# SPEC CPU®2017 Integer Rate Result

## Supermicro

A+ Server 1114S-WN10RT (H12SSW-NTR , AMD EPYC 7573X)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 284</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak = 298</td>
</tr>
</tbody>
</table>

### CPU2017 License: 001176

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Feb-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability: Mar-2022</td>
<td></td>
</tr>
</tbody>
</table>

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<tr>
<th>Tested by:</th>
<th>Supermicro</th>
</tr>
</thead>
<tbody>
<tr>
<td>Software Availability: Feb-2022</td>
<td></td>
</tr>
</tbody>
</table>

### Software

- **OS:** Ubuntu 20.04.3 LTS
- **Kernel:** 5.4.0-99-generic
- **Compiler:** C/C++/Fortran: Version 3.2.0 of AOCC
- **Parallel:** No
- **Firmware:** Version 2.3a released Jan-2022
- **File System:** ext4
- **System State:** Run level 5 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 32/64-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.

### Hardware

<table>
<thead>
<tr>
<th>CPU Name: AMD EPYC 7573X</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz: 3600</td>
</tr>
<tr>
<td>Nominal: 2800</td>
</tr>
<tr>
<td>Enabled: 32 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable: 1 chip</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2: 512 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3: 768 MB I+D on chip per chip, 96 MB shared / 4 cores</td>
</tr>
<tr>
<td>Other: None</td>
</tr>
<tr>
<td>Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)</td>
</tr>
<tr>
<td>Storage: 1 x 240 GB SATA III SSD</td>
</tr>
<tr>
<td>Other: None</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>500.perlbench_r</th>
<th>64</th>
</tr>
</thead>
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<tr>
<td>502.gcc_r</td>
<td>64</td>
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<tr>
<td>525.x264_r</td>
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<tr>
<td>531.deepsjeng_r</td>
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</tr>
<tr>
<td>541.leela_r</td>
<td>64</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>64</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>64</td>
</tr>
</tbody>
</table>

| Copies | 0 | 30 | 60 | 90 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 |
|--------|------|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 500.perlbench_r | 217 | 217 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 502.gcc_r | 268 | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 505.mcf_r | 128 | 128 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 520.omnetpp_r | 306 | 306 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 523.xalancbmk_r | 398 | 398 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 525.x264_r | 580 | 580 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 531.deepsjeng_r | 236 | 236 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 541.leela_r | 252 | 252 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 548.exchange2_r | 647 | 647 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 557.xz_r | 168 | 168 | | | | | | | | | | | | | | | | | | | | | | | | | |

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**Note:** The test was conducted using the SPEC CPU®2017 Integer Rate benchmark suite. The results are expressed in SPECrate® integer performance units (IPUs). The hardware and software configurations are detailed above, along with the test dates and availability information. The test was performed by Supermicro and sponsored by the same organization. The system was equipped with an AMD EPYC 7573X processor running at 3600 MHz, with 32 cores, 2 threads per core, and 512 GB of memory. The software included Ubuntu 20.04.3 LTS and AOCC compiler version 3.2.0. The results show a peak integer rate of 298 SPECrate®2017_int_peak and a base rate of 284 SPECrate®2017_int_base.
Supermicro
A+ Server 1114S-WN10RT
(H12SSW-NTR, AMD EPYC 7573X)

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
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<tr>
<td>500.perlbench_r</td>
<td>64</td>
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<td>217</td>
<td>470</td>
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<td>168</td>
</tr>
</tbody>
</table>

SPECrate®2017_int_base = 284
SPECrate®2017_int_peak = 298

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

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage, 'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

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

To enable Transparent Hugepages (THP) only on request for base runs, 'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root. To enable THP for all allocations for peak runs, '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:

```
LD_LIBRARY_PATH = 
    "/home/cpu2017/amd_rate_aocc320_milanx_A_lib/lib;/home/cpu2017/amd_rate_aocc320_milanx_A_lib/lib32:
MALLOC_CONF = "retain:true"
```

Environment variables set by runcpu during the 523.xalancbmk_r peak run:

```
MALLOC_CONF = "thp:never"
```

