## Dell Inc.

**PowerEdge C6525 (AMD EPYC 7763 64-Core Processor)**

### SPEC CPU®2017 Integer Speed Result

<table>
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<tr>
<th>Test Date:</th>
<th>Feb-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Mar-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2021</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_int_base = 11.9

### SPECspeed®2017_int_peak = 11.9

### CPU2017 License: 55

### Test Sponsor: Dell Inc.

### Tested by: Dell Inc.

### Threads

<table>
<thead>
<tr>
<th>Thread</th>
<th>128</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>6.93</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>12.8</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>7.98</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>8.11</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>13.3</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>16.3</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>6.06</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>5.55</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>22.3</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>24.7</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_int_base = 11.9

### SPECspeed®2017_int_peak = 11.9

### Hardware

**CPU Name:** AMD EPYC 7763  
**Max MHz:** 3500  
**Nominal:** 2450  
**Enabled:** 128 cores, 2 chips  
**Orderable:** 1.2 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:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)  
**Storage:** 252 GB on tmpfs  
**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 2.1.4 released Feb-2021  
**File System:** tmpfs  
**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 C6525 (AMD EPYC 7763 64-Core Processor)

**SPEC®2017 Int Base = 11.9**

**SPEC®2017 Int Peak = 11.9**

### Results Table

<table>
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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>128</td>
<td>254</td>
<td>6.99</td>
<td>256</td>
<td>6.93</td>
<td>1</td>
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<tr>
<td>605.mcf_s</td>
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<td>625.x264_s</td>
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<td>16.5</td>
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<td>6.09</td>
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<td>648.exchange2_s</td>
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<td>1</td>
<td>131</td>
<td>22.4</td>
<td>131</td>
<td>22.4</td>
<td></td>
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<tr>
<td>657.xz_s</td>
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<td>24.7</td>
<td>250</td>
<td>24.8</td>
<td>1</td>
<td>250</td>
<td>24.7</td>
<td>250</td>
<td>24.8</td>
<td></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
'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)

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable
Transparent Hugepages (THP) for this run.
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for peak
runs of 628.pop2_s and 638.imagick_s to enable THP only on request.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-127"
LD_LIBRARY_PATH =
    "/dev/shm/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/dev/shm/cpu201
7-1.1.5/amd_speed_aocc300_milan_B_lib/32;"
MALLOCC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "128"

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 Notes (Continued)

Environment variables set by runcpu during the 657.xz_s peak run:
GOMP_CPU_AFFINITY = "0-127"

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:
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 /dev/shm/cpu2017-1.1.5/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on rhel-8-3-amd Sat Feb 27 06:57:32 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 7763 64-Core Processor
    2 "physical id"s (chips)
    128 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following

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

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

- **cpu cores**: 64
- **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 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`:

- **Architecture**: x86_64
- **CPU op-mode(s)**: 32-bit, 64-bit
- **Byte Order**: Little Endian
- **CPU(s)**: 128
- **On-line CPU(s) list**: 0-127
- **Thread(s) per core**: 1
- **Core(s) per socket**: 64
- **Socket(s)**: 2
- **NUMA node(s)**: 16
- **Vendor ID**: AuthenticAMD
- **CPU family**: 25
- **Model**: 1
- **Model name**: AMD EPYC 7763 64-Core Processor
- **Stepping**: 1
- **CPU MHz**: 1796.110
- **BogoMIPS**: 4890.91
- **Virtualization**: AMD-V
- **L1d cache**: 32K
- **L1i cache**: 32K
- **L2 cache**: 512K
- **L3 cache**: 32768K
- **NUMA node0 CPU(s)**: 0-7
- **NUMA node1 CPU(s)**: 8-15
- **NUMA node2 CPU(s)**: 16-23
- **NUMA node3 CPU(s)**: 24-31
- **NUMA node4 CPU(s)**: 32-39
- **NUMA node5 CPU(s)**: 40-47
- **NUMA node6 CPU(s)**: 48-55
- **NUMA node7 CPU(s)**: 56-63
- **NUMA node8 CPU(s)**: 64-71
- **NUMA node9 CPU(s)**: 72-79
- **NUMA node10 CPU(s)**: 80-87
- **NUMA node11 CPU(s)**: 88-95
- **NUMA node12 CPU(s)**: 96-103
- **NUMA node13 CPU(s)**: 104-111
- **NUMA node14 CPU(s)**: 112-119

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**PowerEdge C6525 (AMD EPYC 7763 64-Core Processor)**

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<tr>
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<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>11.9</td>
</tr>
</tbody>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

**Test Date:** Feb-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

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**Platform Notes (Continued)**

