**SPEC CPU®2017 Integer Speed Result**

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

**Tyrone Camarero DS400TR-212R4**  
(2.20 GHz, Intel Xeon Gold 5220R)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 8.51</th>
<th>SPECspeed®2017_int_peak = 8.72</th>
</tr>
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</table>

<table>
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<tr>
<th>Test Date:</th>
<th>Jan-2021</th>
</tr>
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<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Aug-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2020</td>
</tr>
</tbody>
</table>

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

### Hardware

- **CPU Name:** Intel Xeon Gold 5220R  
  - Max MHz: 4000  
  - Nominal: 2200  
  - Enabled: 48 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: 35.75 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 8.3.2011  
  - 4.18.0-240.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 3.4 released Oct-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

### Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<tr>
<td>perlbench_s</td>
<td>96</td>
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<td>8.72</td>
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<tr>
<td>gcc_s</td>
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<td>8.17</td>
<td>8.50</td>
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<td>mcf_s</td>
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<td>6.97</td>
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<td>omnetpp_s</td>
<td>96</td>
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<td>11.9</td>
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<tr>
<td>xalancbmk_s</td>
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<tr>
<td>x264_s</td>
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<td>3.56</td>
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<td>deepsjeng_s</td>
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<td>leela_s</td>
<td>96</td>
<td></td>
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<tr>
<td>exchange2_s</td>
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<tr>
<td>xz_s</td>
<td>96</td>
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</table>

The graph shows the performance of each benchmark with 4 threads.
**SPEC CPU®2017 Integer Speed Result**

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

Tyrone Camarero DS400TR-212R4
(2.20 GHz, Intel Xeon Gold 5220R)

---

**SPECspeed®2017_int_base = 8.51**

**SPECspeed®2017_int_peak = 8.72**

---

**Results Table**

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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
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</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 8.51**

