ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System
(2.40 GHz, Intel Xeon Gold 6240R)

SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 162

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

Test Date: Apr-2020
Hardware Availability: Sep-2019

Tested by: ASUSTeK Computer Inc.
Software Availability: Sep-2019

603.bwaves_s 48
607.cactuBSSN_s 48
619.ibm_s 48
621.wrf_s 48
627.cam4_s 48
628.pop2_s 48
638.imagick_s 48
644.nab_s 48
649.fotonik3d_s 48
654.roms_s 48

Threads

Software

CPU Name: Intel Xeon Gold 6240R
Max MHz: 4000
Nominal: 2400
Enabled: 48 cores, 2 chips
Orderable: 1, 2 chip(s)
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 35.75 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R)
Storage: 1 x 1 TB SATA SSD
Other: None

OS: SUSE Linux Enterprise Server 15 SP1
Kernel 4.12.14-195-default
Compiler: C/C++: Version 19.0.5.281 of Intel C/C++
Compiler Build 20190815 for Linux;
Fortran: Version 19.0.5.281 of Intel Fortran
Compiler Build 20190815 for Linux
Parallel: Yes
Firmware: Version 6102 released Dec-2019
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

Power Management: BIOS and OS set to prefer performance at the cost of additional power usage

Hardware

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base (161)</th>
<th>SPECspeed®2017_fp_peak (162)</th>
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<tr>
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Threads

578
### Results Table

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<td>85.4</td>
<td>184</td>
<td>87.5</td>
<td>180</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_19u5/lib/intel64"
- OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K 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:

```bash
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.
ASUSTeK Computer Inc.  
ASUS ESC8000 G4(Z11PG-D24) Server System  
(2.40 GHz, Intel Xeon Gold 6240R)

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

Platform Notes

BIOS Configuration:  
VT-d = Disabled  
Patrol Scrub = Disabled  
HyperThreading = Disabled  
ENERGY_PERF_BIAS_CFG mode = performance  
CSM Support = Disabled  
Engine Boost = Level3(Max)  
Enforce POR = Disable  
Memory Frequency = 2933  
LLC dead line allc = Disabled  
SR-IOV Support = Disabled

Sysinfo program /spec2017_19u5/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7ed1e6e46a485a0011  
running on linux-628j Wed Apr 22 18:20:12 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) Gold 6240R CPU @ 2.40GHz  
- 2 "physical id"s (chips)  
- 48 "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 : 24  
- siblings : 24  
- physical 0: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29  
- physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:

- Architecture: x86_64  
- CPU op-mode(s): 32-bit, 64-bit  
- Byte Order: Little Endian  
- Address sizes: 46 bits physical, 48 bits virtual  
- CPU(s): 48  
- On-line CPU(s) list: 0-47  
- Thread(s) per core: 1  
- Core(s) per socket: 24  
- Socket(s): 2  
- NUMA node(s): 2  
- Vendor ID: GenuineIntel  
- CPU family: 6  
- Model: 85  
- Model name: Intel(R) Xeon(R) Gold 6240R CPU @ 2.40GHz  
- Stepping: 7

(Continued on next page)
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SPECspeed®2017_fp_base = 161
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Platform Notes (Continued)

CPU MHz: 2400.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-23
NUMA node1 CPU(s): 24-47
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 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 ablv_l1_abm 3dnowprefetch cpuid_fault ebcat_l3 cdip_l3 invpcid_single intel_pni ssbd mba ibrs ibpb ibrs_Enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ibrms invpcid rtm cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xsavec qcm_llc qcm_occup_llc qcm_mbb_total qcm_mbb_local dtherm ida arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospe avx512_vnni md_clear flush_lld arch_capabilities

/proc/cpuinfo cache data
  cache size : 36608 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 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
  node 0 size: 385613 MB
  node 0 free: 385225 MB
  node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
  node 1 size: 387036 MB
  node 1 free: 385591 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal: 791194344 KB
  HugePages_Total: 0
  Hugepagesize: 2048 KB

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

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

ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System
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SPECspeed®2017_fp_base = 161
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Test Date: Apr-2020
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Hardware Availability: Feb-2020
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Platform Notes (Continued)

os-release:
NAME="SLES"
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
Linux linux-628j 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,
    RSB filling

run-level 3 Apr 21 17:13

SPEC is set to: /spec2017_19u5
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 932G 19G 913G 2% /

From /sys/devices/virtual/dmi/id
BIOS: American Megatrends Inc. 6102 12/19/2019
Vendor: ASUSTeK COMPUTER INC.
Product: Z11PG-D24 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:
    24x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
ASUSTeK Computer Inc.
ASUS ESC8000 G4(Z11PG-D24) Server System
(2.40 GHz, Intel Xeon Gold 6240R)

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

SPECspeed®2017_fp_base = 161
SPECspeed®2017_fp_peak = 162

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 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.5.281 Build 20190815
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 19.0.5.281 Build 20190815
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)
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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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:
```
-m64 -DSPEC_OPENMP -xCORE-AVX512 -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:
```
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
- m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
- ffinte-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
- nostandard-realloc-lhs

Peak 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

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 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div
- qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
- qopenmp -DSPEC_OPENMP

Fortran benchmarks:
603.bwaves_s: basepeak = yes

(Continued on next page)
Peak Optimization Flags (Continued)

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: m64 -std=c11 -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX512 -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: m64 -std=c11 -xCORE-AVX512 -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

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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: