### SPEC CPU®2017 Floating Point Speed Result

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

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

**SPECspeed®2017_fp_base = 120**  
**SPECspeed®2017_fp_peak = 123**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Gold 5218R</td>
<td>OS: CentOS Linux release 8.2.2004 (Core) 4.18.0-193.el8.x86_64</td>
</tr>
<tr>
<td>Nominal: 2100</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>Enabled: 40 cores, 2 chips, 2 threads/core</td>
<td>Firmware: Version 3.3 released Feb-2020</td>
</tr>
<tr>
<td>Orderable: 1.2 (chip)s</td>
<td>File System: xfs</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>L3: 27.5 MB I+D on chip per chip</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Other: jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)</td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
<tr>
<td>Storage: 1 x 480 GB SATA SSD</td>
<td></td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
Tyrone Camarero DS400TOG-424RT2
(2.10 GHz, Intel Xeon Gold 5218R)

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

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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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>40</td>
<td>124</td>
<td>476</td>
<td>124</td>
<td>478</td>
<td>123</td>
<td>481</td>
<td>40</td>
<td>124</td>
<td>477</td>
<td>124</td>
<td>476</td>
<td>123</td>
<td>478</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
<td>113</td>
<td>148</td>
<td>112</td>
<td>149</td>
<td>117</td>
<td>143</td>
<td>40</td>
<td>113</td>
<td>148</td>
<td>112</td>
<td>149</td>
<td>117</td>
<td>143</td>
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<tr>
<td>619.lbm_s</td>
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<td>67.2</td>
<td>77.9</td>
<td>60.2</td>
<td>87.0</td>
<td>63.5</td>
<td>82.4</td>
<td>40</td>
<td>67.2</td>
<td>77.9</td>
<td>60.2</td>
<td>87.0</td>
<td>63.5</td>
<td>82.4</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>40</td>
<td>117</td>
<td>113</td>
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<td>114</td>
<td>116</td>
<td>114</td>
<td>40</td>
<td>109</td>
<td>121</td>
<td>109</td>
<td>121</td>
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<td>121</td>
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<tr>
<td>627.cam4_s</td>
<td>40</td>
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<td>92.0</td>
<td>96.5</td>
<td>91.8</td>
<td>96.3</td>
<td>92.1</td>
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<td>96.4</td>
<td>92.0</td>
<td>96.5</td>
<td>91.8</td>
<td>96.3</td>
<td>92.1</td>
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<tr>
<td>628.pop2_s</td>
<td>40</td>
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<td>65.0</td>
<td>185</td>
<td>64.3</td>
<td>182</td>
<td>65.2</td>
<td>40</td>
<td>183</td>
<td>65.0</td>
<td>185</td>
<td>64.3</td>
<td>182</td>
<td>65.2</td>
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<tr>
<td>638.imagick_s</td>
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<td>85.7</td>
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<td>85.8</td>
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<td>168</td>
<td>85.7</td>
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<td>85.7</td>
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<td>85.8</td>
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<td>644.nab_s</td>
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<td>216</td>
<td>81.1</td>
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<td>71.8</td>
<td>243</td>
<td>71.4</td>
<td>245</td>
<td>71.6</td>
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<td>117</td>
<td>78.0</td>
<td>117</td>
<td>78.0</td>
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<td>78.3</td>
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<td>75.9</td>
<td>118</td>
<td>77.5</td>
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<td>78.1</td>
</tr>
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<td>654.roms_s</td>
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<td>140</td>
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<td>139</td>
<td>114</td>
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<td>139</td>
<td>113</td>
<td>140</td>
<td>112</td>
<td>139</td>
<td>114</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 120
SPECspeed®2017_fp_peak = 123

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"
MALLOCONF = "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 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.

(Continued on next page)
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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 Mon Feb 1 01:36:41 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
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: 20
  Socket(s): 2
  NUMA node(s): 4
  Vendor ID: GenuineIntel
  CPU family: 6

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

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

Platform Notes (Continued)

Model: 85
Model name: Intel(R) Xeon(R) Gold 5218R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 3060.018
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): 0-2,5,6-12,15,16,40-42,45,46,50-52,55,56
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 cx8 apic sep mtrr pge mca cmov
        pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtdsc
        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
        xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
        avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
        invpcid_single intel_pmmu vmx smm sse ibrs ibpb ibrs_enhanced tpr_shadow vnmi
        flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erva invpcid rtm
        cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
        avx512bw avx512vl xsaves optxsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
        cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni 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
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: 80860 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: 77485 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: 84107 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: 83542 MB

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<tr>
<td>Tested by:</td>
<td>Tyrone Systems</td>
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<tr>
<td>Test Date:</td>
<td>Feb-2021</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Aug-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2020</td>
</tr>
</tbody>
</table>

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:       394870504 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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</table>

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 Jan 30 11:29
SPEC is set to: /home/cpu2017
Filesystem          Type   Size  Used Avail Use% Mounted on
/dev/mapper/cl-home  xfs   392G  144G  248G  37% /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 2666

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)

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 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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| Test Date:            | Feb-2021               |
| Hardware Availability:| Aug-2020               |
| Software Availability:| Jun-2020               |

### Compiler Version Notes (Continued)

```markdown
---

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  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C 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) 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.
---

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, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---

Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)  
628.pop2_s(base, peak)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C 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.
---

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**Base Compiler Invocation**

C benchmarks:  
```
icc
```

Fortran benchmarks:  
```
ifort
```
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Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

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 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
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

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

Benchmarks using 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

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

603.bwaves_s (continued):
-03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -gopenmp -nostandard-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 -W1,-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 -nostandard-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

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

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