NUMA node15 CPU(s):  120-127  
Flags:  

```
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
rdtsc lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bptext perfctr_llc mwaitx cpb
cat_l3 cdп_l3 invpcid_single hw_pstate sme ssbd mba siv ibrs ibpb stibp vmmcall
fsgsbase bmi1 avx2 smep bmi2 invpcid cmp rdtd_a rdseed adx smap clflushopt clwb
sha ni xsaveopt xsave xgetbv1 xsaves cqm llc cqm奥林匹克 cqm_mbm_total
cqm_mbm_local clzero irperf xsaveerptr wbnoinvd amd_ppin arat lbrv svm_lock

/nproc/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 1 2 3 4 5 6 7
  node 0 size:  31818 MB
  node 0 free:  31696 MB
  node 1 cpus:  8 9 10 11 12 13 14 15
  node 1 size:  32247 MB
  node 1 free:  32177 MB
  node 2 cpus:  16 17 18 19 20 21 22 23
  node 2 size:  32253 MB
  node 2 free:  32169 MB
  node 3 cpus:  24 25 26 27 28 29 30 31
  node 3 size:  32249 MB
  node 3 free:  32199 MB
  node 4 cpus:  32 33 34 35 36 37 38 39
  node 4 size:  32247 MB
  node 4 free:  32641 MB
  node 5 cpus:  40 41 42 43 44 45 46 47
  node 5 size:  32253 MB
  node 5 free:  32127 MB
  node 6 cpus:  48 49 50 51 52 53 54 55
  node 6 size:  32249 MB
  node 6 free:  32175 MB
  node 7 cpus:  56 57 58 59 60 61 62 63
  node 7 size:  32194 MB
  node 7 free:  32130 MB
  node 8 cpus:  64 65 66 67 68 69 70 71
  node 8 size:  32253 MB
  node 8 free:  32200 MB

(Continued on next page)
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Software Availability: Mar-2021

Platform Notes (Continued)

node 9 cpus: 72 73 74 75 76 77 78 79
node 9 size: 32251 MB
node 9 free: 32208 MB
node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 32253 MB
node 10 free: 32206 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 32249 MB
node 11 free: 32209 MB
node 12 cpus: 96 97 98 99 100 101 102 103
node 12 size: 32249 MB
node 12 free: 32206 MB
node 13 cpus: 104 105 106 107 108 109 110 111
node 13 size: 32251 MB
node 13 free: 32209 MB
node 14 cpus: 112 113 114 115 116 117 118 119
node 14 size: 32249 MB
node 14 free: 32208 MB
node 15 cpus: 120 121 122 123 124 125 126 127
node 15 size: 32245 MB
node 15 free: 32199 MB
node distances:

node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
0:  10  11  11  11  11  11  11  11  32  32  32  32  32  32  32  32
2:  11  10  10  10  10  10  10  10  32  32  32  32  32  32  32  32
3:  11  10  10  10  10  10  10  10  32  32  32  32  32  32  32  32
4:  11  10  10  10  10  10  10  10  32  32  32  32  32  32  32  32
5:  11  10  10  10  10  10  10  10  32  32  32  32  32  32  32  32
6:  11  10  10  10  10  10  10  10  32  32  32  32  32  32  32  32
7:  11  10  10  10  10  10  10  10  32  32  32  32  32  32  32  32

From /proc/meminfo
MemTotal: 527941168 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/sbin/tuned-adm active
  Current active profile: throughput-performance

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

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SPECspeed®2017_int_base = 11.9
SPECspeed®2017_int_peak = 11.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Platform Notes (Continued)

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):
   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/swapsgs barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2):
   Mitigation: Full AMD retropine, IBPB: conditional, IBSR_FW, STIBP: disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):
   Not affected
CVE-2019-11135 (TSX Asynchronous Abort):
   Not affected

run-level 3 Feb 27 06:47

SPEC is set to: /dev/shm/cpu2017-1.1.5

Filesystem     Type   Size  Used Avail Use% Mounted on
    tmpfs     tmpfs   252G  5.7G  247G   3% /dev/shm

From /sys/devices/virtual/dmi/id
   Vendor: Dell Inc.
   Product: PowerEdge C6525
   Product Family: PowerEdge

(Continued on next page)
Dell Inc. PowerEdge C6525 (AMD EPYC 7763 64-Core Processor)  

| SPECspeed®2017_int_base = 11.9 | SPECspeed®2017_int_peak = 11.9 |

CPU2017 License: 55                                    Test Date:        Feb-2021
Test Sponsor: Dell Inc.                               Hardware Availability: Mar-2021
Tested by: Dell Inc.                                  Software Availability: Mar-2021

Platform Notes (Continued)

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 80AD863280AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
8x 80AD863280AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 2.1.4
BIOS Date: 02/17/2021
BIOS Revision: 2.1

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C     | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
     | 625.x264_s(base, peak) 657.xz_s(base, peak)
==============================================================================
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++   | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
     | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
==============================================================================
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 | 648.exchange2_s(base, peak)
==============================================================================
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

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PowerEdge C6525 (AMD EPYC 7763 64-Core Processor)  

**SPEC CPU®2017 Integer Speed Result**

**SPECspeed®2017_int_base = 11.9**  
**SPECspeed®2017_int_peak = 11.9**

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**Compiler Version Notes (Continued)**

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,-mlllvm -Wl,-enable-lcvm-vrp -Wl,-mlllvm -Wl,-region-vectorize
- -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
- -fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- -mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
- -fremap-arrays -mlllvm -function-specialize -flv-function-specialization
- -mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true

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**Base Optimization Flags (Continued)**

C benchmarks (continued):
- `-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs`
- `-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti`

C++ benchmarks:
- `-m64 -std=c++98 -mno-adx -mno-sse4a`
- `-Wl, -mllvm -Wl, -do-block-reorder=aggressive`
- `-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 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -flto -mllvm -enable-partial-unswitch`
- `-mllvm -unroll-threshold=100 -finline-aggressive`
- `-fllv-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 -DSPEC_OPENMP`
- `-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti`

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, -region-vectorize -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 -z muldefs`
- `-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP`
- `-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti`

**Base 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`
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**Dell Inc.**

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**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`
  - `-fvecclib=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`
  - `-fvecclib=AMDLIBM -ffast-math -flto -finline-aggressive`
  - `-mllvm -unroll-threshold=1000 -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 -DSPEC_OPENMP`
  - `-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang`

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## Peak Optimization Flags (Continued)

### Fortran benchmarks:
- *-m64 -mno-adx -mno-sse4a -Wl,-mlllvm -Wl,-inline-recursion=4*
- *-Wl,-mlllvm -Wl,-lsr-in-nested-loop -Wl,-mlllvm -Wl,-enable-iv-split*
- *-Wl,-mlllvm -Wl,-function-specialize*
- *-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6*

## 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*

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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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