### 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: https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

### Platform Notes

BIOS Settings:
- Determinism Control = Manual
- Determinism Slider = Power
- cTDP Control = Manual
- cTDP = 280
- Package Power Limit Control = Manual
- Package Power Limit = 280
Platform Notes (Continued)

APBDIS = 1   
NUMA Nodes Per Socket = NPS4

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aaca64d
running on h12ssw-7573x Wed Feb 16 07:22:17 2022

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 7573X 32-Core Processor
  1 "physical id"s (chips)
  64 "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 : 32
  siblings : 64
  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

From lscpu from util-linux 2.34:
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): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 1
NUMA node(s): 8
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7573X 32-Core Processor
Stepping: 2
Frequency boost: enabled
CPU MHz: 1665.530
CPU max MHz: 2800.0000
CPU min MHz: 1500.0000
BogoMIPS: 5600.21
Virtualization: AMD-V
L1d cache: 1 MiB
L1i cache: 1 MiB
L2 cache: 16 MiB

(Continued on next page)
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</tbody>
</table>

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**Platform Notes (Continued)**

- **L3 cache:** 768 MiB
- **NUMA node0 CPU(s):** 0-3,32-35
- **NUMA node1 CPU(s):** 4-7,36-39
- **NUMA node2 CPU(s):** 8-11,40-43
- **NUMA node3 CPU(s):** 12-15,44-47
- **NUMA node4 CPU(s):** 16-19,48-51
- **NUMA node5 CPU(s):** 20-23,52-55
- **NUMA node6 CPU(s):** 24-27,56-59
- **NUMA node7 CPU(s):** 28-31,60-63

**Vulnerability Notes:**
- **Itlb multihit:** Not affected
- **L1tf:** Not affected
- **Mds:** Not affected
- **Meltdown:** Not affected
- **Spec store bypass:** Mitigation; Speculative Store Bypass disabled via prctl and seccomp
- **Spectre v1:** Mitigation; usercopy/swapgs barriers and __user pointer sanitation
- **Spectre v2:** Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
- **Srbds:** Not affected
- **Tsx async abort:** Not affected

**Flags:**
- fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf nmi pml4e pdpte1g monitor ssse3 sse3瓮02 ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb perfctr_l1d mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bml1 avx2 smep bml2 invpcid cm4 rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsaves xgetbv1 xsaves qm_llc qm_occup_llc qm_mbb_total qm_mbb_local clzero irperf xsaves pr whomeivd arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold v_vmsave_vmload vgif umip pkpu ospke vaes vpclmulqdq rdpid overflow_recov succor smca

---

From `lscpu --cache`:

- **NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL**
  - L1d 32K 1M 8 Data 1
  - L1i 32K 1M 8 Instruction 1
  - L2 512K 16M 8 Unified 2
  - L3 96M 768M 16 Unified 3

From `/proc/cpuinfo cache data`

- **cache size:** 512 KB

---

**WARNING:** a numactl 'node' might or might not correspond to a physical chip.

**available:** 8 nodes (0-7)

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**  
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### Supermicro

**A+ Server 1114S-WN10RT**  
(H12SSW-NTR, AMD EPYC 7573X)

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**Test Date:** Feb-2022  
**Test Sponsor:** Supermicro  
**Hardware Availability:** Mar-2022  
**Tested by:** Supermicro  
**Software Availability:** Feb-2022

#### Platform Notes (Continued)

```
node 0 cpus: 0 1 2 3 32 33 34 35
node 0 free: 64148 MB
node 1 cpus: 4 5 6 7 36 37 38 39
node 1 free: 64300 MB
node 2 cpus: 8 9 10 11 40 41 42 43
node 2 free: 64481 MB
node 3 cpus: 12 13 14 15 44 45 46 47
node 3 free: 64315 MB
node 4 cpus: 16 17 18 19 48 49 50 51
node 4 free: 64509 MB
node 5 cpus: 20 21 22 23 52 53 54 55
node 5 free: 64260 MB
node 6 cpus: 24 25 26 27 56 57 58 59
node 6 free: 64350 MB
node 7 cpus: 28 29 30 31 60 61 62 63
node 7 free: 64496 MB
node distances:

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<th>3</th>
<th>4</th>
<th>5</th>
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<td>12</td>
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<td>12</td>
<td>11</td>
<td>10</td>
</tr>
</tbody>
</table>
```

