



# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Fujitsu

PRIMERGY RX2450 M1, AMD EPYC 72F3  
3.70 GHz

SPECrate®2017\_int\_base = 185

SPECrate®2017\_int\_peak = Not Run

CPU2017 License: 19

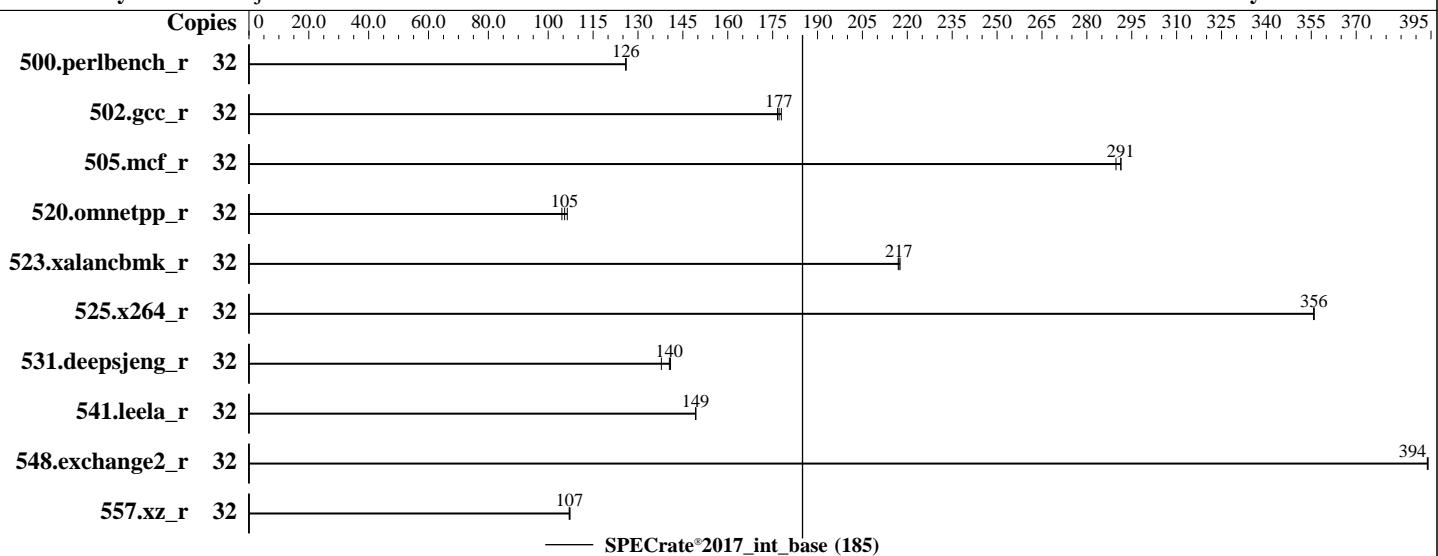
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Oct-2021

Hardware Availability: Oct-2021

Software Availability: Mar-2021



## Hardware

CPU Name: AMD EPYC 72F3  
Max MHz: 4100  
Nominal: 3700  
Enabled: 16 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 per core  
Other: None  
Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200V-L)  
Storage: 1 x PCIe SSD, 2TB  
Other: None

## 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



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	32	<b>404</b>	<b>126</b>	404	126	405	126							
502.gcc_r	32	257	177	255	178	<b>256</b>	<b>177</b>							
505.mcf_r	32	177	291	<b>178</b>	<b>291</b>	178	290							
520.omnetpp_r	32	<b>398</b>	<b>105</b>	401	105	395	106							
523.xalancbmk_r	32	155	218	156	217	<b>156</b>	<b>217</b>							
525.x264_r	32	<b>157</b>	<b>356</b>	157	356	157	356							
531.deepsjeng_r	32	266	138	<b>261</b>	<b>140</b>	260	141							
541.leela_r	32	355	149	<b>355</b>	<b>149</b>	355	149							
548.exchange2_r	32	213	394	213	394	<b>213</b>	<b>394</b>							
557.xz_r	32	323	107	322	107	<b>323</b>	<b>107</b>							

**SPECrate®2017\_int\_base = 185**

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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.

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## 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/be
nchmark/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 = 200

Determinism Slider = Power

DRAM Scrub Time = Disabled

EDC Control = Manual

EDC = 300

EDC Platform Limit = 300

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## 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 = 200  
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 982a61ec0915b55891ef0e16acaf64d  
running on localhost Tue Aug 3 04:49:24 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 72F3 8-Core Processor  
2 "physical id"s (chips)  
32 "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 : 8  
siblings : 16  
physical 0: cores 0 1 2 3 4 5 6 7  
physical 1: cores 0 1 2 3 4 5 6 7

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): 32  
On-line CPU(s) list: 0-31  
Thread(s) per core: 2  
Core(s) per socket: 8  
Socket(s): 2  
NUMA node(s): 16  
Vendor ID: AuthenticAMD  
CPU family: 25  
Model: 1  
Model name: AMD EPYC 72F3 8-Core Processor  
Stepping: 1  
CPU MHz: 4047.341

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## Platform Notes (Continued)

