## SPEC CPU®2017 Floating Point Speed Result

ASUSTeK Computer Inc.  
ASUS RS700-E10(Z12PP-D32) Server System  
(2.00 GHz, Intel Xeon Gold 6330)

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

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**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>56</td>
<td>186</td>
<td>187</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>56</td>
<td>251</td>
<td>657</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>56</td>
<td>139</td>
<td>139</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>56</td>
<td>139</td>
<td>146</td>
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<tr>
<td>627.cam4_s</td>
<td>56</td>
<td>135</td>
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<td>56</td>
<td>74.2</td>
<td>204</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>56</td>
<td>110</td>
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</tr>
<tr>
<td>644.nab_s</td>
<td>56</td>
<td>324</td>
<td>324</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
<td>109</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>56</td>
<td>213</td>
<td>213</td>
</tr>
</tbody>
</table>

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**Hardware**

- **CPU Name:** Intel Xeon Gold 6330  
- **Max MHz:** 3100  
- **Nominal:** 2000  
- **Enabled:** 56 cores, 2 chips  
- **Orderable:** 1, 2 chip(s)  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 1.25 MB I+D on chip per core  
- **L3:** 42 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R, running at 2933)  
- **Storage:** 1 x 4 TB PCIE NVME SSD  
- **Other:** None

---

**Software**

- **OS:** Red Hat Enterprise Linux release 8.3 (Ootpa)  
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux; Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux; C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
- **Parallel:** Yes  
- **Firmware:** Version 0504 released May-2021  
- **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 and OS set to prefer performance at the cost of additional power usage.
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SPECspeed®2017_fp_base = 186

SPECspeed®2017_fp_peak = 187

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

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 = "/home/cpu118/lib/intel64:/home/cpu118/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"

### 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
```

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

(Continued on next page)
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<td>(2.00 GHz, Intel Xeon Gold 6330)</td>
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ASUSTeK Computer Inc. 
ASUS RS700-E10(Z12PP-D32) Server System 
(2.00 GHz, Intel Xeon Gold 6330)

**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Test Date:** Oct-2021  
**Hardware Availability:** May-2021  
**Tested by:** ASUSTeK Computer Inc.  
**Software Availability:** Mar-2021

## General Notes (Continued)

* built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5  

## Platform Notes

**BIOS Configuration:**  
VT-d = Disabled  
Patrol Scrub = Disabled  
Hyper-Threading = Disable  
Engine Boost = Aggressive  
SR-IOV Support = Disabled  
BMC Configuration:  
Fan mode = Full speed mode

Sysinfo program /home/cpu118/bin/sysinfo  
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca64d  
running on localhost.localdomain Wed Oct  6 09:13:32 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 6330 CPU @ 2.00GHz
  2 "physical id"s (chips)
  56 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
         25 26 27
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
         25 26 27
```

