Altos Computing Inc.
BrainSphere R389 F4 (Intel Xeon Silver 4216)

 SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 179
SPECrate®2017_fp_peak = 188

Copies

503.bwaves_r 64 32
507.cactuBSSN_r 64 32
508.namd_r 64 32
510.parest_r 64 32
511.povray_r 64 32
519.lbm_r 64 32
521.wrf_r 64 32
526.blender_r 64 32
527.cam4_r 64 32
538.imagick_r 64 32
544.nab_r 64 32
549.fotonik3d_r 64 32
554.roms_r 64 32

Hardware
CPU Name: Intel Xeon Silver 4216
Max MHz: 3200
Nominal: 2100
Enabled: 32 cores, 2 chips, 2 threads/core
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: 22 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx4 PC4-2933V-R, running at 2400)
Storage: 1 x 1.6 TB SATA SSD
Other: None

Software
OS: Red Hat Enterprise Linux release 8.1 (Ootpa)
4.18.0-147.el8.x86_64
Compiler: C/C++; Version 19.1.1.217 of Intel C/C++ Compiler Build 20200306 for Linux;
Fortran: Version 19.1.1.217 of Intel Fortran Compiler Build 20200306 for Linux
Parallel: No
Firmware: Version R12 released Jul-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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>64</td>
<td>1534</td>
<td>418</td>
<td>1535</td>
<td>418</td>
<td>32</td>
<td>751</td>
<td>427</td>
<td>751</td>
<td>427</td>
<td>751</td>
<td>427</td>
<td>751</td>
<td>427</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>64</td>
<td>330</td>
<td>245</td>
<td>329</td>
<td>246</td>
<td>64</td>
<td>330</td>
<td>245</td>
<td>329</td>
<td>246</td>
<td>331</td>
<td>245</td>
<td>331</td>
<td>245</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>64</td>
<td>487</td>
<td>125</td>
<td>487</td>
<td>125</td>
<td>64</td>
<td>487</td>
<td>125</td>
<td>487</td>
<td>125</td>
<td>488</td>
<td>125</td>
<td>488</td>
<td>125</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>64</td>
<td>1673</td>
<td>100</td>
<td>1675</td>
<td>100</td>
<td>1679</td>
<td>99.7</td>
<td>32</td>
<td>672</td>
<td>124</td>
<td>672</td>
<td>125</td>
<td>672</td>
<td>125</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>64</td>
<td>763</td>
<td>196</td>
<td>758</td>
<td>197</td>
<td>766</td>
<td>195</td>
<td>64</td>
<td>661</td>
<td>226</td>
<td>658</td>
<td>227</td>
<td>652</td>
<td>229</td>
</tr>
<tr>
<td>519.lbm_r</td>
<td>64</td>
<td>693</td>
<td>97.4</td>
<td>693</td>
<td>97.3</td>
<td>693</td>
<td>97.3</td>
<td>64</td>
<td>693</td>
<td>97.4</td>
<td>693</td>
<td>97.3</td>
<td>693</td>
<td>97.3</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>64</td>
<td>798</td>
<td>180</td>
<td>786</td>
<td>182</td>
<td>789</td>
<td>182</td>
<td>32</td>
<td>376</td>
<td>191</td>
<td>375</td>
<td>191</td>
<td>375</td>
<td>191</td>
</tr>
<tr>
<td>526.blender_r</td>
<td>64</td>
<td>567</td>
<td>172</td>
<td>568</td>
<td>171</td>
<td>568</td>
<td>172</td>
<td>64</td>
<td>567</td>
<td>172</td>
<td>568</td>
<td>171</td>
<td>568</td>
<td>172</td>
</tr>
<tr>
<td>527.cam4_r</td>
<td>64</td>
<td>627</td>
<td>178</td>
<td>623</td>
<td>180</td>
<td>617</td>
<td>181</td>
<td>64</td>
<td>627</td>
<td>178</td>
<td>623</td>
<td>180</td>
<td>617</td>
<td>181</td>
</tr>
<tr>
<td>538.imagick_r</td>
<td>64</td>
<td>333</td>
<td>478</td>
<td>333</td>
<td>478</td>
<td>333</td>
<td>478</td>
<td>64</td>
<td>333</td>
<td>478</td>
<td>333</td>
<td>478</td>
<td>333</td>
<td>478</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>64</td>
<td>384</td>
<td>281</td>
<td>384</td>
<td>280</td>
<td>385</td>
<td>280</td>
<td>64</td>
<td>384</td>
<td>281</td>
<td>384</td>
<td>280</td>
<td>385</td>
<td>280</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>64</td>
<td>1957</td>
<td>127</td>
<td>1960</td>
<td>127</td>
<td>1956</td>
<td>128</td>
<td>64</td>
<td>1957</td>
<td>127</td>
<td>1960</td>
<td>127</td>
<td>1956</td>
<td>128</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>64</td>
<td>1266</td>
<td>80.3</td>
<td>1268</td>
<td>80.2</td>
<td>1267</td>
<td>80.3</td>
<td>32</td>
<td>520</td>
<td>97.7</td>
<td>520</td>
<td>97.8</td>
<td>519</td>
<td>98.0</td>
</tr>
</tbody>
</table>