**SPECspeed®2017_int_peak = 8.72**

---

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

**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,scatter"
- 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 + 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
```
SPEC CPU®2017 Integer Speed Result

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
Tyrone Camarero DS400TR-212R4
(2.20 GHz, Intel Xeon Gold 5220R)

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

General Notes (Continued)

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 8.3.1 sources available from jemalloc.net or httpspec.cpu2017.notes_plat_005: BIOS Settings:

Platform Notes

Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Extreme 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 e8664e66d2d7080afea98d4b38e2f1c
running on spec Sat Jan 30 21:52:59 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 5220R CPU @ 2.20GHz
  2 "physical id"s (chips)
  96 "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 : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 2

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

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

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

Platform Notes (Continued)

Core(s) per socket: 24
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5220R CPU @ 2.20GHz
Stepping: 7
CPU MHz: 2899.990
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-3, 7-9, 13-15, 19, 20, 24-27, 31-33, 37-39, 43, 44, 47, 48-51, 55-57, 61-63, 67, 68
NUMA node1 CPU(s): 4-6, 10-12, 16-18, 21-23, 52-54, 58-60, 64-66, 69-71
NUMA node2 CPU(s): 24-27, 31-33, 37-39, 43, 44, 47, 48-51, 55-57, 61-63, 67, 68
NUMA node3 CPU(s): 28-30, 34-36, 40-42, 45-47, 76-78, 82-84, 88-90, 93-95
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 perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perf spirituality su split_die cpuid_template node ida pni pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1_l1a sse4_1_l1b x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abtm cmipprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppow ssbd mba ibrs ibpb stibp ibrs_enhanced fsbeg base tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmx mxrt rdt_a avx512f avx512dq rmmvdq smap clflushopt clwb intel_pt avx512cd avx512bw avx512v1 xsaves xsaveopt xsavecf xsavec xsaveopt xsaveopt xaves cqm llc cqm_occup_llc cqm_mbmc_total cqm_mbmc_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld arch_capabilities

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 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
  node 0 size: 90171 MB
  node 0 free: 78900 MB
  node 1 cpus: 4 5 6 10 11 12 16 17 18 21 22 23 24 25 26 27 28 29 30 31 32 33 34 37 38 39 43 44 47 72 73 74 75 79 80 81 85 86 87 91 92
  node 1 size: 91538 MB
  node 1 free: 82378 MB
  node 2 cpus: 24 25 26 27 31 32 33 37 38 39 43 44 47 72 73 74 75 79 80 81 85 86 87 91 92
  node 2 size: 92546 MB

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

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SPECspeed®2017_int_base = 8.51
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Tyrone Systems
(2.20 GHz, Intel Xeon Gold 5220R)

Platform Notes (Continued)

node 2 free: 81989 MB
node 3 cpus: 28 29 30 34 35 40 41 42 45 46 76 77 78 82 83 84 88 89 90 93 94 95
node 3 size: 92030 MB
node 3 free: 81992 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
MemTotal:       394855232 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 8.3.2011
centos-release-upstream: Derived from Red Hat Enterprise Linux 8.3
os-release:
    NAME="CentOS Linux"
    VERSION="8"
    ID="centos"
    ID_LIKE="rhel fedora"
    VERSION_ID="8"
    PLATFORM_ID="platform:e18"
    PRETTY_NAME="CentOS Linux 8"
    ANSI_COLOR="0;31"
redhat-release: CentOS Linux release 8.3.2011
system-release: CentOS Linux release 8.3.2011
system-release-cpe: cpe:/o:centos:centos:8

uname -a:
Linux spec 4.18.0-240.el8.x86_64 #1 SMP Fri Sep 25 19:48:47 UTC 2020 x86_64 x86_64
x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):       KVM: Mitigation: Split huge pages
CVE-2018-3620 (L1 Terminal Fault):     Not affected
Microarchitectural Data Sampling:       Not affected

(Continued on next page)
Tyrone Systems
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SPECspeed®2017_int_base = 8.51
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Platform Notes (Continued)

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: 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): Not affected

run-level 3 Jan 29 11:22
SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/cl-home xfs 372G 154G 218G 42% /home

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: 3.4
  BIOS Date: 10/30/2020
  BIOS Revision: 5.14

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
| C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) |
|         | 625.x264_s(base, peak) 657.xz_s(base, peak)                         |
==============================================================================

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

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

NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

-------------------------------------------------------------

C       | 600.perlbench_s(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.

-------------------------------------------------------------

C       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
       | 625.x264_s(base, peak) 657.xz_s(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       | 600.perlbench_s(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.

-------------------------------------------------------------

C++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
       | 631.deepsjeng_s(base, peak) 641.leela_s(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.

-------------------------------------------------------------

Fortran | 648.exchange2_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.
SPEC CPU®2017 Integer Speed Result

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**SPECspeed®2017_int_base = 8.51**

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<th>CPU2017 License</th>
<th>006042</th>
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<tbody>
<tr>
<td>Test Sponsor</td>
<td>Netweb Pte Ltd</td>
</tr>
<tr>
<td>Tested by</td>
<td>Tyrone Systems</td>
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<td>Dec-2020</td>
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</tbody>
</table>

### Base Compiler Invocation

C benchmarks:
- `icc`

C++ benchmarks:
- `icpc`

Fortran benchmarks:
- `ifort`

### Base Portability Flags

- `600.perlbench_s`: `-DSPEC_LP64 -DSPEC_LINUX_X64`
- `602.gcc_s`: `-DSPEC_LP64`
- `605.mcf_s`: `-DSPEC_LP64`
- `620.omnetpp_s`: `-DSPEC_LP64`
- `623.xalancbmk_s`: `-DSPEC_LP64 -DSPEC_LINUX`
- `625.x264_s`: `-DSPEC_LP64`
- `631.deepsjeng_s`: `-DSPEC_LP64`
- `641.leela_s`: `-DSPEC_LP64`
- `648.exchange2_s`: `-DSPEC_LP64`
- `657.xz_s`: `-DSPEC_LP64`

### Base Optimization Flags

**C benchmarks:**
- `-m64` `-qnextgen -std=c11`
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
- `-xCORE-AVX512 -O3 -ffast-math -ftlo -mfpmath=sse -funroll-loops`
- `-fuse-ld=gold -gopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP`
- `-L/usr/local/je5.0.1-64/lib -ljemalloc`

**C++ benchmarks:**
- `-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
- `-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -ftlo -mfpmath=sse`
- `-funroll-loops -fuse-ld=gold -gopt-mem-layout-trans=4`
- `-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.1.217/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

**Fortran benchmarks:**
- `-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -xCORE-AVX512`
- `-O3 -ipo -no-prec-div -gopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte`

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SPEC CPU®2017 Integer Speed Result
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Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero DS400TR-212R4
(2.20 GHz, Intel Xeon Gold 5220R)

SPECspeed®2017_int_base = 8.51
SPECspeed®2017_int_peak = 8.72

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

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

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-mbranches-within-32B-boundaries

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64(*) -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

(*) Indicates a portability flag that was found in a non-portability variable.

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-strict-overflow
-mbranches-within-32B-boundaries
-L/usr/local/je5.0.1-64/lib -ljemalloc

(Continued on next page)
Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)
Tyrone Camarero DS400TR-212R4
(2.20 GHz, Intel Xeon Gold 5220R)

SPECspeed®2017_int_base = 8.51
SPECspeed®2017_int_peak = 8.72

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

Peak Optimization Flags (Continued)

602.gcc_s: -m64 -qnextgen -std=c11 -fuse-ld=gold
-W1,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -gopt-mem-layout-trans=4
-L/usr/local/je5.0.1-64/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -qnextgen -std=c11
-W1,-plugin-opt=-x86-branches-within-32B-boundaries
-W1,-z,muldefs -xCORE-AVX512 -flto -O3 -ffast-math
-fuse-ld=gold -gopt-mem-layout-trans=4 -fno-alias
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:
620.omnetpp_s: basepeak = yes
623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes
641.leela_s: basepeak = yes

Fortran benchmarks:
648.exchange2_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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