From lscpu from util-linux 2.32.1:  
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
```

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

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Test Date: Oct-2021
Tested by: ASUSTeK Computer Inc.
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Platform Notes (Continued)

CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Gold 6330 CPU @ 2.00GHz
Stepping:            6
CPU MHz:             2649.181
CPU max MHz:         3100.0000
CPU min MHz:         800.0000
BogoMIPS:            4000.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            43008K
NUMA node0 CPU(s):   0-27
NUMA node1 CPU(s):   28-55
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 pdelgb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref 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 abml1e avx2 smep bmi2 erms invpcid_single intel_pplt ssbd mba ibrs
ibbp stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid ept_ad fsbgbase tsc_adjust
bmi1 hver ax2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsavesopt xsaves xgetbv1
xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd
dtherm ida arat p1n pts hwp hwp_act_window hwp-ep hwp_pkg_req avx512vbm ipum pku
ospke avx512_vbmi2 gfn vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
la57 rdpid md_clear pconfig flush_lld arch_capabilities

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 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
node 0 size: 490730 MB
node 0 free: 510262 MB
node 1 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55
node 1 size: 490244 MB
node 1 free: 511137 MB
node distances:
node 0 1
 0: 10 20
 1: 20 10

(Continued on next page)
Platform Notes (Continued)

From /proc/meminfo
  MemTotal: 1056478312 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="8.3 (Ootpa)"
    ID="rhe1"
    ID_LIKE="fedora"
    VERSION_ID="8.3"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
  Linux localhost.localdomain 4.18.0-240.22.1.el8_3.x86_64 #1 SMP Thu Mar 25 14:36:04 EDT 2021 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):
  Mitigation: Not affected
CVE-2018-3620 (L1 Terminal Fault):
  Mitigation: Not affected
Microarchitectural Data Sampling:
  Mitigation: Not affected
CVE-2017-5754 (Meltdown):
  Mitigation: Speculative Store Bypass disabled via prct1 and seccomp
CVE-2018-3639 (Speculative Store Bypass):
  Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1):
  Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling):
CVE-2019-11135 (TSX Asynchronous Abort):
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Tested by: ASUSTeK Computer Inc.

Test Date: Oct-2021
Hardware Availability: May-2021
Software Availability: Mar-2021

Platform Notes (Continued)

run-level 3 Oct 5 06:18
SPECSpec is set to: /home/cpu118
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 3.6T 36G 3.6T 1% /home

From /sys/devices/virtual/dmi/id
Vendor: ASUSTeK COMPUTER INC.
Product: RS700-E10-RS12U
Product Family: Server

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:
16x NO DIMM NO DIMM
16x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2933

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 0504
BIOS Date: 05/26/2021
BIOS Revision: 5.4

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
   | 644.nab_s(base)
==============================================================================
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
  64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

C | 644.nab_s(peak)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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Compilation Details:

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C
- 619.lbm_s(base, peak)
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- 644.nab_s(base)

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C
- 644.nab_s(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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C++, C, Fortran
- 607.cactuBSSN_s(base, peak)

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
- Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
- Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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Fortran
- 603.bwaves_s(base, peak)
- 649.fotonik3d_s(base, peak)
- 654.roms_s(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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Fortran, C
- 621.wrf_s(base, peak)
- 627.cam4_s(base, peak)
- 628.pop2_s(base, peak)

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Compiler Version Notes (Continued)  

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
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Base Compiler Invocation  

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

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:
- m64 -std=c11 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
-mbranches-within-32B-bounds
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---

## Base Optimization Flags (Continued)

Fortran benchmarks:
- `m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div`  
- `qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
- `nostandard-realloc-lhs mbranches-within-32B-boundaries`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using both Fortran and C:
- `m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div`  
- `qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
- `DSPEC_OPENMP mbranches-within-32B-boundaries nostandard-realloc-lhs`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Benchmarks using Fortran, C, and C++:
- `m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div`  
- `qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
- `DSPEC_OPENMP mbranches-within-32B-boundaries nostandard-realloc-lhs`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

---

## Peak Compiler Invocation

C benchmarks (except as noted below):
- `icc`
- `644.nab_s: icx`

Fortran benchmarks:
- `ifort`

Benchmarks using both Fortran and C:
- `ifort icc`

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

---

## Peak Portability Flags

Same as Base Portability Flags
Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flo -mfpmath=sse -funroll-loops -fiopenmp
-DSPEC_OPENMP -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2
-03 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -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
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes
## SPEC CPU®2017 Floating Point Speed Result

**ASUSTeK Computer Inc.**  
ASUS RS700-E10(Z12PP-D32) Server System  
(2.00 GHz, Intel Xeon Gold 6330)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak</th>
<th>SPECspeed®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>187</td>
<td>186</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Tested by:** ASUSTeK Computer Inc.  
**Test Date:** Oct-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Mar-2021

The flags files that were used to format this result can be browsed at  
http://www.spec.org/cpu2017/flags/ASUSTeKPlatform-Settings-z12-V1.0.html  

You can also download the XML flags sources by saving the following links:  
http://www.spec.org/cpu2017/flags/ASUSTeKPlatform-Settings-z12-V1.0.xml  
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.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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