SPEC CPU®2017 Integer Rate Result

Fujitsu
PRIMERGY RX2450 M1, AMD EPYC 75F3
2.95 GHz

SPECrate®2017_int_base = 571
SPECrate®2017_int_peak = Not Run

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

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

Covers
500.perlbench_r 128
502.gcc_r 128
505.mcf_r 128
520.omnetpp_r 253
523.xalancbmk_r 680
525.x264_r 1190
531.deepsjeng_r 494
541.leela_r 545
548.exchange2_r 1390
557.xz_r 318

SPECrate®2017_int_base (571)

Hardware
CPU Name: AMD EPYC 75F3
Max MHz: 4000
Nominal: 2950
Enabled: 64 cores, 2 chips, 2 threads/core
Orderable: 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 / 4 cores
Other: None
Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200V-L)
Storage: 1 x PCIe SSD, 2TB
Other: None

Software
OS: SUSE Linux Enterprise Server 15 SP2 (x86_64)
kernel version
5.3.18-22-default
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
Firmware: Fujitsu BIOS Version 2.1.V2 Released Oct-2021
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc: jemalloc memory allocator library v5.2.0
Power Management: BIOS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Integer Rate Result

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Results Table

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</tbody>
</table>

SPECrate®2017_int_base = 571
SPECrate®2017_int_peak = Not Run

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/benchmark/speccpu-milan/amd_rate_aocc300_milan_B_lib/lib;/home/benchmark/speccpu-milan/amd_rate_aocc300_milan_B_lib/lib32:" MALLOC_CONF = "retain:true"

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 5.2.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.2.0/jemalloc-5.2.0.tar.bz2

Platform Notes

BIOS configuration:
ACPI SRAT L3 Cache As NUMA Domain = Enabled
APBDIS = 1
cTDP Control = Manual
cTDP = 280
Determinism Slider = Power
DRAM Scrub Time = Disabled
EDC Control = Manual
EDC = 300
EDC Platform Limit = 300

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

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2.95 GHz

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

Platform Notes (Continued)

Fix SOC P-state = P0
IOMMU = Enabled
L1 Stream HW Prefetcher = Enabled
L2 Stream HW Prefetcher = Enabled
NUMA Nodes Per Socket = NPS4
Package Power Limit = 280
Package Power Limit Control = Manual
SVM Mode = Disabled
SMT Control = Enabled
xGMI Link Max Speed = 18Gbps

Sysinfo program /home/benchmark/speccpu-milan/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aaca64d
running on localhost Tue Aug  3 06:08:32 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 : AMD EPYC 75F3 32-Core Processor
    2 "physical id"s (chips)
    128 "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
  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

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): 128
  On-line CPU(s) list: 0-127
  Thread(s) per core: 2
  Core(s) per socket: 32
  Socket(s): 2
  NUMA node(s): 16
  Vendor ID: AuthenticAMD
  CPU family: 25
  Model: 1
  Model name: AMD EPYC 75F3 32-Core Processor

(Continued on next page)
Fujitsu
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Platform Notes (Continued)

Stepping: 1
CPU MHz: 3035.319
CPU max MHz: 2950.0000
CPU min MHz: 1500.0000
BogoMIPS: 5899.80
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-3,64-67
NUMA node1 CPU(s): 4-7,68-71
NUMA node2 CPU(s): 8-11,72-75
NUMA node3 CPU(s): 12-15,76-79
NUMA node4 CPU(s): 16-19,80-83
NUMA node5 CPU(s): 20-23,84-87
NUMA node6 CPU(s): 24-27,88-91
NUMA node7 CPU(s): 28-31,92-95
NUMA node8 CPU(s): 32-35,96-99
NUMA node9 CPU(s): 36-39,100-103
NUMA node10 CPU(s): 40-43,104-107
NUMA node11 CPU(s): 44-47,108-111
NUMA node12 CPU(s): 48-51,112-115
NUMA node13 CPU(s): 52-55,116-119
NUMA node14 CPU(s): 56-59,120-123
NUMA node15 CPU(s): 60-63,124-127

Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmmext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3nowprefetch osw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mdwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbbase bm1 axv2 smep bmi2 erms invpcid cqg rdt_a rdseed adx clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsave cs美貌 cmq_occw llc cmq_mbmm_total cmq_mbbm_local clzero irperfl xsaveerprf wbinvind arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyas id decodeassistz pausefilter pfthreshold v_vmsave_vmload vgif umip pk opk spe vaes vpcmullqdq rdpid overflow_recv succe smca

