## SPEC CPU®2017 Integer Speed Result

**ASUSTeK Computer Inc.**
**ASUS RS720A-E11(KMPP-D32) Server System**
**2.45 GHz, AMD EPYC 7763**

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### SPECspeed®2017_int_base = 12.3

### SPECspeed®2017_int_peak = 12.3

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base (12.3)</th>
<th>SPECspeed®2017_int_peak (12.3)</th>
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</thead>
<tbody>
<tr>
<td>128</td>
<td></td>
<td></td>
</tr>
<tr>
<td>600.perlbench_s</td>
<td>6.84</td>
<td></td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>13.3</td>
<td>20.5</td>
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<tr>
<td>605.mcf_s</td>
<td>13.3</td>
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</tr>
<tr>
<td>620.omnetpp_s</td>
<td>8.67</td>
<td></td>
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<tr>
<td>623.xalancbmk_s</td>
<td></td>
<td></td>
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<tr>
<td>625.x264_s</td>
<td>6.49</td>
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<tr>
<td>631.deepsjeng_s</td>
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<tr>
<td>641.leela_s</td>
<td>5.63</td>
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<tr>
<td>648.exchange2_s</td>
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<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9016

**Test Date:** Mar-2021

**Test Sponsor:** ASUSTeK Computer Inc.

**Hardware**

- **CPU Name:** AMD EPYC 7763
- **Max MHz:** 3500
- **Nominal:** 2450
- **Enabled:** 128 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:** 256 MB I+D on chip per chip, 32 MB shared / 8 cores
- **Other:** None
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)
- **Storage:** 1 x 1 TB SATA SSD
- **Other:** None

**Software**

- **OS:** Ubuntu 20.04 LTS (x86_64)
- **Compiler:** 5.4.0-58-generic
- **Parallel:** Yes
- **Firmware:** Version 0404 released Feb-2021
- **File System:** ext4
- **System State:** Run level 5 (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.
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>625.x264_s</td>
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<td>16.7</td>
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<td>105</td>
<td>16.7</td>
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<tr>
<td>631.deepsjeng_s</td>
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<td>128</td>
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<td>648.exchange2_s</td>
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<td>25.4</td>
<td>128</td>
<td>243</td>
<td>25.4</td>
<td>243</td>
</tr>
</tbody>
</table>

### 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

'ulimit -l 2097152' was used to set environment locked pages in memory limit

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.

'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable

(Continued on next page)
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CPU2017 License: 9016  
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Hardware Availability: Mar-2021

Software Availability: Mar-2021

Operating System Notes (Continued)

Transparent Hugepages (THP) for this run.
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for peak runs of 628.pop2_s and 638.imagick_s to enable THP only on request.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-255"
LD_LIBRARY_PATH = 
"/spec2017B1/amd_speed_aocc300_milan_B_lib/64;/spec2017B1/amd_speed_aocc
300_milan_B_lib/32;"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "256"

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 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"

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.
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:

(Continued on next page)
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**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021  

**General Notes (Continued)**

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 /spec2017B1/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on test Tue Mar 2 14:19:33 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 7763 64-Core Processor
- 2 "physical id"s (chips)
- 256 "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: 64
  - siblings: 128
  - 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 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 56 57 58 59 60 61 62 63
  - 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 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 56 57 58 59 60 61 62 63

From lscpu:

- 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): 256
- On-line CPU(s) list: 0-255
- Thread(s) per core: 2
- Core(s) per socket: 64
- Socket(s): 2

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Platform Notes (Continued)

NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7763 64-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 1818.700
CPU max MHz: 2450.0000
CPU min MHz: 1500.0000
BogoMIPS: 4948.86
Virtualization: AMD-V
L1d cache: 4 MiB
L1i cache: 4 MiB
L2 cache: 64 MiB
L3 cache: 512 MiB
NUMA node0 CPU(s): 0-31,128-159
NUMA node1 CPU(s): 32-63,160-191
NUMA node2 CPU(s): 64-95,192-223
NUMA node3 CPU(s): 96-127,224-255
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pg mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdelgb rdscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor sse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibrd skinit wt dt tce topexit perfctr_core perfctr_nb bext perfctr_llc mwai tx cpb cat_l3 cdp_l3 invvpидs single hw_pstate ssbd mba ibrs iibp stibp vmmcall fsgsbases bml1 avx2 smep bmi2 erts invvpид cqm rdt_a rdsed adx smap clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsaves cqm llc cqm_occcu llc cqm_mbb_total cqm_mbb_local clzero irperf xsaveprtr wbnoinvd arat npt lbv svm_lock nrip_save tsc scale vmcb_clean flushbyasid decodeassist pfthreshold v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