CPU max MHz: 3700.0000  
CPU min MHz: 1500.0000  
BogoMIPS: 7399.78  
Virtualization: AMD-V  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 512K  
L3 cache: 32768K  
NUMA node0 CPU(s): 0,16  
NUMA node1 CPU(s): 1,17  
NUMA node2 CPU(s): 2,18  
NUMA node3 CPU(s): 3,19  
NUMA node4 CPU(s): 4,20  
NUMA node5 CPU(s): 5,21  
NUMA node6 CPU(s): 6,22  
NUMA node7 CPU(s): 7,23  
NUMA node8 CPU(s): 8,24  
NUMA node9 CPU(s): 9,25  
NUMA node10 CPU(s): 10,26  
NUMA node11 CPU(s): 11,27  
NUMA node12 CPU(s): 12,28  
NUMA node13 CPU(s): 13,29  
NUMA node14 CPU(s): 14,30  
NUMA node15 CPU(s): 15,31  
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 aperfmpf perf\_pni pclmulqdq monitor ssse3 fma cx16 pcid sse4\_1 sse4\_2 movbe popcnt aes xsave avx f16c rdrandlahf\_lm cmp\_legacy svm extapic cr8\_legacy abm sse4a misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr\_core perfctr\_nb bpext perfctr\_llc mwaitx cpb cat\_13 cdp\_13 invpcid\_single hw\_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 erms invpcid cqmq rdt\_a rdseed adx smap clflushopt clwb sha\_ni xsaveopt xsavec xgetbv1 xsaves cqmq\_llc cqmq\_occup\_llc cqmq\_mbm\_total cqmq\_mbm\_local clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm\_lock nrrip\_save tsc\_scale vmcb\_clean flushbyasid decodeassists pausefilter pfthreshold v\_vmsave\_vmlload vgif umip pku ospke vaes vpclmulqdq rdpid overflow\_recov succor smca

/proc/cpuinfo cache data  
cache size : 512 KB

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 16  
node 0 size: 128759 MB  
node 0 free: 128660 MB  
node 1 cpus: 1 17

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## Platform Notes (Continued)

```
node 1 size: 129021 MB
node 1 free: 128751 MB
node 2 cpus: 2 18
node 2 size: 129023 MB
node 2 free: 128918 MB
node 3 cpus: 3 19
node 3 size: 129021 MB
node 3 free: 128944 MB
node 4 cpus: 4 20
node 4 size: 129023 MB
node 4 free: 128926 MB
node 5 cpus: 5 21
node 5 size: 129021 MB
node 5 free: 128912 MB
node 6 cpus: 6 22
node 6 size: 129023 MB
node 6 free: 128936 MB
node 7 cpus: 7 23
node 7 size: 129009 MB
node 7 free: 128912 MB
node 8 cpus: 8 24
node 8 size: 129023 MB
node 8 free: 128948 MB
node 9 cpus: 9 25
node 9 size: 129021 MB
node 9 free: 128950 MB
node 10 cpus: 10 26
node 10 size: 129023 MB
node 10 free: 128957 MB
node 11 cpus: 11 27
node 11 size: 129021 MB
node 11 free: 128956 MB
node 12 cpus: 12 28
node 12 size: 129023 MB
node 12 free: 128956 MB
node 13 cpus: 13 29
node 13 size: 128987 MB
node 13 free: 128920 MB
node 14 cpus: 14 30
node 14 size: 129023 MB
node 14 free: 128957 MB
node 15 cpus: 15 31
node 15 size: 128781 MB
node 15 free: 128714 MB
node distances:
node   0    1    2    3    4    5    6    7    8    9    10   11   12   13   14   15
  0:  10   11   12   12   12   12   12   32   32   32   32   32   32   32   32
```

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## Platform Notes (Continued)

1:	11	10	12	12	12	12	12	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	
2:	12	12	10	11	12	12	12	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
3:	12	12	11	10	12	12	12	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
4:	12	12	12	12	10	11	12	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
5:	12	12	12	12	11	10	12	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
6:	12	12	12	12	12	12	10	11	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
7:	12	12	12	12	12	12	11	10	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
8:	32	32	32	32	32	32	32	32	32	10	11	12	12	12	12	12	12	12	12	12	12	12	12	12
9:	32	32	32	32	32	32	32	32	32	11	10	12	12	12	12	12	12	12	12	12	12	12	12	12
10:	32	32	32	32	32	32	32	32	32	12	12	12	10	11	12	12	12	12	12	12	12	12	12	12
11:	32	32	32	32	32	32	32	32	32	12	12	11	10	10	12	12	12	12	12	12	12	12	12	12
12:	32	32	32	32	32	32	32	32	32	12	12	12	12	12	10	11	12	12	12	12	12	12	12	12
13:	32	32	32	32	32	32	32	32	32	12	12	12	12	12	11	10	10	12	12	12	12	12	12	12
14:	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	12	12	10	10	11	12	12	12	12
15:	32	32	32	32	32	32	32	32	32	12	12	12	12	12	12	12	11	10	10	11	10	10	11	10

From /proc/meminfo

```
MemTotal:      2113335624 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
(720aebe/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
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and

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## Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):

seccomp  
Mitigation: usercopy/swaps  
barriers and \_\_user pointer  
sanitization

CVE-2017-5715 (Spectre variant 2):

Mitigation: Full AMD retrpoline,  
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 04:47

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)

Target: x86\_64-unknown-linux-gnu

Thread model: posix

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## Compiler Version Notes (Continued)

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  
523.xalancbmk\_r: -DSPEC\_LINUX -DSPEC\_LP64  
525.x264\_r: -DSPEC\_LP64

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## Base Portability Flags (Continued)

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 -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 -lamdlibm
-ljemalloc -lflang -lflangrti
```

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 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti
```



# SPEC CPU®2017 Integer Rate Result

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Fujitsu

PRIMERGY RX2450 M1, AMD EPYC 72F3  
3.70 GHz

SPECrate®2017\_int\_base = 185

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

## 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

<http://www.spec.org/cpu2017/flags/aocc300-flags-B2.html>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-MILAN-RevB.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/aocc300-flags-B2.xml>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-MILAN-RevB.xml>

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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