From numactl --hardware

 WARNING: a numactl 'node' might or might not correspond to a physical chip.
 available: 16 nodes (0-15)
 node 0 cpus: 0 1 2 3 64 65 66 67
 node 0 size: 128753 MB

(Continued on next page)
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Test Date: Oct-2021
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Platform Notes (Continued)

node 0 free: 128454 MB
node 1 cpus: 4 5 6 7 68 69 70 71
node 1 size: 129019 MB
node 1 free: 128735 MB
node 2 cpus: 8 9 10 11 72 73 74 75
node 2 size: 129021 MB
node 2 free: 128750 MB
node 3 cpus: 12 13 14 15 76 77 78 79
node 3 size: 129019 MB
node 3 free: 128739 MB
node 4 cpus: 16 17 18 19 80 81 82 83
node 4 size: 129021 MB
node 4 free: 128726 MB
node 5 cpus: 20 21 22 23 84 85 86 87
node 5 size: 129019 MB
node 5 free: 128716 MB
node 6 cpus: 24 25 26 27 88 89 90 91
node 6 size: 128988 MB
node 6 free: 128719 MB
node 7 cpus: 28 29 30 31 92 93 94 95
node 7 size: 129007 MB
node 7 free: 128572 MB
node 8 cpus: 32 33 34 35 96 97 98 99
node 8 size: 129021 MB
node 8 free: 128757 MB
node 9 cpus: 36 37 38 39 100 101 102 103
node 9 size: 129019 MB
node 9 free: 128765 MB
node 10 cpus: 40 41 42 43 104 105 106 107
node 10 size: 129021 MB
node 10 free: 128765 MB
node 11 cpus: 44 45 46 47 108 109 110 111
node 11 size: 129019 MB
node 11 free: 128763 MB
node 12 cpus: 48 49 50 51 112 113 114 115
node 12 size: 129021 MB
node 12 free: 128763 MB
node 13 cpus: 52 53 54 55 116 117 118 119
node 13 size: 129019 MB
node 13 free: 128766 MB
node 14 cpus: 56 57 58 59 120 121 122 123
node 14 size: 129021 MB
node 14 free: 128769 MB
node 15 cpus: 60 61 62 63 124 125 126 127
node 15 size: 128779 MB
node 15 free: 128520 MB
node distances:

(Continued on next page)
Fujitsu
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Platform Notes (Continued)

From /proc/meminfo
MemTotal: 2113309080 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
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/lp-1a956f1) 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

(Continued on next page)
Fujitsu
PRIMERGY RX2450 M1, AMD EPYC 75F3 2.95 GHz

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Platform Notes (Continued)

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 3 Aug 3 04:56
SPEC is set to: /home/benchmark/speccpu-milan
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p3 xfs 1.3T 46G 1.3T 4% /home

From /sys/devices/virtual/dmi/id
Vendor: FUJITSU
Product: PRIMERGY RX2450 M1
Serial: MACUxxxxxx

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:
32x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 2.1.V2
BIOS Date: 08/02/2021
BIOS Revision: 5.22

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
| 525.x264_r(base) 557.xz_r(base)
==============================================================================
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)
Fujitsu
PRIMERGY RX2450 M1, AMD EPYC 75F3
2.95 GHz

Fujitsu

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Software Availability: Mar-2021

Compiler Version Notes (Continued)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

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

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
548.exchange2_r(base)

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
500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64

(Continued on next page)
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Base Portability Flags (Continued)

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

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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -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
-lamdlibm -ljemalloc -lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroiloops -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 -lamdlibm
-ljemalloc -lflang -lflangrti

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-Isr-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 -O3 -ffast-math

(Continued on next page)
**Fujitsu**
PRIMERGY RX2450 M1, AMD EPYC 75F3 2.95 GHz

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<td>Fujitsu</td>
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<tr>
<td>Test Date</td>
<td>Oct-2021</td>
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<tr>
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<td>Oct-2021</td>
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<tr>
<td>Software Availability</td>
<td>Mar-2021</td>
</tr>
</tbody>
</table>

### SPECrate®2017 Int Results

| SPECrate®2017_int_base | 571 |
| SPECrate®2017_int_peak | Not Run |

### Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `march=znver3`  
- `fveclib=AMDLIBM`  
- `z muldefs`  
- `mllvm -unroll-aggressive`  
- `mllvm -unroll-threshold=500`  
- `lamlidlibm`  
- `ljemalloc`  
- `lflang`  
- `lflangrti`

### Base Other Flags

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

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

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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