# SPEC CPU®2017 Integer Speed Result

**ASUSTeK Computer Inc.**

ASUS RS720A-E11(KMPP-D32) Server System
2.75 GHz, AMD EPYC 7453

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>11.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>11.3</td>
</tr>
</tbody>
</table>

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**CPU2017 License:** 9016

**Test Sponsor:** ASUSTeK Computer Inc.

**Test Date:** Aug-2021

**Hardware Availability:** Mar-2021

**Tested by:** ASUSTeK Computer Inc.

**Software Availability:** Mar-2021

---

### Threads

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</table>

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### Hardware

**CPU Name:** AMD EPYC 7453

**Max MHz:** 3450

**Nominal:** 2750

**Enabled:** 56 cores, 2 chips, 2 threads/core

**Orderable:** 1.2 chips

**Cache L1:** 32 KB I + 32 KB D on chip per core

**L2:** 512 KB I+D on chip per core

**L3:** 64 MB I+D on chip per chip, 16 MB shared / 7 cores

**Other:** None

**Memory:** 1 TB (16 x 64 GB 4Rx4 PC4-3200AA-L)

**Storage:** 1 x 240 GB SATA SSD

**Other:** None

---

### Software

**OS:** SUSE Linux Enterprise Server 15 SP2 (x86_64) Kernel 5.3.18-22-default

**Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC

**Parallel:** Yes

**Firmware:** Version 0404 released Feb-2021

**File System:** xfs

**System State:** Run level 3 (multi-user)

**Base Pointers:** 64-bit

**Peak Pointers:** 64-bit

**Other:** jemalloc: jemalloc memory allocator library v5.1.0

**Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
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ASUS RS720A-E11(KMPP-D32) Server System

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.3

Test Date: Aug-2021
Hardware Availability: Mar-2021
Software Availability: Mar-2021

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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</tbody>
</table>

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

Compiler Notes

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit
OS set to performance mode via cpupower frequency-set -g performance
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.
To enable Transparent Hugepages (THP) for all allocations,

(Continued on next page)
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Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-111"
LD_LIBRARY_PATH =
   "/cpu118/amd_speed_aocc300_milan_B_lib/64;/cpu118/amd_speed_aocc300_milan_B_lib/32;"
MALLOCONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREADLIMIT = "112"

Environment variables set by runcpu during the 600.perlbench_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 602.gcc_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 605.mcf_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 623.xalancbmk_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 625.x264_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 641.leela_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 657.xz_s peak run:
GOMP_CPU_AFFINITY = "0-55"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

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.

(Continued on next page)
General Notes (Continued)

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: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Platform Notes

BIOS Configuration:
DLWM Support = Disabled
SVM Mode = Disabled
NUMA nodes per socket = NPS2
APBDIS = 1
Fix SOC P-state = P0
Engine Boost = Enabled

Sysinfo program /cpu118/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on localhost Tue Aug 10 00:52:12 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 : AMD EPYC 7453 28-Core Processor
  2 "physical id"s (chips)
  112 "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 : 56
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu from util-linux 2.33.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 48 bits physical, 48 bits virtual
CPU(s): 112
On-line CPU(s) list: 0-111

(Continued on next page)
Platform Notes (Continued)

Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 2
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7453 28-Core Processor
Stepping: 1
CPU MHz: 1791.114
CPU max MHz: 2750.0000
CPU min MHz: 1500.0000
BogoMIPS: 5489.89
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-13,56-69
NUMA node1 CPU(s): 14-27,70-83
NUMA node2 CPU(s): 28-41,84-97
NUMA node3 CPU(s): 42-55,98-111
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl apic syscall

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 3 4 5 6 7 8 9 10 11 12 13 56 57 58 59 60 61 62 63 64 65 66 67 68 69
node 0 size: 257797 MB
node 0 free: 257471 MB
node 1 cpus: 14 15 16 17 18 19 20 21 22 23 24 25 26 27 70 71 72 73 74 75 76 77 78 79 80 81 82 83
node 1 size: 258027 MB
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Platform Notes (Continued)

node 1 free: 257510 MB
node 2 cpus: 28 29 30 31 32 33 34 35 36 37 38 39 40 41 84 85 86 87 88 89 90 91 92 93 94 95 96 97
node 2 size: 258039 MB
node 2 free: 257837 MB
node 3 cpus: 42 43 44 45 46 47 48 49 50 51 52 53 54 55 98 99 100 101 102 103 104 105 106 107 108 109 110 111
node 3 size: 258039 MB
node 3 free: 257849 MB
node distances:
node 0  1   2   3
0:   10  12  32  32
1:   12  10  32  32
2:   32  32  10  12
3:   32  32  12  10

From /proc/meminfo
MemTotal:       1056669104 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP2"
    VERSION_ID="15.2"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:
Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64
x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
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

(Continued on next page)
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Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy\textslash{}swapgs barriers and \_\_user pointer sanitation

CVE-2017-5715 (Spectre variant 2):
Mitigation: Full AMD retpoline, IBPB: conditional, IBRS\_FW, STIBP: always-on, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling):
Not affected

CVE-2019-11135 (TSX Asynchronous Abort):
Not affected

run-level 3 Aug 9 08:30

SPEC is set to: /cpu118

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   199G   46G  154G  23% /

From /sys/devices/virtual/dmi/id
Vendor: ASUSTeK COMPUTER INC.
Product: RS720A-E11-RS12E
Product Family: Server
Serial: 123456789012