From /proc/meminfo

```
MemTotal:       528289516 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

/sbin/tuned-adm active  
Current active profile: balanced

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

/usr/bin/lsb_release -d

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Platform Notes (Continued)

Ubuntu 20.04.3 LTS

From /etc/*release* /etc/*version*
debian_version: bullseye/sid
os-release:
   NAME="Ubuntu"
   VERSION="20.04.3 LTS (Focal Fossa)"
   ID=ubuntu
   ID_LIKE=debian
   PRETTY_NAME="Ubuntu 20.04.3 LTS"
   VERSION_ID="20.04"
   HOME_URL="https://www.ubuntu.com/"
   SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
   Linux h12ssw-7573x 5.4.0-99-generic #112-Ubuntu SMP Thu Feb 3 13:50:55 UTC 2022 x86_64
   x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multithit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store
CVE-2018-3639 (Speculative Store Bypass): Bypass disabled via prctl and
   seccomp
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapsgs
   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 Feb 16 07:19

SPEC is set to: /home/cpu2017

Filesystem  Type Size Used Avail Use% Mounted on
/dev/sda2  ext4  219G  17G  192G  8% /

From /sys/devices/virtual/dmi/id
Vendor: Supermicro
Product: Super Server
Serial: 0123456789

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

### Platform Notes (Continued)

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:**
- 8x NO DIMM Unknown
- 8x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

**BIOS:**
- BIOS Vendor: American Megatrends Inc.
- BIOS Version: 2.3a
- BIOS Date: 01/25/2022
- BIOS Revision: 5.22

(End of data from `sysinfo` program)

### Compiler Version Notes

<table>
<thead>
<tr>
<th>Compiler</th>
<th>C</th>
<th>502.gcc_r(peak)</th>
</tr>
</thead>
</table>

**AMD clang version 13.0.0** (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
- Target: i386-unknown-linux-gnu
- Thread model: posix
- InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

<table>
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<tr>
<th>Compiler</th>
<th>C</th>
<th>500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)</th>
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**AMD clang version 13.0.0** (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
- Target: x86_64-unknown-linux-gnu
- Thread model: posix
- InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

<table>
<thead>
<tr>
<th>Compiler</th>
<th>C</th>
<th>502.gcc_r(peak)</th>
</tr>
</thead>
</table>

**AMD clang version 13.0.0** (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
- Target: i386-unknown-linux-gnu
- Thread model: posix

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Supermicro
A+ Server 1114S-WN10RT
(H12SSW-NTR , AMD EPYC 7573X)

SPEC CPU®2017 Integer Rate Result

SPECrate®2017_int_base = 284
SPECrate®2017_int_peak = 298

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2022
Hardware Availability: Mar-2022
Software Availability: Feb-2022

Compiler Version Notes (Continued)

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

---

C
| 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base, peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

---

C++
| 523.xalancbmk_r(peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

---

C++
| 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

---

C++
| 523.xalancbmk_r(peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

---

C++
| 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)

(Continued on next page)
Supermicro
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Compiler Version Notes (Continued)

<table>
<thead>
<tr>
<th>531.deepsjeng_r(base, peak) 541.leela_r(base, peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)</td>
</tr>
<tr>
<td>Target: x86_64-unknown-linux-gnu</td>
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<tr>
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</tr>
<tr>
<td>InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin</td>
</tr>
</tbody>
</table>

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
Supermicro
A+ Server 1114S-WN10RT
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SPEC CPU®2017 Integer Rate Result

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CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2022
Hardware Availability: Mar-2022
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Base Optimization Flags

C benchmarks:
- -m64 -Wl,--allow-multiple-definition -Wl,-mllvm -Wl,--enable-licm-vrp
- -flto -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
- -Wl,-mllvm -Wl,--enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
- -ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
