## SPEC CPU®2017 Floating Point Speed Result

**ASUSTeK Computer Inc.**

ASUS RS300-E10(P11C-C/4L) Server System
(3.40 GHz, Intel Xeon E-2236)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>33.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>34.1</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Hardware Availability:** Oct-2019  
**Software Availability:** May-2019

### Hardware

<table>
<thead>
<tr>
<th>Thread</th>
<th>603.bwaves_s</th>
<th>607.cactuBSSN_s</th>
<th>619.lbm_s</th>
<th>621.wrf_s</th>
<th>627.cam4_s</th>
<th>628.pop2_s</th>
<th>638.imagick_s</th>
<th>644.nab_s</th>
<th>649.fotonik3d_s</th>
<th>654.roms_s</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threads</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>SPECspeed®2017_fp_base (33.7)</td>
<td>78.5</td>
<td>55.7</td>
<td>35.8</td>
<td>45.0</td>
<td>46.7</td>
<td>35.3</td>
<td>74.9</td>
<td>75.0</td>
<td>SPECspeed®2017_fp_peak (34.1)</td>
<td>78.6</td>
</tr>
</tbody>
</table>

### Software

| OS | SUSE Linux Enterprise Server 15  
| 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 |

---

**CPU Name:** Intel Xeon E-2236  
**Max MHz:** 4800  
**Nominal:** 3400  
**Enabled:** 6 cores, 1 chip, 2 threads/core  
**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:** 12 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
## 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>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>751</td>
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<tr>
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<td>29.4</td>
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<tr>
<td>628.pop2_s</td>
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<td>32.5</td>
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<tr>
<td>638.imagick_s</td>
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<td>33.0</td>
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<td>33.0</td>
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<td>33.0</td>
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<tr>
<td>644.nab_s</td>
<td>12</td>
<td>233</td>
<td>75.0</td>
<td>233</td>
<td>74.9</td>
<td>234</td>
<td>74.8</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>12</td>
<td>542</td>
<td>16.8</td>
<td>547</td>
<td>16.7</td>
<td>541</td>
<td>16.9</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>12</td>
<td>1031</td>
<td>15.3</td>
<td>1048</td>
<td>15.0</td>
<td>1036</td>
<td>15.2</td>
</tr>
</tbody>
</table>

### 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 295195f888a3d7ed1e6e46a485a0011
running on linux-zeo2 Tue Dec 24 12:05:45 2019

**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-2236 CPU @ 3.40GHz
  1 "physical id"s (chips)
  12 "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 : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5
```

From lscpu:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2236 CPU @ 3.40GHz
Stepping: 10
CPU MHz: 3400.000
CPU max MHz: 4800.0000
CPU min MHz: 800.0000
BogoMIPS: 6816.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11
```

(Continued on next page)
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Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.
Test Date: Dec-2019
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 rdtsscp
        lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
        aperf perf 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 vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1
        hle avx2 smep bmi2 irds invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt
        xsavec xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notify hwp_act_window hwp_epp
        md_clear flush_l1d

/proc/cpuinfo cache data
  cache size : 12288 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 4 5 6 7 8 9 10 11
  node 0 size: 64043 MB
  node 0 free: 61416 MB
  node distances:
    node 0
      0:  10

From /proc/meminfo
  MemTotal:       65580900 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  os-release:
    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)
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Platform Notes (Continued)

Microarchitectural Data Sampling: cache flushes, SMT vulnerable
CVE-2017-5754 (Meltdown): Mitigation: Clear CPU buffers; SMT vulnerable
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
CVE-2017-5753 (Spectre variant 2): Mitigation: Full generic retropoline, IBPB:
conditional, IBRS_FW, STIBP: conditional, RSB filling

run-level 3 Dec 23 16:32

SPEC is set to: /spec2017_110

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 929G 26G 904G 3% /

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

==============================================================================
| 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)
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Compiler Version Notes (Continued)

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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.

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
### Base Portability Flags

<table>
<thead>
<tr>
<th>Base Portability Flags</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>607.cactuBSSN_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>619.lbm_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG</td>
</tr>
<tr>
<td>628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian</td>
</tr>
<tr>
<td>-assume byterecl</td>
</tr>
<tr>
<td>638.imagick_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>644.nab_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>649.fotonik3d_s: -DSPEC_LP64</td>
</tr>
<tr>
<td>654.roms_s: -DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Base Optimization Flags

**C benchmarks:**
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-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
-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
-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)
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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:

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