SPEC CPU®2017 Floating Point Rate Result

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Altos Computing Inc.

BrainSphere R389 F4 (Intel Xeon Gold 6230)

$SPECrate^{®}2017\_fp\_base = 225$

$SPECrate^{®}2017\_fp\_peak = 237$

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

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

Benchmark	Copies	Base	Peak
503.bwaves_r	80 / 40	515	527
507.cactuBSSN_r	80	314	
508.namd_r	80	162	
510.parest_r	80 / 40	123	156
511.povray_r	80	247	288
519.lbm_r	80	121	
521.wrf_r	80 / 40	226	238
526.blender_r	80	220	
527.cam4_r	80	230	
538.imagick_r	80	598	
544.nab_r	80	365	
549.fotonik3d_r	80	159	
554.roms_r	80 / 40	98.2	118

SPECrate®2017_fp_base (225)
SPECrate®2017_fp_peak (237)

Hardware

CPU Name: Intel Xeon Gold 6230
 Max MHz: 3900
 Nominal: 2100
Enabled: 40 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: 27.5 MB I+D on chip per chip
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933V-R)
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

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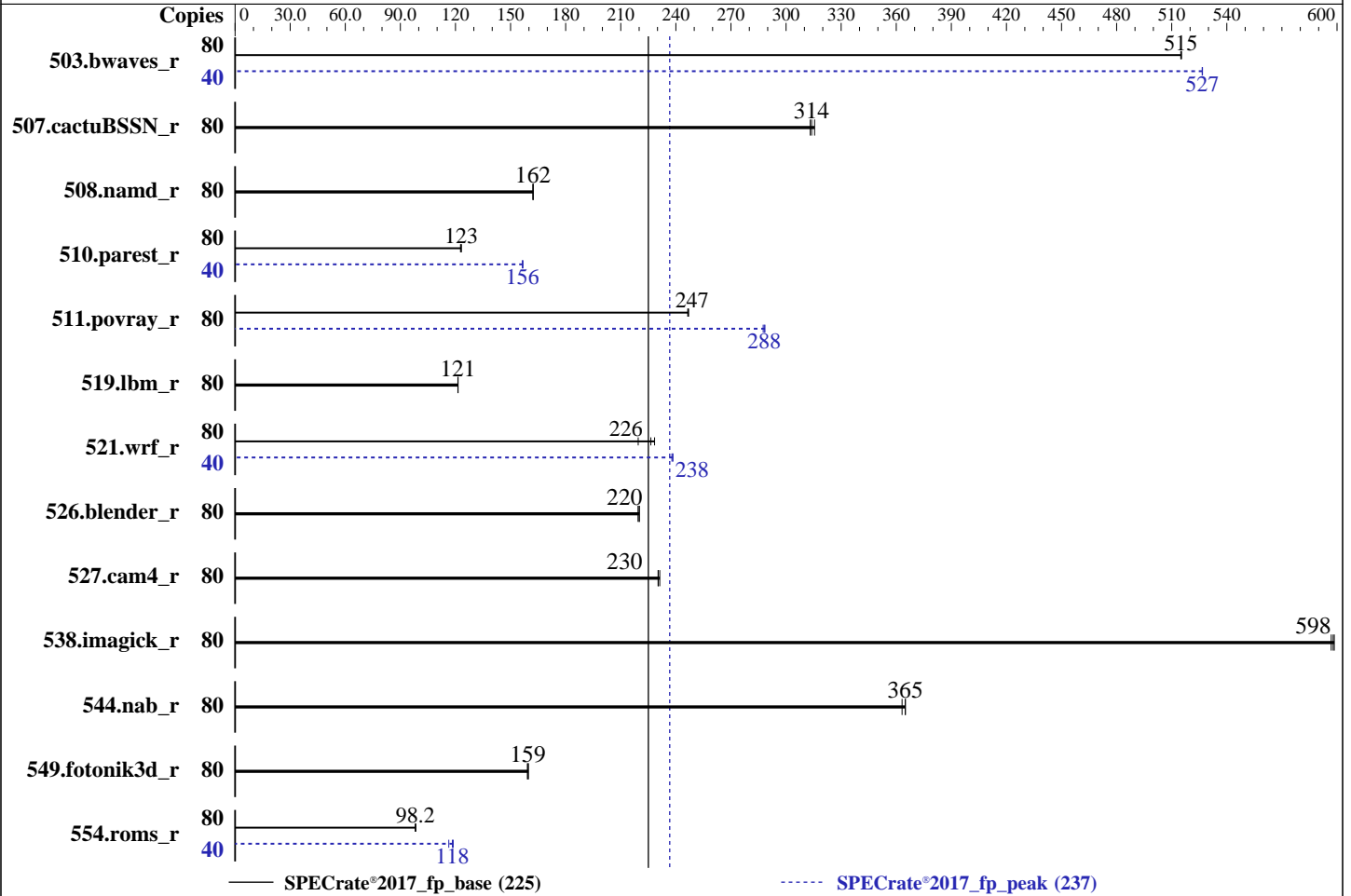|	
CPU2017 License: 97	**Test Date:** May-2021
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Results Table

