SPEC CPU®2017 Integer Rate Result

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Fujitsu

PRIMERGY RX2450 M1, AMD EPYC 7763
2.45 GHz

$SPECrate^{®}2017_int_base = $ 824

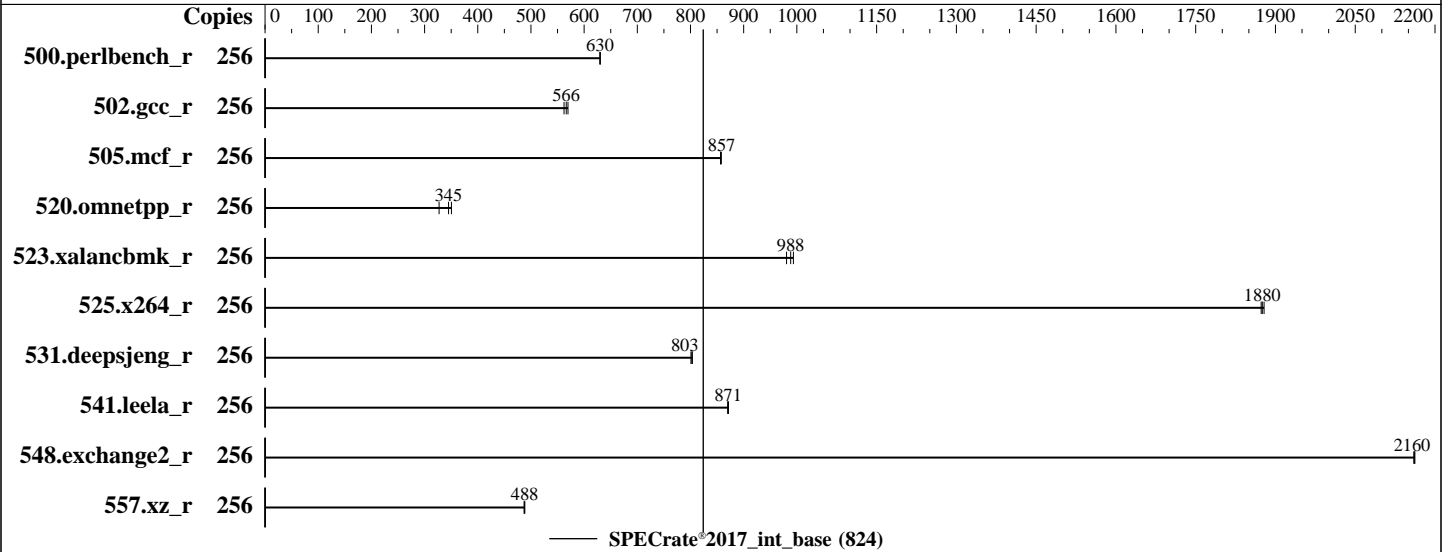$SPECrate^{®}2017_int_peak = $ Not Run

CPU2017 License: 19

Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Oct-2021

Hardware Availability: Oct-2021

Software Availability: Mar-2021

Copies		
500.perlbench_r	256	630
502.gcc_r	256	566
505.mcf_r	256	857
520.omnetpp_r	256	345
523.xalancbmk_r	256	988
525.x264_r	256	1880
531.deepsjeng_r	256	803
541.leela_r	256	871
548.exchange2_r	256	2160
557.xz_r	256	488

SPECrate®2017_int_base (824)

Hardware

CPU Name: AMD EPYC 7763
 Max MHz: 3500
 Nominal: 2450
Enabled: 128 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 / 8 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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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Results Table

Benchmark	Base Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Peak Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	256	647	630	**647**	**630**	647	630							
502.gcc_r	256	**640**	**566**	645	562	636	570							
505.mcf_r	256	483	857	**483**	**857**	482	858							
520.omnetpp_r	256	**973**	**345**	958	350	1026	327							
523.xalancbmk_r	256	272	994	276	981	**274**	**988**							
525.x264_r	256	**239**	**1880**	239	1870	239	1880							
531.deepsjeng_r	256	365	804	366	801	**366**	**803**							
541.leela_r	256	**487**	**871**	487	871	487	870							
548.exchange2_r	256	**310**	**2160**	311	2160	310	2160							
557.xz_r	256	566	488	**566**	**488**	568	487							
SPECrate®2017_int_base =		**824**												
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.
```

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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 = 280
 Determinism Slider = Power
 DRAM Scrub Time = Disabled
 EDC Control = Manual
 EDC = 300
 EDC Power 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 = Disabled
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 982a61ec0915b55891ef0e16acafc64d
running on localhost Fri Sep 10 03:22:53 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 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):              256
      On-line CPU(s) list: 0-255
      Thread(s) per core:  2
      Core(s) per socket:  64
      Socket(s):           2
      NUMA node(s):        16
      Vendor ID:           AuthenticAMD
      CPU family:          25
```

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CPU2017 License: 19		**Test Date:**	Oct-2021
Test Sponsor: Fujitsu		**Hardware Availability:** Oct-2021
Tested by: Fujitsu		**Software Availability:** Mar-2021