**SPECrate®2017_fp_base = 179**

**SPECrate®2017_fp_peak = 188**

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

## 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/je5.0.1-64"

MALLOC_CONF = "retain:true"
Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4216)

SPECrate®2017_fp_base = 179
SPECrate®2017_fp_peak = 188

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

Test Date: Feb-2021
Hardware Availability: Feb-2020
Software Availability: Apr-2020

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS Configuration:
Power Policy Quick Settings set to Best Performance
IMC set to Auto
Sub_NUMA Cluster set to Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed31e06e46a485a0011
running on rhel81 Thu Feb 18 23:42:30 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) Silver 4216 CPU @ 2.10GHz
   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:
   Architecture:  x86_64

(Continued on next page)
## Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU op-mode(s): 32-bit, 64-bit</td>
</tr>
<tr>
<td>Byte Order: Little Endian</td>
</tr>
<tr>
<td>CPU(s): 64</td>
</tr>
<tr>
<td>On-line CPU(s) list: 0-63</td>
</tr>
<tr>
<td>Thread(s) per core: 2</td>
</tr>
<tr>
<td>Core(s) per socket: 16</td>
</tr>
<tr>
<td>Socket(s): 2</td>
</tr>
<tr>
<td>NUMA node(s): 2</td>
</tr>
<tr>
<td>Vendor ID: GenuineIntel</td>
</tr>
<tr>
<td>CPU family: 6</td>
</tr>
<tr>
<td>Model: 85</td>
</tr>
<tr>
<td>Model name: Intel(R) Xeon(R) Silver 4216 CPU @ 2.10GHz</td>
</tr>
<tr>
<td>Stepping: 7</td>
</tr>
<tr>
<td>CPU MHz: 935.956</td>
</tr>
<tr>
<td>CPU max MHz: 3200.0000</td>
</tr>
<tr>
<td>CPU min MHz: 800.0000</td>
</tr>
<tr>
<td>BogoMIPS: 4200.00</td>
</tr>
<tr>
<td>Virtualization: VT-x</td>
</tr>
<tr>
<td>L1d cache: 32K</td>
</tr>
<tr>
<td>L1i cache: 32K</td>
</tr>
<tr>
<td>L2 cache: 1024K</td>
</tr>
<tr>
<td>L3 cache: 22528K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s): 0-15,32-47</td>
</tr>
<tr>
<td>NUMA node1 CPU(s): 16-31,48-63</td>
</tr>
<tr>
<td>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 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pinn ssbd mba ibpb stibp ibrs Enhanced tpr_shadow vmx flexpriority ept vpid fsgsbase tsc_adjust bmis hle avx2 smep bmi2 erms invpcid rtm cmp mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pu ospke avx512_vnni md_clear flush_lld arch_capabilities</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

| cache size : 22528 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 3 5 6 7 8 9 10 11 12 13 14 15 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 |
| node 0 size: 191849 MB |
| node 0 free: 191445 MB |

(Continued on next page)
 SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

Altos Computing Inc.
BrainSphere R389 F4 (Intel Xeon Silver 4216)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 179</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak = 188</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>Test Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>97</td>
<td>Feb-2021</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Hardware Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altos Computing Inc.</td>
<td>Feb-2020</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tested by:</th>
<th>Software Availability:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Altos Computing Inc.</td>
<td>Apr-2020</td>
</tr>
</tbody>
</table>

---

### Platform Notes (Continued)

node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 1 size: 193503 MB
node 1 free: 192948 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 394601912 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*

<table>
<thead>
<tr>
<th>os-release:</th>
</tr>
</thead>
</table>
| 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 rhel81 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

<table>
<thead>
<tr>
<th>CVE-2018-3620 (L1 Terminal Fault):</th>
<th>Not affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microarchitectural Data Sampling:</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2017-5754 (Meltdown):</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp</td>
<td></td>
</tr>
<tr>
<td>CVE-2017-5753 (Spectre variant 1):</td>
<td>Mitigation: usercopy/swapgs barriers and __user pointer sanitation</td>
</tr>
<tr>
<td>CVE-2017-5715 (Spectre variant 2):</td>
<td>Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling</td>
</tr>
</tbody>
</table>

run-level 3 Feb 18 23:36

SPEC is set to: /home/cpu2017

(Continued on next page)
**Altos Computing Inc.**

**BrainSphere R389 F4 (Intel Xeon Silver 4216)**

**SPECrate®2017_fp_base = 179**

**SPECrate®2017_fp_peak = 188**

**CPU2017 License:** 97

**Test Sponsor:** Altos Computing Inc.

**Tested by:** Altos Computing Inc.

**Test Date:** Feb-2021

**Hardware Availability:** Feb-2020

**Software Availability:** Apr-2020

---

**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/mapper/rhel-home</td>
<td>xfs</td>
<td>1.5T</td>
<td>151G</td>
<td>1.3T</td>
<td>11%</td>
<td>/home</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- **BIOS:** GIGABYTE R12 07/21/2020
- **Vendor:** Altos
- **Product:** BrainSphere R389 F4
- **Product Family:** Server
- **Serial:** GIGBN8521A0019

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

(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 Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
```

```
C++                | 508.namd_r(base, peak) 510.parest_r(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++, C             | 511.povray_r(base) 526.blender_r(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.
```

(Continued on next page)
CPU2017 License: 97
Test Sponsor: Altos Computing Inc.
Tested by: Altos Computing Inc.

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

==============================================================================
C++, C          | 511.povray_r(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.
==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(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.
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++, C          | 511.povray_r(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.
==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(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.
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.
(Continued on next page)
Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4216)

**SPEC CPU®2017 Floating Point Rate Result**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>179</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>188</td>
</tr>
</tbody>
</table>

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

**Test Date:** Feb-2021  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

---

### Compiler Version Notes (Continued)

```
64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 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) 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

```
  521.wrf_r(base) 527.cam4_r(base, peak)
```

---

### Intel(R) Fortran

```
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

```
  521.wrf_r(peak)
```

---

### Intel(R) Fortran

```
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

```
  521.wrf_r(base) 527.cam4_r(base, peak)
```

---

### Intel(R) Fortran

```
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

```
  521.wrf_r(base) 527.cam4_r(base, peak)
```

---

### Intel(R) Fortran

```
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

```
  521.wrf_r(peak)
```