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 Samsung M386A8K40DM2-CWE 64 GB 4 rank 3200
16x Unknown Unknown

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 0404
BIOS Date: 02/02/2021
BIOS Revision: 4.4

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 600.perlbench\_s(base, peak) 602.gcc\_s(base, peak) 605.mcf\_s(base, peak) 625.x264\_s(base, peak) 657.xz\_s(base, peak)
==============================================================================
AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)

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

ASUSTeK Computer Inc.
ASUS RS720A-E11(KMPP-D32) Server System
2.75 GHz, AMD EPYC 7453

SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = 11.3

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

Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

---

C++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
    | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)

---

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

---

Fortran | 648.exchange2_s(base, peak)

---

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

---

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

---

Base Portability Flags

600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64

(Continued on next page)
SPEC CPU®2017 Integer Speed Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.
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<td>Hardware Availability: Mar-2021</td>
</tr>
<tr>
<td>Tested by: ASUSTeK Computer Inc.</td>
<td>Software Availability: Mar-2021</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 11.3**

**SPECspeed®2017_int_peak = 11.3**

---

Base Portability Flags (Continued)

623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

---

Base Optimization Flags

C benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-Wl,-mllv -Wl,-enable-licm-vrp -Wl,-mllv -Wl,-region-vectorize
-Wl,-mllv -Wl,-function-specialize
-Wl,-mllv -Wl,-align-all-nofallback-blocks=6
-Wl,-mllv -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllv -unroll-threshold=50 -mllv -inline-threshold=1000
-fremap-arrays -mllv -function-specialize -flv-function-specialization
-mllv -enable-gvn-hoist -mllv -global-vectorize-slp=true
-mllv -enable-licm-vrp -mllv -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llflang -llflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllv -Wl,-do-block-reorder=aggressive
-Wl,-mllv -Wl,-region-vectorize -Wl,-mllv -Wl,-function-specialize
-Wl,-mllv -Wl,-align-all-nofallback-blocks=6
-Wl,-mllv -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mllv -enable-partial-unswitch
-mllv -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllv -loop-unswitch-threshold=200000
-mllv -reroll-loops -mllv -aggressive-loop-unswitch
-mllv -extra-vectorizer-passes -mllv -reduce-array-computations=3
-mllv -global-vectorize-slp=true -mllv -convert-pow-exp-to-int=false
-z muldefs -mllv -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -llflang
-llflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllv -Wl,-inline-recursion=4
-Wl,-mllv -Wl,-lsl-in-nested-loop -Wl,-mllv -Wl,-enable-iv-split
-Wl,-mllv -Wl,-region-vectorize -Wl,-mllv -Wl,-function-specialize

(Continued on next page)
### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -flto -z muldefs`
- `-mlvm -unroll-aggressive -mlvm -unroll-threshold=150 -DSPEC_OPENMP`
- `-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti`

### Base Other Flags

C benchmarks:
- `-Wno-unused-command-line-argument -Wno-return-type`

C++ benchmarks:
- `-Wno-unused-command-line-argument -Wno-return-type`

Fortran benchmarks:
- `-Wno-return-type`

### Peak Compiler Invocation

C benchmarks:
- `clang`

C++ benchmarks:
- `clang++`

Fortran benchmarks:
- `flang`

### Peak Portability Flags

Same as Base Portability Flags
SPEC CPU®2017 Integer Speed Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.
ASUS RS720A-E11(KMPP-D32) Server System
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CPU2017 License: 9016
Test Date: Aug-2021
Test Sponsor: ASUSTeK Computer Inc.
Hardware Availability: Mar-2021
Tested by: ASUSTeK Computer Inc.
Software Availability: Mar-2021

Peak Optimization Flags

C benchmarks:
- m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
- Wl,-mllvm -Wl,-enable-llicm-vrp -Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -flto 
- mllvm -unroll-threshold=50 -freemap-arrays -flv-function-specialization
- mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
- mllvm -global-vectorize-slp=true -mllvm -function-specialize
- mllvm -enable-llicm-vrp -mllvm -reduce-array-computations=3
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
- rflang

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: -m64 -std=c++98 -mno-adx -mno-sse4a
- Wl,-mllvm -Wl,-do-block-reorder=aggressive
- Wl,-mllvm -Wl,-function-specialize
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
- march=znver3 -fveclib=AMDLIBM -ffast-math -flto
- finline-aggressive -mllvm -unroll-threshold=100
- flv-function-specialization -mllvm -enable-llicm-vrp
- mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
- mllvm -reduce-array-computations=3
- mllvm -global-vectorize-slp=true
- mllvm -do-block-reorder=aggressive
- fvirtual-function-elimination -fvisibility=hidden
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
- ljemalloc -lflang

631.deepsjeng_s: basepeak = yes

641.leela_s: Same as 623.xalancbmk_s

Fortran benchmarks:

648.exchange2_s: basepeak = yes
ASUSTeK Computer Inc.
ASUS RS720A-E11(KMPP-D32) Server System
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SPECspeed®2017_int_peak = 11.3

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

Test Date: Aug-2021
Hardware Availability: Mar-2021
Software Availability: Mar-2021

Peak Other Flags

C benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

C++ benchmarks:
-Wno-unused-command-line-argument -Wno-return-type

Fortran benchmarks:
-Wno-return-type

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:
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-AMD-Milan-V1.3.2021-07-06.xml

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