## SPEC CPU®2017 Floating Point Speed Result

**Tyrone Systems**  
(Test Sponsor: Netweb Pte Ltd)  
DS400TN-28/R/T  
(2.60 GHz, Intel Xeon Gold 6240)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>127</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>132</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 006042  
**Test Sponsor:** Netweb Pte Ltd  
**Tested by:** Netweb  
**Test Date:** Nov-2019  
**Hardware Availability:** Sep-2019  
**Software Availability:** Aug-2019

### Hardware

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (127)</th>
<th>SPECspeed®2017_fp_peak (132)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36</td>
<td>93.7</td>
<td>87.0</td>
</tr>
<tr>
<td>72</td>
<td>93.6</td>
<td>93.0</td>
</tr>
<tr>
<td>36</td>
<td>120</td>
<td>128</td>
</tr>
<tr>
<td>72</td>
<td>114</td>
<td>114</td>
</tr>
<tr>
<td>36</td>
<td>82.8</td>
<td>84.3</td>
</tr>
<tr>
<td>72</td>
<td>64.4</td>
<td>66.5</td>
</tr>
<tr>
<td>36</td>
<td>116</td>
<td>114</td>
</tr>
</tbody>
</table>

| 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: Yes  
Firmware: Version 3.1a released Oct-2019  
File System: xfs  
System State: Run level 3 (multi-user)  
Base Pointers: 64-bit  
Peak Pointers: 64-bit  
Other: None  
Power Management: None |
|---------|---------------------------------|

**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  
**Other:** None  
**Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933P-R)  
**Storage:** 1 x 480 GB SSD  
**Other:** None
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SPECspeed®2017_fp_base = 127
SPECspeed®2017_fp_peak = 132

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>PEAK Seconds</th>
<th>PEAK Ratio</th>
<th>BASE Seconds</th>
<th>BASE Ratio</th>
<th>PEAK Seconds</th>
<th>PEAK Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>36</td>
<td>117</td>
<td>505</td>
<td>118</td>
<td>502</td>
<td>36</td>
<td>118</td>
<td>500</td>
<td>117</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>36</td>
<td><strong>115</strong></td>
<td><strong>144</strong></td>
<td><strong>116</strong></td>
<td><strong>144</strong></td>
<td>36</td>
<td><strong>116</strong></td>
<td><strong>144</strong></td>
<td><strong>115</strong></td>
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<tr>
<td>619.lbm_s</td>
<td>36</td>
<td>55.8</td>
<td>93.8</td>
<td><strong>55.9</strong></td>
<td><strong>93.7</strong></td>
<td>36</td>
<td>56.2</td>
<td>93.2</td>
<td><strong>56.0</strong></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>36</td>
<td>110</td>
<td>120</td>
<td><strong>110</strong></td>
<td><strong>120</strong></td>
<td>36</td>
<td>104</td>
<td>128</td>
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<td>627.cam4_s</td>
<td>36</td>
<td><strong>102</strong></td>
<td><strong>87.0</strong></td>
<td>102</td>
<td>87.1</td>
<td>72</td>
<td><strong>79.8</strong></td>
<td><strong>111</strong></td>
<td><strong>80.0</strong></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>36</td>
<td><strong>178</strong></td>
<td><strong>66.5</strong></td>
<td>180</td>
<td>65.8</td>
<td>72</td>
<td><strong>184</strong></td>
<td><strong>64.4</strong></td>
<td><strong>183</strong></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>36</td>
<td>126</td>
<td>114</td>
<td><strong>126</strong></td>
<td><strong>114</strong></td>
<td>36</td>
<td>126</td>
<td>115</td>
<td><strong>126</strong></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>36</td>
<td><strong>82.6</strong></td>
<td><strong>211</strong></td>
<td>82.5</td>
<td>212</td>
<td>72</td>
<td>77.7</td>
<td><strong>225</strong></td>
<td><strong>77.6</strong></td>
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<tr>
<td>649.fotonik3d_s</td>
<td>36</td>
<td><strong>110</strong></td>
<td><strong>82.8</strong></td>
<td>112</td>
<td>81.1</td>
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<td><strong>110</strong></td>
<td><strong>83.0</strong></td>
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<td>36</td>
<td>136</td>
<td>116</td>
<td><strong>136</strong></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/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
Filesystem 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.
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.
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<tr>
<td>Test Sponsor:</td>
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<tr>
<td>Tested by:</td>
<td>Netweb</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Nov-2019</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Sep-2019</td>
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<tr>
<td>Software Availability:</td>
<td>Aug-2019</td>
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</tbody>
</table>

**Platform Notes**

Sysinfo program /home/cpu2017/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011  
runtime on NODE4 Wed Nov  6 12:42:32 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) 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): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Gold 6240 CPU @ 2.60GHz  
Stepping: 7  
CPU MHz: 999.914  
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): 0-17,36-53  
NUMA node1 CPU(s): 18-35,54-71  
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov

(Continued on next page)
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SPECspeed®2017_fp_peak = 132

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Tested by: Netweb

Test Date: Nov-2019
Hardware Availability: Sep-2019
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Platform Notes (Continued)

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
aperfmperf eagerfpu 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 epb cat_13 cdp_13 intel_pinn
intel_pt ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow vmmi flexpriority ept
vpid fgsgbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsaves xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
pts pku ospke avx512_vnni md_clear spec_ctrl intel_stibp flush_lld arch_capabilities

/testproc/cpulinfo cache data
  cache size : 25344 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 16 17 36 37 38 39 40 41 42 43 44 45
  46 47 48 49 50 51 52 53
  node 0 size: 195244 MB
  node 0 free: 163958 MB
  node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 54 55 56 57 58 59 60
  61 62 63 64 65 66 67 68 69 70 71
  node 1 size: 196608 MB
  node 1 free: 164296 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
MemTotal: 394875456 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)

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"

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Platform Notes (Continued)

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 NODE4 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 Nov 5 01:43

SPEC is set to: /home/cpu2017

Filesystem  Type  Size  Used  Avail Use% Mounted on
/dev/mapper/centos-home  xfs  392G  208G  185G  53%  /home

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 3.1a 10/16/2019
Vendor: Tyrone Systems
Product: X11DPI-N(T)
Serial: 123456789

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:
    4x NO DIMM NO DIMM
    12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

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

(Continued on next page)
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Compiler Version Notes (Continued)

------------------------------------------------------------------------------
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.
icpc: 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.
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.
------------------------------------------------------------------------------

Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
------------------------------------------------------------------------------
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.
------------------------------------------------------------------------------

Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
------------------------------------------------------------------------------
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.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
## Base Compiler Invocation

C benchmarks:
```bash
icc -m64 -std=c11
```

Fortran benchmarks:
```bash
ifort -m64
```

Benchmarks using both Fortran and C:
```bash
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```bash
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 -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:
```bash
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:
```bash
-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:
```bash
-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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Base Optimization Flags (Continued)

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:
603.bwaves_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=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

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Peak Optimization Flags (Continued)

654.roms_s (continued):
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pas 1) -prof-use(pas 2) -O2 -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

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

Tested with SPEC CPU®2017 v1.1.0 on 2019-11-06 12:42:31-0500.