Benchmark	Base						Peak					
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	80	1558	515	1557	515	**1557**	**515**	40	762	527	761	527	**762**	**527**
507.cactuBSSN_r	80	323	313	**323**	**314**	321	316	80	323	313	**323**	**314**	321	316
508.namd_r	80	**468**	**162**	469	162	468	162	80	**468**	**162**	469	162	468	162
510.parest_r	80	**1700**	**123**	1700	123	1705	123	40	**669**	**156**	669	156	668	157
511.povray_r	80	758	247	756	247	**758**	**247**	80	650	288	647	289	**648**	**288**
519.lbm_r	80	695	121	**695**	**121**	695	121	80	695	121	**695**	**121**	695	121
521.wrf_r	80	816	219	**792**	**226**	785	228	40	**376**	**238**	377	238	376	238
526.blender_r	80	**554**	**220**	554	220	555	219	80	**554**	**220**	554	220	555	219
527.cam4_r	80	608	230	**607**	**230**	605	231	80	608	230	**607**	**230**	605	231
538.imagick_r	80	332	599	**333**	**598**	333	597	80	332	599	**333**	**598**	333	597
544.nab_r	80	369	365	371	363	**369**	**365**	80	369	365	371	363	**369**	**365**
549.fotonik3d_r	80	**1955**	**159**	1959	159	1952	160	80	**1955**	**159**	1959	159	1952	160
554.roms_r	80	1296	98.1	1292	98.4	**1294**	**98.2**	40	535	119	**537**	**118**	546	116
SPECrate®2017_fp_base =	**225**											
SPECrate®2017_fp_peak =	**237**											

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"
```

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Test Date: May-2021
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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
 sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

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

 Sysinfo program /home/cpu2017/bin/sysinfo
 Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
 running on rhel81 Tue May 25 10:28:32 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 6230 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 from util-linux 2.32.1:
      Architecture:        x86_64
```

(Continued on next page)

Altos Computing Inc.

SPECrate®2017_fp_base = 225

BrainSphere R389 F4 (Intel Xeon Gold 6230)

SPECrate®2017_fp_peak = 237

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

Platform Notes (Continued)

```
        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
        Model:                85
        Model name:           Intel(R) Xeon(R) Gold 6230 CPU @ 2.10GHz
        Stepping:             5
        CPU MHz:              3556.498
        CPU max MHz:          3900.0000
        CPU min MHz:          1000.0000
        BogoMIPS:             4200.00
        Virtualization:       VT-x
        L1d cache:            32K
        L1i cache:            32K
        L2 cache:             1024K
        L3 cache:             28160K
        NUMA node0 CPU(s):    0-2,5,6,10-12,15,16,40-42,45,46,50-52,55,56
        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 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 cdp_l3
    invpcid_single intel_ppin ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept
    vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
    avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
    xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
    dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke md_clear
    flush_l1d 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: 191850 MB
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 0 free: 180881 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: 193506 MB
   node 1 free: 185067 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: 193531 MB
   node 2 free: 185134 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: 193531 MB
   node 3 free: 184861 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:       790958276 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*
    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 rhel81 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:
```

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Platform Notes (Continued)

```
CVE-2018-12207 (iTLB Multihit):                       No status reported
CVE-2018-3620 (L1 Terminal Fault):                    Not affected
Microarchitectural Data Sampling:                     Mitigation: Clear CPU buffers; SMT
                                                      vulnerable
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: Full generic
                                                      retpoline, IBPB: conditional,
                                                      IBRS_FW, STIBP: conditional, RSB
                                                      filling
CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
CVE-2019-11135 (TSX Asynchronous Abort):              No status reported

run-level 3 May 25 01:38

SPEC is set to: /home/cpu2017
   Filesystem              Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   1.5T  177G  1.3T  13% /home

From /sys/devices/virtual/dmi/id
    Vendor:        Altos
    Product:       BrainSphere R389 F4
    Product Family: Server
    Serial:        GIGBN8521A0019

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:
    24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

BIOS:
    BIOS Vendor:     GIGABYTE
    BIOS Version:    R12
    BIOS Date:       07/21/2020
    BIOS Revision:   5.14

(End of data from sysinfo program)
```

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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.
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             | 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
```

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Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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Compiler Version Notes (Continued)

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


==============================================================================
C++, C          | 511.povray_r(peak)
------------------------------------------------------------------------
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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.
------------------------------------------------------------------------


==============================================================================
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.
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         | 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 19.1.1.217 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) 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 Compiler for applications running on Intel(R) 64, Version 2021.1
  NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
==============================================================================
Fortran, C     | 521.wrf_r(peak)
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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.
------------------------------------------------------------------------------


==============================================================================
Fortran, C     | 521.wrf_r(base) 527.cam4_r(base, peak)
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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
```

(Continued on next page)

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Base Compiler Invocation (Continued)

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`
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
```

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

Altos Computing Inc.

SPECrate®2017_fp_base = 225

BrainSphere R389 F4 (Intel Xeon Gold 6230)

SPECrate®2017_fp_peak = 237

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

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-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
```

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
```

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Peak Compiler Invocation (Continued)

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`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `-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:

503.bwaves_r: `-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`

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SPEC CPU®2017 Floating Point Rate Result

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Peak Optimization Flags (Continued)

503.bwaves_r (continued):
```
-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
-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/Intel-ic19.1u1-official-linux64_revA.html
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

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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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