/proc/cpuinfo cache data
  cache size : 512 KB

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Software Availability: Mar-2021

Platform Notes (Continued)

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 14 15 16 17 18 19 20 21 22 23 24 25 26 27
28 29 30 31 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146
147 148 149 150 151 152 153 154 155 156 157 158 159
node 0 size: 257887 MB
node 0 free: 256826 MB

node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191
node 1 size: 258020 MB
node 1 free: 257091 MB

node 2 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223
node 2 size: 258007 MB
node 2 free: 257385 MB

node 3 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114

115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 220 221 222 223 224 225 226 227 228 229 230 231 232
233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254
255
node 3 size: 258030 MB
node 3 free: 257422 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: 1056712128 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

/usr/bin/lsb_release -d
Ubuntu 20.04 LTS

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
NAME="Ubuntu"

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Platform Notes (Continued)

VERSION="20.04 LTS (Focal Fossa)"
ID=ubuntu
ID_LIKE=debian
PRETTY_NAME="Ubuntu 20.04 LTS"
VERSION_ID="20.04"
HOME_URL="https://www.ubuntu.com/"
SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
    Linux test 5.4.0-58-generic #64-Ubuntu SMP Wed Dec 9 08:16:25 UTC 2020 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 seccomp

CVE-2017-5753 (Spectre variant 1):
    Mitigation: usercopy/swaps barriers and __user pointer sanitization
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 5 Mar 2 09:21

SPEC is set to: /spec2017B1
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sdb2 ext4 938G 46G 845G 6% /

From /sys/devices/virtual/dmi/id
    Product Family: Server

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:
    16x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200
    16x Unknown Unknown

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Platform Notes (Continued)

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)
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)
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Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Base Portability Flags

600.perlbmk_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
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,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize

(Continued on next page)
ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.45 GHz, AMD EPYC 7763

SPEC CPU®2017 Integer Speed Result

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SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

ASUSTeK Computer Inc.

ASUS RS720A-E11(KMPP-D32) Server System
2.45 GHz, AMD EPYC 7763

CPU2017 License: 9016
Test Date: Mar-2021
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Hardware Availability: Mar-2021
Software Availability: Mar-2021

Base Optimization Flags (Continued)

C++ 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 -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-fllvm-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
-lflangrti

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

(Continued on next page)
ASUSTeK Computer Inc.
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SPECspeed®2017_int_base = 12.3
SPECspeed®2017_int_peak = 12.3

Peak Compiler Invocation (Continued)

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:


602.gcc_s: Same as 600.perlbench_s

605.mcf_s: base peak = yes

625.x264_s: Same as 600.perlbench_s

657.xz_s: base peak = yes

C++ benchmarks:

620.omnetpp_s: base peak = yes

623.xalancbmk_s: -m64 -std=c++98 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-do-block-reorder=aggressive

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# SPEC CPU®2017 Integer Speed Result

**ASUSTeK Computer Inc.**  
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**Software Availability:** Mar-2021

## Peak Optimization Flags (Continued)

623.xalancbmk_s (continued):
- `-Wl,-mlllvm -Wl,-function-specialize`
- `-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast`
- `-march=znver3 -fveclib=AMDLIBM -ffast-math -flto`
- `-finline-aggressive -mlllvm -unroll-threshold=100`
- `-flv-function-specialization -mlllvm -enable-licm-vrp`
- `-mlllvm -reroll-loops -mlllvm -aggressive-loop-unswitch`
- `-mlllvm -reduce-array-computations=3`
- `-mlllvm -global-vectorize-slp=true`
- `-mlllvm -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`

## 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:

## SPEC CPU®2017 Integer Speed Result

ASUSTeK Computer Inc.  
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