ASUSTeK Computer Inc.

ASUS RS300-E10(P11C-C/4L) Server System
(3.50 GHz, Intel Xeon E-2224G)

SPEC CPU 2017 Floating Point Speed Result

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Feb-2020
Hardware Availability: Oct-2019
Software Availability: May-2019

SPECspeed®2017_fp_base = 27.9
SPECspeed®2017_fp_peak = 28.2

Threads

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak (28.2)</th>
<th>SPECspeed®2017_fp_base (27.9)</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s 4</td>
<td>607.cactuBSSN_s 4</td>
</tr>
<tr>
<td>619.lbm_s 4</td>
<td>621.wrf_s 4</td>
</tr>
<tr>
<td>627.cam4_s 4</td>
<td>628.pop2_s 4</td>
</tr>
<tr>
<td>638.imagick_s 4</td>
<td>644.nab_s 4</td>
</tr>
<tr>
<td>649.fotonik3d_s 4</td>
<td>654.roms_s 4</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon E-2224G
Max MHz: 4700
Nominal: 3500
Enabled: 4 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 256 KB I+D on chip per core
L3: 8 MB I+D on chip per chip
Other: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
Storage: 1 x 1 TB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15
Kernel 4.12.14-150.17-default
Compiler: C/C++: Version 19.0.4.227 of Intel C/C++
Compiler Build 20190416 for Linux:
Fortran: Version 19.0.4.227 of Intel Fortran
Compiler Build 20190416 for Linux
Parallel: Yes
Firmware: Version 3102 released Oct-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: Prefer performance at the cost of additional power usage.
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>4</td>
<td>716</td>
<td>82.5</td>
<td>715</td>
<td>82.5</td>
<td>713</td>
<td>82.7</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>4</td>
<td>399</td>
<td>41.8</td>
<td>399</td>
<td>41.8</td>
<td>402</td>
<td>41.5</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>4</td>
<td>315</td>
<td>16.6</td>
<td>315</td>
<td>16.6</td>
<td>316</td>
<td>16.6</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>4</td>
<td>404</td>
<td>32.8</td>
<td>405</td>
<td>32.7</td>
<td>401</td>
<td>33.0</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>4</td>
<td>451</td>
<td>19.6</td>
<td>452</td>
<td>19.6</td>
<td>453</td>
<td>19.6</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>4</td>
<td>362</td>
<td>32.8</td>
<td>362</td>
<td>32.8</td>
<td>364</td>
<td>32.7</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>4</td>
<td>685</td>
<td>21.1</td>
<td>684</td>
<td>21.1</td>
<td>685</td>
<td>21.1</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>4</td>
<td>450</td>
<td>38.8</td>
<td>450</td>
<td>38.9</td>
<td>450</td>
<td>38.8</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>4</td>
<td>505</td>
<td>18.1</td>
<td>505</td>
<td>18.1</td>
<td>505</td>
<td>18.0</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>4</td>
<td>989</td>
<td>15.9</td>
<td>991</td>
<td>15.9</td>
<td>990</td>
<td>15.9</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 27.9**  
**SPECspeed®2017_fp_peak = 28.2**

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

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"  
OS set to performance mode via cpupower frequency-set -g performance

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
KMP_AFFINITY = "granularity=fine,compact"  
LD_LIBRARY_PATH = "/spec2017_110/lib/intel64"  
OMP_STACKSIZE = "192M"

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5  
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  
Yes: 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:**
- VT-d = Disabled
- AES = Disabled

Sysinfo program /spec2017_110/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edbe6e46a485a0011
running on linux-zeo2 Sat Feb 1 23:52:34 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) E-2224G CPU @ 3.50GHz
  1 "physical id"s (chips)
  4 "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 : 4
  siblings : 4
  physical 0: cores 0 1 2 3
```

From lscpu:

