# SPEC CPU®2017 Integer Rate Result

## Test Information

**Tyrone Systems**  
(Test Sponsor: Netweb Pte Ltd)  
Tyrone Camarero SDI100A2G-210  
(2.90 GHz, Intel Xeon Gold 6326)

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

**Performance Results**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 235</td>
<td>= 243</td>
</tr>
</tbody>
</table>

## Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 6326</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3500</td>
</tr>
<tr>
<td>Nominal</td>
<td>2900</td>
</tr>
<tr>
<td>Enabled</td>
<td>32 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 Chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td></td>
<td>L2: 1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td></td>
<td>L3: 24 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>OS</td>
<td>CentOS Linux release 8.4.2105</td>
</tr>
<tr>
<td></td>
<td>Kernel 4.18.0-305.3.1.el8.x86_64</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 1.1 released May-2021</td>
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<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS set to prefer performance at the cost of additional power usage.</td>
</tr>
</tbody>
</table>
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**Results Table**

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<thead>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>64</td>
<td>612</td>
<td>166</td>
<td>616</td>
<td>165</td>
<td>618</td>
<td>165</td>
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<td>532</td>
<td>192</td>
<td>534</td>
<td>191</td>
<td>537</td>
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<tr>
<td>502.gcc_r</td>
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<td>505.mcf_r</td>
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<tr>
<td>520.omnetpp_r</td>
<td>64</td>
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<td>523.xalancbmk_r</td>
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<td>250</td>
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<td>541.leela_r</td>
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<tr>
<td>548.exchange2_r</td>
<td>64</td>
<td>334</td>
<td>501</td>
<td>337</td>
<td>497</td>
<td>343</td>
<td>489</td>
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<td>501</td>
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<tr>
<td>557.xz_r</td>
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<td>487</td>
<td>142</td>
<td>485</td>
<td>143</td>
<td>485</td>
<td>143</td>
<td>64</td>
<td>491</td>
<td>141</td>
<td>490</td>
<td>141</td>
<td>490</td>
<td>141</td>
</tr>
</tbody>
</table>

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

**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/lib/ia32:/home/cpu2017/je5.0.1-32"
```

```
MALLOC_CONF = "retain:true"
```

**General Notes**

Binaries compiled locally by Netweb
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Files system page cache synced and cleared with:
```
sync; echo 3> /proc/sys/vm/drop_caches
```

runcpu command invoked through numactl i.e.:
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SPECrate®2017_int_peak = 243

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

General Notes (Continued)

numactl --interleave=all runcpu <etc>

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.
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.
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.


Platform Notes

BIOS Settings:
Power Technology set to Custom
Power Performance Tuning set to BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode set to Performance
LLC Dead Line Alloc set to Disable

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acfc64d running on localhost.localdomain Sat Aug 21 14:52:33 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 6326 CPU @ 2.90GHz
  2 "physical id"s (chips)
  64 "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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2

(Continued on next page)
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Hardware Availability: Apr-2021
Software Availability: Jun-2021

Platform Notes (Continued)

Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6326 CPU @ 2.90GHz
BIOS Model name: Intel(R) Xeon(R) Gold 6326 CPU @ 2.90GHz
Stepping: 6
CPU MHz: 3300.000
BogoMIPS: 5800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 24576K
NUMA node0 CPU(s): 0-7, 32-39
NUMA node1 CPU(s): 8-15, 40-47
NUMA node2 CPU(s): 16-23, 48-55
NUMA node3 CPU(s): 24-31, 56-63
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 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 invpcid_single intel_pinn ssbd mba ibrs ibpb ibrs_enabled tpr_shadow vnumi flexpriority ept vpid ept_ad fs荆base tsc_adjust bmi1 hle avx2 smep bmi2 erness invpcid cmq rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cmq_llc cmq_occum_llc cmq_mbb_total cmq_mbb_local split_lock_detect wbnoivd dtherm ida arat pln pts avx512vbmi umip pkp ospe avx512_vbmi2 gfn vaes vpcmimuldq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fnrm md_clear pconfig flush_l1d 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 32 33 34 35 36 37 38 39
   node 0 size: 128531 MB
   node 0 free: 109711 MB
   node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
   node 1 size: 129020 MB
   node 1 free: 108721 MB

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Platform Notes (Continued)

node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 129020 MB
node 2 free: 92112 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 129017 MB
node 3 free: 128497 MB
node distances:
  node   0   1   2   3
  0:  10  11  20  20
  1:  11  10  20  20
  2:  20  20  10  11
  3:  20  20  11  10

From /proc/meminfo
  MemTotal:       527964892 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  centos-release: CentOS Linux release 8.4.2105
  centos-release-upstream: Derived from Red Hat Enterprise Linux 8.4
  os-release:
    NAME="CentOS Linux"
    VERSION="8"
    ID="centos"
    ID_LIKE="rhel fedora"
    VERSION_ID="8"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="CentOS Linux 8"
    ANSI_COLOR="0;31"
  redhat-release: CentOS Linux release 8.4.2105
  system-release: CentOS Linux release 8.4.2105
  system-release-cpe: cpe:/o:centos:centos:8

uname -a:
  Linux localhost.localdomain 4.18.0-305.3.1.el8.x86_64 #1 SMP Tue Jun 1 16:14:33 UTC 2021 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected

(Continued on next page)
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Platform Notes (Continued)

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
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Aug 21 09:55
SPEC is set to: /home/cpu2017

Additional information from dmidecode 3.2 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:
16x SK Hynix HMA84GR7DJR4N-XN 32 GB 2 rank 3200

BIOS:
BIOS Vendor: American Megatrends International, LLC.
BIOS Version: 1.1
BIOS Date: 05/10/2021
BIOS Revision: 5.22

Compiler Version Notes

C | 500.perlbench_r(peak) 557.xz_r(peak)

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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## Compiler Version Notes (Continued)

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<table>
<thead>
<tr>
<th>C</th>
<th>502.gcc_r(peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113</td>
</tr>
<tr>
<td></td>
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</tr>
</tbody>
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<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)</th>
</tr>
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<tbody>
<tr>
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<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
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<th>Base Compiler Invocation</th>
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<tbody>
<tr>
<td>C benchmarks: icx</td>
</tr>
<tr>
<td>C++ benchmarks: icpx</td>
</tr>
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(Continued on next page)
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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-ffast-math=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-ffast-math=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc
SPEC CPU®2017 Integer Rate Result

Tyrone Systems
(Test Sponsor: Netweb Pte Ltd)

Tyrone Camarero SDI100A2G-210
(2.90 GHz, Intel Xeon Gold 6326)

SPECrate®2017_int_base = 235
SPECrate®2017_int_peak = 243

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

Test Date: Aug-2021
Hardware Availability: Apr-2021
Software Availability: Jun-2021

Peak Compiler Invocation

C benchmarks (except as noted below):
  icx
  500.perlbench_r: icc
  557.xz_r: icc

C++ benchmarks:
  icpx

Fortran benchmarks:
  ifort

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:
  500.perlbench_r: -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/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  -lqkmalloc

  502.gcc_r: -m32
  -L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin
  -std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
  -fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto
  -Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4

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

502.gcc_r (continued):
- mbranches-within-32B-boundaries
- L/usr/local/jge5.0.1-32/lib -ljemalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl, -z, muldefs -xCORE-AVX512 -flto
- O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias
- mbranches-within-32B-boundaries
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ intel64_lin
  - lqkmalloc

557.xz_r: -Wl, -z, muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
- L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
  - lqkmalloc

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbmk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: 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-revI.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Tyrone-Platform-Settings-V1.2-CLX-revI.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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