- -mllvm -inline-threshold=1000 -freemap-arrays
- -mllvm -function-specialize -fllvm-function-specialization
- -mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
- -mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
- -mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang

C++ benchmarks:
- -m64 -std=c++98 -flto -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
- -Wl,-mllvm -Wl,--enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
- -ffast-math -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
- -mllvm -enable-loop-fusion -z muldefs -fvirtual-function-elimination
- -fvisibility=hidden -lamdlibm -ljemalloc -lflang

Fortran benchmarks:
- -m64 -Wl,-mllvm -Wl,--inline-recursion=4
- -Wl,-mllvm -Wl,--lsr-in-nested-loop -Wl,-mllvm -Wl,--enable-iv-split
- -flto -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
- -Wl,-mllvm -Wl,--enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
- -ffast-math -z muldefs -mllvm -unroll-aggressive
- -mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang

Base Other Flags

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

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

Supermicro
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SPECrate®2017_int_base = 284
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Base Other Flags (Continued)

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

Peak Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang+

Fortran benchmarks:
flang

Peak Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:
500.perlbench_r: -m64 -Wl,-allow-multiple-definition
-mlib -Wl,-enable-licm-vrp -flto
-Wl,-mlib -Wl,-function-specialize
-mlib -Wl,-align-all-nofallthru-blocks=6
-mlib -Wl,-reduce-array-computations=3
-fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver3

(Continued on next page)
500.perlbench_r (continued):
-fveclib=AMDLIBM  -ffast-math  -fstruct-layout=7  
-mlvm -unroll-threshold=50  -fremap-arrays  
-flv-function-specialization  -mlvm -inline-threshold=1000  
-mlvm -function-specialize  -mlvm -enable-llicm-vrp  
-mlvm -reduce-array-computations=3  -lamdlibm -ljemalloc

502.gcc_r: -m32 -Wl,-allow-multiple-definition  
-Wl,-mlvm -Wl,-enable-llicm-vrp -fito  
-Wl,-mlvm -Wl,-function-specialize -Ofast -march=znver3  
-fveclib=AMDLIBM  -ffast-math  -fstruct-layout=7  
-mlvm -unroll-threshold=50  -fremap-arrays  
-flv-function-specialization  -mlvm -inline-threshold=1000  
-mlvm -function-specialize  -mlvm -function-specialize  
-mlvm -enable-llicm-vrp  
-mlvm -reduce-array-computations=3  -fgnu89-inline  
-ljemalloc

505.mcf_r: -m64 -Wl,-allow-multiple-definition  
-Wl,-mlvm -Wl,-enable-llicm-vrp -fito  
-Wl,-mlvm -Wl,-function-specialize  
-Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mlvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math  
-fstruct-layout=7 -mlvm -unroll-threshold=50  
-fremap-arrays -flv-function-specialization  
-mlvm -inline-threshold=1000 -mlvm -function-specialize  
-mlvm -global-vectorize-slp=true  
-mlvm -reduce-array-computations=3 -lamdlibm -ljemalloc

525.x264_r: basepeak = yes

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: -m64 -std=c++98 -flto -Wl,-mlvm -Wl,-function-specialize  
-Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mlvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math  
-finline-aggressive -mlvm -unroll-threshold=100  
-flv-function-specialization -mlvm -enable-llicm-vrp  
-mlvm -reroll-loops -mlvm -aggressive-loop-unswitch  
-mlvm -reduce-array-computations=3

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

520.omnetpp_r (continued):
-mllvm -global-vectorize-slp=true
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -ljemalloc

523.xalancbnk_r: -m32 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto
-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
-finline-aggressive -mllvm -unroll-threshold=100
-flv-function-specialization -mllvm -enable-licm-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
-ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:

548.exchange2_r: basepeak = yes

Peak Other Flags

C benchmarks (except as noted below):
-Wno-unused-command-line-argument

502.gcc_r: -L/usr/lib -Wno-unused-command-line-argument
-L/sppo/bin/cpu2017v118-aocc3-milanX/amd_rate_aocc320_milanx_A_lib/lib32

C++ benchmarks (except as noted below):
-Wno-unused-command-line-argument

523.xalancbnk_r: -L/usr/lib -Wno-unused-command-line-argument
-L/sppo/bin/cpu2017v118-aocc3-milanX/amd_rate_aocc320_milanx_A_lib/lib32
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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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