Platform Notes (Continued)

```
        Model:                  1
        Model name:             AMD EPYC 7763 64-Core Processor
        Stepping:               1
        CPU MHz:                3430.598
        CPU max MHz:            2450.0000
        CPU min MHz:            1500.0000
        BogoMIPS:               4900.07
        Virtualization:         AMD-V
        L1d cache:              32K
        L1i cache:              32K
        L2 cache:               512K
        L3 cache:               32768K
        NUMA node0 CPU(s):      0-7,128-135
        NUMA node1 CPU(s):      8-15,136-143
        NUMA node2 CPU(s):      16-23,144-151
        NUMA node3 CPU(s):      24-31,152-159
        NUMA node4 CPU(s):      32-39,160-167
        NUMA node5 CPU(s):      40-47,168-175
        NUMA node6 CPU(s):      48-55,176-183
        NUMA node7 CPU(s):      56-63,184-191
        NUMA node8 CPU(s):      64-71,192-199
        NUMA node9 CPU(s):      72-79,200-207
        NUMA node10 CPU(s):     80-87,208-215
        NUMA node11 CPU(s):     88-95,216-223
        NUMA node12 CPU(s):     96-103,224-231
        NUMA node13 CPU(s):     104-111,232-239
        NUMA node14 CPU(s):     112-119,240-247
        NUMA node15 CPU(s):     120-127,248-255
        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 pni pclmulqdq
     monitor ssse3 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 ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb
     cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase
     bmi1 avx2 smep bmi2 erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
     xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
     clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale
     vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload 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)
```

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Platform Notes (Continued)

```
node 0 cpus: 0 1 2 3 4 5 6 7 128 129 130 131 132 133 134 135
node 0 size: 128752 MB
node 0 free: 128310 MB
node 1 cpus: 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143
node 1 size: 129018 MB
node 1 free: 128637 MB
node 2 cpus: 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151
node 2 size: 129020 MB
node 2 free: 128784 MB
node 3 cpus: 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159
node 3 size: 129018 MB
node 3 free: 128808 MB
node 4 cpus: 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167
node 4 size: 129020 MB
node 4 free: 128781 MB
node 5 cpus: 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175
node 5 size: 129018 MB
node 5 free: 128749 MB
node 6 cpus: 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183
node 6 size: 128986 MB
node 6 free: 128778 MB
node 7 cpus: 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191
node 7 size: 129006 MB
node 7 free: 128794 MB
node 8 cpus: 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199
node 8 size: 129020 MB
node 8 free: 128827 MB
node 9 cpus: 72 73 74 75 76 77 78 79 200 201 202 203 204 205 206 207
node 9 size: 129018 MB
node 9 free: 128848 MB
node 10 cpus: 80 81 82 83 84 85 86 87 208 209 210 211 212 213 214 215
node 10 size: 129020 MB
node 10 free: 128717 MB
node 11 cpus: 88 89 90 91 92 93 94 95 216 217 218 219 220 221 222 223
node 11 size: 129018 MB
node 11 free: 128805 MB
node 12 cpus: 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231
node 12 size: 129020 MB
node 12 free: 128842 MB
node 13 cpus: 104 105 106 107 108 109 110 111 232 233 234 235 236 237 238 239
node 13 size: 129018 MB
node 13 free: 128840 MB
node 14 cpus: 112 113 114 115 116 117 118 119 240 241 242 243 244 245 246 247
node 14 size: 129020 MB
node 14 free: 128832 MB
node 15 cpus: 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255
node 15 size: 128776 MB
```

(Continued on next page)

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Platform Notes (Continued)

```
   node 15 free: 128595 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   12   32   32   32   32   32   32   32   32
     1:  11   10   12   12   12   12   12   12   32   32   32   32   32   32   32   32
     2:  12   12   10   11   12   12   12   12   32   32   32   32   32   32   32   32
     3:  12   12   11   10   12   12   12   12   32   32   32   32   32   32   32   32
     4:  12   12   12   12   10   11   12   12   32   32   32   32   32   32   32   32
     5:  12   12   12   12   11   10   12   12   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
     7:  12   12   12   12   12   12   11   10   32   32   32   32   32   32   32   32
     8:  32   32   32   32   32   32   32   32   10   11   12   12   12   12   12   12
     9:  32   32   32   32   32   32   32   32   11   10   12   12   12   12   12   12
    10:  32   32   32   32   32   32   32   32   12   12   10   11   12   12   12   12
    11:  32   32   32   32   32   32   32   32   12   12   11   10   12   12   12   12
    12:  32   32   32   32   32   32   32   32   12   12   12   12   10   11   12   12
    13:  32   32   32   32   32   32   32   32   12   12   12   12   11   10   12   12
    14:  32   32   32   32   32   32   32   32   12   12   12   12   12   12   10   11
    15:  32   32   32   32   32   32   32   32   12   12   12   12   12   12   11   10

 From /proc/meminfo
    MemTotal:       2113279340 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/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
```

(Continued on next page)

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Platform Notes (Continued)

```
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/swapgs
                                                   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 Sep 10 03:20

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)
------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
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++      | 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`

(Continued on next page)

spec®

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Base Portability Flags (Continued)

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`

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
```

(Continued on next page)

Fujitsu

PRIMERGY RX2450 M1, AMD EPYC 7763
2.45 GHz

SPECrate®2017_int_base =   824

SPECrate®2017_int_peak = Not Run

CPU2017 License: 19	**Test Date:** Oct-2021
Test Sponsor: Fujitsu	**Hardware Availability:** Oct-2021
Tested by: Fujitsu	**Software Availability:** Mar-2021

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-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
```

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-RevA.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-RevA.xml
```

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

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