```
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              4
On-line CPU(s) list: 0-3
Thread(s) per core:  1
Core(s) per socket:  4
Socket(s):           1
NUMA node(s):        1
Vendor ID:           GenuineIntel
CPU family:          6
Model:               158
Model name:          Intel(R) Xeon(R) E-2224G CPU @ 3.50GHz
Stepping:            10
CPU MHz:             3500.000
CPU max MHz:         4700.0000
CPU min MHz:         800.0000
BogoMIPS:            7008.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            256K
L3 cache:            8192K
NUMA node0 CPU(s):   0-3
```

(Continued on next page)
ASUSTeK Computer Inc.

ASUS RS300-E10(P11C-C/4L) Server System (3.50 GHz, Intel Xeon E-2224G)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>27.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>28.2</td>
</tr>
</tbody>
</table>

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Feb-2020
Hardware Availability: Oct-2019
Software Availability: May-2019

Platform Notes (Continued)

Flags: fpu vme de pse tsc msr pae 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 tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single pti ssbd ibrs ibpb stibp tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrms invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notifive hwp_act_window hwp_epp md_clear flush_lid

/platforms/cpuinfo

cache data

cache size: 8192 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0 1 2 3
node 0 size: 64046 MB
node 0 free: 55095 MB
node distances:
  node 0
node 0 distances:
  node 0
  0: 10

From /proc/meminfo

MemTotal: 65583688 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

NAME="SLES"
VERSION="15"
VERSION_ID="15"
PRETTY_NAME="SUSE Linux Enterprise Server 15"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15"

uname -a:

Linux linux-zeo2 4.12.14-150.17-default #1 SMP Thu May 2 15:15:46 UTC 2019 (bf13fb8)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Mitigation: PTE Inversion; VMX: conditional

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.
ASUS RS300-E10(P11C-C/4L) Server System
(3.50 GHz, Intel Xeon E-2224G)

SPECspeed®2017_fp_base = 27.9
SPECspeed®2017_fp_peak = 28.2

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Feb-2020
Hardware Availability: Oct-2019
Software Availability: May-2019

Platform Notes (Continued)

Microarchitectural Data Sampling: cache flushes, SMT disabled
CVE-2017-5754 (Meltdown): Mitigation: Clear CPU buffers; SMT disabled
CVE-2018-3639 (Speculative Store Bypass): Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: Speculative Store Bypass disabled
via prctl and seccomp
CVE-2017-5715 (Spectre variant 2): Mitigation: __user pointer sanitization
via prctl and seccomp
CVE-2017-5753 (Spectre variant 2): Mitigation: Full generic retpoline, IBPB:
conditional, IBRS_FW, STIBP: disabled, RSB filling

run-level 3 Jan 31 17:00

SPEC is set to: /spec2017_110
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   929G   33G  897G   4% /

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 3102 10/04/2019
Vendor: ASUSTeK COMPUTER INC.
Product: P11C-C Series
Product Family: Server
Serial: System Serial Number

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:
  4x Samsung M391A2K43BB1-CTD 16 GB 2 rank 2667, configured at 2666

(End of data from sysinfo program)

Compiler Version Notes
==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)

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

ASUSTeK Computer Inc.
ASUS RS300-E10(P11C-C/4L) Server System
(3.50 GHz, Intel Xeon E-2224G)
SPECspeed®2017_fp_base = 27.9
SPECspeed®2017_fp_peak = 28.2

Compiler Version Notes (Continued)

Intel (R) C++ Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
------------------------------------------------------------------------------
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)
------------------------------------------------------------------------------
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64
ASUSTeK Computer Inc.
ASUS RS300-E10(P11C-C/4L) Server System
(3.50 GHz, Intel Xeon E-2224G)

SPECspeed®2017_fp_base = 27.9
SPECspeed®2017_fp_peak = 28.2

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.
Test Date: Feb-2020
Hardware Availability: Oct-2019
Software Availability: May-2019

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64
Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard-realloc-lhs
649.fotonik3d_s: Same as 603.bwaves_s
654.roms_s: -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-qopenmp -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
628.pop2_s: Same as 621.wrf_s

(Continued on next page)
ASUSTeK Computer Inc.
ASUS RS300-E10(P11C-C/4L) Server System
(3.50 GHz, Intel Xeon E-2224G)

SPECspeed®2017_fp_base = 27.9
SPECspeed®2017_fp_peak = 28.2

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Test Date: Feb-2020
Tested by: ASUSTeK Computer Inc.
Hardware Availability: Oct-2019
Test Date: Feb-2020
Software Availability: May-2019

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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: