHz
Stepping: 7
CPU MHz: 1079.254
CPU max MHz: 3900.0000
CPU min MHz: 1000.0000
BogoMIPS: 5200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 25344K
NUMA node0 CPU(s): 0-2,5,6,9,10,14,15,36-38,41,42,45,46,50,51
NUMA node1 CPU(s): 3,4,7,8,11-13,16,17,39,40,43,44,47-49,52,53
NUMA node2 CPU(s): 18-20,23,24,27,28,32,33,34-36,39,40,63,64,68,69
NUMA node3 CPU(s): 21,22,25,26,29-31,34,35,37,58,61,62,65-67,70,71
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 pdelgb rdtscp lm constant_tsc art 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 xtrm pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes f16c rsbafi lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdcd13 invpcid_single intel_ppin ssbd ibrs ibpb ibrs_enhanced tpr_shadow vnmi flexpriority vpd tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtm cmp mpn rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data
  cache size: 25344 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0 1 2 5 6 9 10 14 15 36 37 38 41 42 45 46 50 51
  node 0 size: 95353 MB
  node 0 free: 82276 MB
  node 1 cpus: 3 4 7 8 11 12 13 16 17 39 40 43 44 47 49 52 53
  node 1 size: 96736 MB
  node 1 free: 79051 MB
  node 2 cpus: 18 19 20 23 24 27 28 32 33 54 55 56 59 60 63 64 68 69
  node 2 size: 96763 MB
  node 2 free: 85010 MB
  node 3 cpus: 21 22 25 26 29 30 31 34 35 57 58 61 62 65 66 67 70 71
  node 3 size: 96763 MB
  node 3 free: 85419 MB

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SPECspeed®2017_fp_base = 121
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Platform Notes (Continued)

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
  MemTotal:       394872264 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/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

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):  Not affected
CVE-2018-3639 (Speculative Store Bypass):  Mitigation: Speculative Store Bypass disabled via prctl and seccomp

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**Platform Notes (Continued)**

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swapgs barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

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 Feb 10 10:34

SPEC is set to: /home/cpu2017

Filesystem | Type | Size  | Used | Avail | Use% | Mounted on
---|---|---|---|---|---|---
/dev_mapper/cl-home | xfs | 392G  | 146G  | 247G  | 38% | /home

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 2934

BIOS:
- BIOS Vendor: American Megatrends Inc.
- BIOS Version: 3.3
- BIOS Date: 02/21/2020
- BIOS Revision: 5.14

(End of data from sysinfo program)

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**Compiler Version Notes**

```
C
| 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, peak)
```

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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, Fortran | 607.cactuBSSN_s(base, 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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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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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306
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Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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==============================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)

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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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==============================================================================

**Base Compiler Invocation**

C benchmarks:
icc

Fortran benchmarks:
ifort

(Continued on next page)
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<td>ifort icc</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>icpc icc ifort</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>-DSPEC_LP64</td>
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<td>-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
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**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  
- 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:

- m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
- ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
- mbranches-within-32B-boundaries

### Fortran benchmarks:

- m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3  
- no-prec-div -qopt-prefetch -ffinite-math-only  
- qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs  
- mbranches-within-32B-boundaries -L/usr/local/je5.0.1-64/lib -ljemalloc

**Base Optimization Flags (Continued)**

### Fortran benchmarks using both Fortran and C:

- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
- qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
- DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs  
- L/usr/local/je5.0.1-64/lib -ljemalloc

### Fortran, C, and C++:

- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
- qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp

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## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/je5.0.1-64/lib -ljemalloc

## Peak Compiler Invocation

**C benchmarks:**
- `icc`

**Fortran benchmarks:**
- `ifort`

**Benchmarks using both Fortran and C:**
- `ifort icc`

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

## 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: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries
-L/usr/local/je5.0.1-64/lib -ljemalloc`

**Fortran benchmarks:**
- `603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512`

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### Peak Optimization Flags (Continued)

603.bwaves_s (continued):
-03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -gopenmp -nstandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/je5.0.1-64/lib -ljemalloc

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -gopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nstandard-realloc-lhs
-L/usr/local/je5.0.1-64/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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


http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-CLX-revB.html

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

http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml

http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-CLX-revB.xml

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