## SPEC CPU®2017 Integer Speed Result

### Dell Inc.

**PowerEdge R6515 (AMD EPYC 75F3 32-Core Processor)**

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Mar-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Mar-2021</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Mar-2021</td>
</tr>
</tbody>
</table>

**Thread Combinations:**

- **600.perlbench_s**
  - 32 threads: 7.92
  - 1 thread: 7.98
- **602.gcc_s**
  - 32 threads: 7.92
  - 1 thread: 7.98
- **605.mcf_s**
  - 32 threads: 8.65
  - 1 thread: 8.74
- **620.omnetpp_s**
  - 32 threads: 8.65
  - 1 thread: 8.74
- **623.xalancbmk_s**
  - 32 threads: 15.5
  - 1 thread: 15.0
- **625.x264_s**
  - 32 threads: 6.75
  - 1 thread: 6.72
- **631.deepsjeng_s**
  - 32 threads: 6.35
  - 1 thread: 6.35
- **641.leela_s**
  - 32 threads: 6.35
  - 1 thread: 6.35
- **648.exchange2_s**
  - 32 threads: 25.6
  - 1 thread: 25.5
- **657.xz_s**
  - 32 threads: 26.3
  - 1 thread: 26.5

**SPECspeed®2017_int_base = 13.3**

**SPECspeed®2017_int_peak = 13.3**

### Hardware

- **CPU Name:** AMD EPYC 75F3
- **Max MHz:** 4000
- **Nominal:** 2950
- **Enabled:** 32 cores, 1 chip
- **Orderable:** 1 chip
- **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:** 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-R)
- **Storage:** 480 GB SATA SSD
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.el8.x86_64
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 2.0.3 released Jan-2021
- **File System:** xfs
- **System State:** Run level 3 (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.
Dell Inc.

PowerEdge R6515 (AMD EPYC 75F3 32-Core Processor)

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>32</td>
<td>224</td>
<td>7.92</td>
<td>222</td>
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<td>602.gcc_s</td>
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<td>605.mcf_s</td>
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<td>22.0</td>
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<td>623.xalancbmk_s</td>
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<td>625.x264_s</td>
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<tr>
<td>631.deepsjeng_s</td>
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<td>641.leela_s</td>
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<tr>
<td>648.exchange2_s</td>
<td>32</td>
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<tr>
<td>657.xz_s</td>
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<td>26.4</td>
<td>235</td>
<td>26.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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>

'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.

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

To enable Transparent Hugepages (THP) for all allocations, '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:
GOMP_CPU_AFFINITY = "0-31"
LD_LIBRARY_PATH = 
  "/home/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/32;"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "32"

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 605.mcf_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 620.omnetpp_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 631.deepsjeng_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 641.leela_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 648.exchange2_s peak run:
GOMP_CPU_AFFINITY = "0"

Environment variables set by runcpu during the 657.xz_s peak run:

(Continued on next page)
Environment Variables Notes (Continued)

GOMP_CPU_AFFINITY = "0-31"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7713 CPU + 512GiB Memory using RHEL 8.2

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:
Logical processor : Disabled
L3 Cache as NUMA Domain : Enabled
Virtualization Technology : Disabled
DRAM Refresh Delay : Performance
System Profile : Custom
CPU Power Management : Maximum Performance
Memory Patrol Scrub : Disabled
PCI ASPM L1 Link
       Power Management : Disabled

Sysinfo program /home/cpu2017-1.1.5/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on rhel-8-3-amd Sat Mar 20 21:33:54 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
  1 "physical id"'s (chips)
  32 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following

(Continued on next page)
Dell Inc. PowerEdge R6515 (AMD EPYC 75F3 32-Core Processor)

SPECspeed®2017_int_base = 13.3
SPECspeed®2017_int_peak = 13.3

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Mar-2021
CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Mar-2021

Platform Notes (Continued)

excerpts from /proc/cpuinfo might not be reliable. Use with caution.

cpu cores : 32
siblings : 32
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:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 1
NUMA node(s): 8
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 75F3 32-Core Processor
Stepping: 1
CPU MHz: 3441.684
BogoMIPS: 5888.94
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-3
NUMA node1 CPU(s): 4-7
NUMA node2 CPU(s): 8-11
NUMA node3 CPU(s): 12-15
NUMA node4 CPU(s): 16-19
NUMA node5 CPU(s): 20-23
NUMA node6 CPU(s): 24-27
NUMA node7 CPU(s): 28-31
Flags: fpu vme de pse tsc msr pae 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 ibr mfsbsr msr wbaffsas half fpcontrol idx saveavi xsave avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsave xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local clzero irperf xsaveerptr wbnoinvd amd_pini arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold

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

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**Dell Inc.**

PowerEdge R6515 (AMD EPYC 75F3 32-Core Processor)

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>13.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>13.3</td>
</tr>
</tbody>
</table>

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**Platform Notes (Continued)**

\[ v\_vmsave\_vmload \ vgif \ umip \ pku \ ospke \ vaes \ vpclmulqdq \ rdpid \ overflow\_reco \ succor \ smca \]

/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 | 8 nodes (0-7) |

| node 0 cpus | 0 1 2 3 |
| node 0 size | 128587 MB |
| node 0 free | 128480 MB |

| node 1 cpus | 4 5 6 7 |
| node 1 size | 129012 MB |
| node 1 free | 128898 MB |

| node 2 cpus | 8 9 10 11 |
| node 2 size | 129016 MB |
| node 2 free | 128925 MB |

| node 3 cpus | 12 13 14 15 |
| node 3 size | 129012 MB |
| node 3 free | 128808 MB |

| node 4 cpus | 16 17 18 19 |
| node 4 size | 129020 MB |
| node 4 free | 128885 MB |

| node 5 cpus | 20 21 22 23 |
| node 5 size | 129022 MB |
| node 5 free | 128716 MB |

| node 6 cpus | 24 25 26 27 |
| node 6 size | 128985 MB |
| node 6 free | 128847 MB |

| node 7 cpus | 28 29 30 31 |
| node 7 size | 116899 MB |
| node 7 free | 116794 MB |

| node distances: |

<table>
<thead>
<tr>
<th>node 0 1 2 3 4 5 6 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>0: 10 11 11 11 11 11 11</td>
</tr>
<tr>
<td>1: 11 10 11 11 11 11 11</td>
</tr>
<tr>
<td>2: 11 11 10 11 11 11 11</td>
</tr>
<tr>
<td>3: 11 11 11 10 11 11 11</td>
</tr>
<tr>
<td>4: 11 11 11 11 10 11 11</td>
</tr>
<tr>
<td>5: 11 11 11 11 10 11 11</td>
</tr>
<tr>
<td>6: 11 11 11 11 11 11 10</td>
</tr>
<tr>
<td>7: 11 11 11 11 11 11 10</td>
</tr>
</tbody>
</table>

From `/proc/meminfo`

<table>
<thead>
<tr>
<th>MemTotal:</th>
<th>1044066228 kB</th>
</tr>
</thead>
<tbody>
<tr>
<td>HugePages_Total:</td>
<td>0</td>
</tr>
<tr>
<td>Hugepagesize:</td>
<td>2048 kB</td>
</tr>
</tbody>
</table>

(Continued on next page)
Platform Notes (Continued)

/sbin/tuned-adm active
Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.3 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.3"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
    ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
  Linux rhel-8-3-amd 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 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): Mitigation: Speculative Store
CVE-2018-3639 (Speculative Store Bypass): Bypass disabled via prctl and
CVE-2017-5753 (Spectre variant 1): seccomp
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline,
CVE-2020-0543 (Special Register Buffer Data Sampling): IBPB: conditional, IBRS_FW, STIBP:
CVE-2019-11135 (TSX Asynchronous Abort): disabled, RSB filling
Not affected
Not affected

run-level 3 Mar 20 21:18
SPEC is set to: /home/cpu2017-1.1.5
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs 392G 16G 376G 4% /home

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

- **Vendor:** Dell Inc.
- **Product:** PowerEdge R6515
- **Product Family:** PowerEdge

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:
- 8x 802C8632802C 72ASS16G72LZ-3G2B3 128 GB 4 rank 3200
- 8x Not Specified Not Specified

### BIOS:
- **BIOS Vendor:** Dell Inc.
- **BIOS Version:** 2.0.3
- **BIOS Date:** 01/15/2021
- **BIOS Revision:** 2.0

(End of data from sysinfo program)

## Compiler Version Notes

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### C

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>600.perlbench_s(base, peak)</th>
<th>602.gcc_s(base, peak)</th>
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<th>625.x264_s(base, peak)</th>
<th>657.xz_s(base, peak)</th>
</tr>
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</table>

**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

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### C++

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>620.omnetpp_s(base, peak)</th>
<th>623.xalancbmk_s(base, peak)</th>
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- **Target:** x86_64-unknown-linux-gnu
- **Thread model:** posix
- **InstalledDir:** /opt/AMD/aocc-compiler-3.0.0/bin

