Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4210R)

CPU2017 License: 97
Test Sponsor: Altos Computing Inc.
Tested by: Altos Computing Inc.

Test Date: Aug-2020
Hardware Availability: Feb-2020
Software Availability: Dec-2019

Hardware
CPU Name: Intel Xeon Silver 4210R
Max MHz: 3200
Nominal: 2400
Orderable: 1,2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 13.75 MB I+D on chip per chip
Other: None
Memory: 384 GB (24 x 16 GB 1Rx4 PC4-2933V-R, running at 2400)
Storage: 1 x 480 GB SATA SSD
Other: None

Software
OS: Red Hat Enterprise Linux release 8.1
Compiler: C/C++: Version 19.0.5.281 of Intel C/C++
Compiler Build 20190815 for Linux;
Fortran: Version 19.0.5.281 of Intel Fortran
Compiler Build 20190815 for Linux
Parallel: No
Firmware: Version R11 released Feb-2020
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage
# SPEC CPU®2017 Floating Point Rate Result

## Altos Computing Inc.

### SPECrate®2017_fp_base = 120

### SPECrate®2017_fp_peak = 123

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</tbody>
</table>

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

## Compiler Notes

The build date 20190815 in sw_compiler is correct, but the date in the compiler version notes is not.

## 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"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

(Continued on next page)
Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4210R)

**General Notes (Continued)**

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.

**Platform Notes**

BIOS Configuration:
Power Policy Quick Settings set to Performance
IMC set to 1-way interleaving
Sub_NUMA Cluster set to enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbl6e646a485a0011
running on localhost.localdomain Fri Aug 14 07:08:47 2020

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) Silver 4210R CPU @ 2.40GHz
  2 "physical id"s (chips)
  40 "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 : 10
siblings : 20
physical 0: cores 0 1 2 3 4 8 9 10 11 12
physical 1: cores 0 1 2 3 4 8 9 10 11 12
```

From lscpu:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
```

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

Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4210R)

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SPECrat®2017_fp_peak = 123

CPU2017 License: 97
Test Sponsor: Altos Computing Inc.
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Test Date: Aug-2020
Hardware Availability: Feb-2020
Software Availability: Dec-2019

Platform Notes (Continued)

Core(s) per socket: 10
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2828.628
CPU max MHz: 3200.0000
CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 14080K
NUMA node0 CPU(s): 0-9,20-29
NUMA node1 CPU(s): 10-19,30-39
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts aperfmperf pni pclmulqdq dttes64 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

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

phy node distances:
node   0   1
0: 10 21

(Continued on next page)
Platform Notes (Continued)

1:  21  10

From /proc/meminfo
MemTotal:       394608288 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
os-release:
   NAME="Red Hat Enterprise Linux"
   VERSION="8.1 (Ootpa)"
   ID="rhel"
   ID_LIKE="fedora"
   VERSION_ID="8.1"
   PLATFORM_ID="platform:el8"
   PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
   ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

uname -a:
   Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 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: usercopy/swapgs barriers and __user
   pointer sanitization
CVE-2017-5715 (Spectre variant 2):        Mitigation: Enhanced IBRS, IBPB: conditional,
   RSB filling
run-level 3 Aug 14 02:33

SPEC is set to: /home/cpu2017
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs 392G 48G 344G 13% /home

From /sys/devices/virtual/dmi/id
   BIOS:   GIGABYTE R11 02/25/2020
   Vendor: ALTOS
   Product: BrainSphere R389 F4

(Continued on next page)
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Platform Notes (Continued)

Product Family: Server
Serial: GIGBN8521A0007

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:
24x Samsung M393A2K40CB2-CVF 16 GB 1 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

C
| 519.lbm_r(base, peak) 538.imagick_r(base, peak)
| 544.nab_r(base, peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++
| 508.namd_r(base, peak) 510.parest_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++, C
| 511.povray_r(base, peak) 526.blender_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

C++, C, Fortran
| 507.cactuBSSN_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
(Continued on next page)
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Compiler Version Notes (Continued)

Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                    | 554.roms_r(base, peak)
==============================================================================
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

==============================================================================
Fortran, C       | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
==============================================================================
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

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

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</table>

### Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:

```
icpc icc ifort
```

### Base Portability Flags

- `503.bwaves_r`: `-DSPEC_LP64`
- `507.cactuBSSN_r`: `-DSPEC_LP64`
- `508.namd_r`: `-DSPEC_LP64`
- `510.parest_r`: `-DSPEC_LP64`
- `511.povray_r`: `-DSPEC_LP64`
- `519.lbm_r`: `-DSPEC_LP64`
- `521.wrf_r`: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `526.blender_r`: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
- `527.cam4_r`: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
- `538.imagick_r`: `-DSPEC_LP64`
- `544.nab_r`: `-DSPEC_LP64`
- `549.fotonik3d_r`: `-DSPEC_LP64`
- `554.roms_r`: `-DSPEC_LP64`

### Base Optimization Flags

**C benchmarks:**

```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

**C++ benchmarks:**

```
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

**Fortran benchmarks:**

```
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs
```

**Benchmarks using both Fortran and C:**

```
-m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs
```

(Continued on next page)
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### Base Optimization Flags (Continued)

- **C benchmarks:**
  - gcc

- **C++ benchmarks:**
  - icpc

- **Fortran benchmarks:**
  - ifort

### Peak Compiler Invocation

- **C benchmarks:**
  - icc

- **C++ benchmarks:**
  - icpc

- **Fortran benchmarks:**
  - ifort

### Peak Portability Flags

- Same as Base Portability Flags

### Peak Optimization Flags

- **C benchmarks:**
  - 519.lbm_r: -m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -03 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4

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

538.imagick_r: basepeak = yes
544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: -m64 -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

510.parest_r: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves_r: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs

549.fotonik3d_r: basepeak = yes

554.roms_r: -m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:

-m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs

Benchmarks using both C and C++:

511.povray_r: -m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactusBSSN_r: basepeak = yes
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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 2020-08-14 07:08:46-0400.  
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