---

### Intel(R) Fortran

```
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

```
  521.wrf_r(base) 527.cam4_r(base, peak)
```

---

(Continued on next page)
Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4216)

SPECrates\textsuperscript{®}2017\textsuperscript{\textregistered}fp\textsuperscript{peak} = 188

SPECrates\textsuperscript{®}2017\textsuperscript{\textregistered}fp\textsubscript{base} = 179

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

Test Date: Feb-2021
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Compiler Version Notes (Continued)

Fortran, C | 521.wrf\_r(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.

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.

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

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

(Continued on next page)
Base Portability Flags (Continued)

549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both C and C++:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)
Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4216)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 179</th>
<th>SPECrate®2017_fp_peak = 188</th>
</tr>
</thead>
</table>

**CPU2017 License:** 97

**Test Sponsor:** Altos Computing Inc.

**Tested by:** Altos Computing Inc.

**Test Date:** Feb-2021

**Hardware Availability:** Feb-2020

**Software Availability:** Apr-2020

---

**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++:
- `-m64` `-qnextgen` `-std=c11`
- `-Wl,-plugin-opt=-x86-branches-within-32B-boundaries` `-Wl,-z,muldefs`
- `-fuse-ld=gold` `-xCORE-AVX512` `-Ofast` `-ffast-math` `-flto` `-mfpmath=sse`
- `-funroll-loops` `-qopt-mem-layout-trans=4` `-O3` `-ipo` `-no-prec-div`
- `-qopt-prefetch` `-ffinite-math-only`
- `-qopt-multiple-gather-scatter-by-shuffles` `-nostandard-realloc-lhs`
- `-align array32byte` `-auto` `-mbranches-within-32B-boundaries`
- `-L/usr/local/jemalloc64-5.0.1/lib` `-ljemalloc`

---

**Peak 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`

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

---

**Peak Portability Flags**

Same as Base Portability Flags

---

**Peak Optimization Flags**

C benchmarks:

519.lbm_r: `basepeak = yes`

(Continued on next page)


**Altos Computing Inc.**

**BrainSphere R389 F4 (Intel Xeon Silver 4216)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 179</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak = 188</td>
</tr>
</tbody>
</table>

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

**Test Date:** Feb-2021  
**Hardware Availability:** Feb-2020  
**Software Availability:** Apr-2020

---

**Peak Optimization Flags (Continued)**

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

**C++ benchmarks:**

- **508.namd_r**: basepeak = yes

**510.parest_r**: -m64 -qnextgen
- -W1,-plugin-opt=-x86-branches-within-32B-boundaries
- -W1,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -Ofast
- -ffast-math -flto -mfpmath=sse -funroll-loops
- -qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib
  -ljemalloc

**Fortran benchmarks:**

- **503.bwaves_r**: -m64 -W1,-plugin-opt=-x86-branches-within-32B-boundaries
- -W1,-z,muldefs -fuse-ld=gold -xCORE-AVX512 -O3 -ipo
- -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-multiple-gather-scatter-by-shuffles
- -qopt-mem-layout-trans=4 -nostandard-realloc-lhs
- -align array32byte -auto -mbranches-within-32B-boundaries
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

- **549.fotonik3d_r**: basepeak = yes

- **554.roms_r**: Same as 503.bwaves_r

**Benchmarks using both Fortran and C:**

- **521.wrf_r**: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
  -ipo -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-multiple-gather-scatter-by-shuffles
  -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
  -nostandard-realloc-lhs -align array32byte -auto
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

- **527.cam4_r**: basepeak = yes

**Benchmarks using both C and C++:**

- **511.povray_r**: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
  -ipo -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-multiple-gather-scatter-by-shuffles
  -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries

---

*(Continued on next page)*
Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Silver 4216)

SPECrate®2017_fp_base = 179

SPECrate®2017_fp_peak = 188

CPU2017 License: 97
Test Sponsor: Altos Computing Inc.
Tested by: Altos Computing Inc.
Test Date: Feb-2021
Hardware Availability: Feb-2020
Software Availability: Apr-2020

Peak Optimization Flags (Continued)

511.povray_r (continued):
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender_r.basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r; basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Altos-Platform-Settings-V1.0-revD.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/Altos-Platform-Settings-V1.0-revD.xml

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2021-02-18 10:42:30-0500.
Report generated on 2021-03-16 15:28:10 by CPU2017 PDF formatter v6255.
Originally published on 2021-03-16.