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### Fortran

<table>
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<th>Benchmark</th>
<th>648.exchange2_s(base, peak)</th>
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(Continued on next page)
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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

### Base Compiler Invocation

- **C benchmarks:**
  - clang

- **C++ benchmarks:**
  - clang++

- **Fortran benchmarks:**
  - flang

### Base Portability Flags

- 600.perlbench_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,-mlibm -Wl,-enable-llicm-vrp -Wl,-mlibm -Wl,-region-vectorize
  - -Wl,-mlibm -Wl,-function-specialize
  - -Wl,-mlibm -Wl,-align-all-nofallthru-blocks=6
  - -Wl,-mlibm -Wl,-reduce-array-computations=3 -O3 -march=znver3
  - -fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5

(Continued on next page)
Dell Inc.

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SPECspeed®2017_int_base = 13.3
SPECspeed®2017_int_peak = 13.3

Base Optimization Flags (Continued)

C benchmarks (continued):
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
--fremap-arrays -mlirvm -function-specialize -flv-function-specialization
-mlirvm -enable-gvn-hoist -mlirvm -global-vectorize-slp=true
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llflang -llflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-W1,-mlirvm -W1,-do-block-reorder=aggressive
-W1,-mlirvm -W1,-region-vectorize -W1,-mlirvm -W1,-function-specialize
-W1,-mlirvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlirvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mlirvm -enable-partial-unswitch
-mlirvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mlirvm -loop-unswitch-threshold=200000
-mlirvm -eroll-loops -mlirvm -aggressive-loop-unswitch
-mlirvm -extra-vectorizer-passes -mlirvm -reduce-array-computations=3
-mlirvm -global-vectorize-slp=true -mlirvm -convert-pow-exp-to-int=false
-z muldefs -mlirvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -llflang
-llflangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -W1,-mlirvm -W1,-inline-recursion=4
-W1,-mlirvm -W1,-lsr-in-nested-loop -W1,-mlirvm -W1,-enable-iv-split
-W1,-mlirvm -W1,-region-vectorize -W1,-mlirvm -W1,-function-specialize
-W1,-mlirvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlirvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -z muldefs
-mlirvm -unroll-aggressive -mlirvm -unroll-threshold=150 -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -llflang
-llflangrti

Base Other Flags

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

C++ benchmarks:
-Wno-unused-command-line-argument -Wno-return-type
## Dell Inc. 

**PowerEdge R6515 (AMD EPYC 75F3 32-Core Processor)**

<table>
<thead>
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<th>55</th>
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### SPEC CPU®2017 Integer Speed Result

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>13.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>13.3</td>
</tr>
</tbody>
</table>

### Base Other Flags (Continued)

- Fortran benchmarks: 
  - Wno-return-type

### Peak Compiler Invocation

- **C benchmarks:** 
  - clang

- **C++ benchmarks:** 
  - clang++

- Fortran benchmarks: 
  - flang

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

- **C benchmarks:**
  - -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
  - -Wl,-mllvm -Wl,-enable-licm-vrp -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 -flto -fstruct-layout=5
  - -mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
  - -mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
  - -mllvm -global-vectorize-slp=true -mllvm -function-specialize
  - -mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
  - -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
  - -lflang

- **C++ benchmarks:**
  - -m64 -std=c++98 -mno-adx -mno-sse4a
  - -Wl,-mllvm -Wl,-do-block-reorder-aggressive
  - -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 -flto -finline-aggressive

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

**C++ benchmarks** (continued):

- `mllvm -unroll-threshold=100`  
- `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`  
- `-DSPEC_OPENMP`  
- `-fopenmp`  
- `-fopenmp=libomp`  
- `-lomp`  
- `-lamdlibm`  
- `-ljemalloc`  
- `-lflang`

**Fortran benchmarks**:

- `-m64`  
- `-mno-adx`  
- `-mno-sse4a`  
- `-Wl,-mllvm -Wl,-inline-recursion=4`  
- `-Wl,-mllvm -Wl,-isr-in-nested-loop`  
- `-Wl,-mllvm -Wl,-enable-iv-split`  
- `-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`  
- `-mllvm -unroll-aggressive`  
- `-mllvm -unroll-threshold=150`  
- `-DSPEC_OPENMP`  
- `-fopenmp`  
- `-fopenmp=libomp`  
- `-lomp`  
- `-lamdlibm`  
- `-ljemalloc`  
- `-lflang`

### 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:


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