Dell Inc.

PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

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

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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

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</table>

**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: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-R)
Storage: 225 GB on tmpfs
Other: None

**Software**

OS: Red Hat Enterprise Linux 8.3 (Ootpa)
4.18.0-240.10.1.el8_3.x86_64
Compiler: C/C++/Fortran: Version 3.0.0 ofAOCC
Parallel: Yes
Firmware: Version 2.0.3 released Jan-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 R7525 (AMD EPYC 7763 64-Core Processor)  

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

**Results Table**

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**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 -1 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)
Dell Inc.

PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

SPEC CPU®2017 Integer Speed Result

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Dell Inc.

PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

SPECspeed®2017_int_base = 11.9

SPECspeed®2017_int_peak = 11.9

CPU2017 License: 55
Test Sponsor: Dell Inc.
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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 = "0-127"
LD_LIBRARY_PATH =
"/mnt/ramdisk/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/mnt/ramdisk/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 = "128"

Environment variables set by runcpu during the 602.gcc_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 625.x264_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:
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.
Benchmark run from a 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"
Dell Inc. PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

**SPECspeed®2017_int_base = 11.9**

**SPECspeed®2017_int_peak = 11.9**

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**General Notes (Continued)**

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 /mnt/ramdisk/cpu2017-1.1.5/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Tue Mar 9 09:51:40 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 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

(Continued on next page)
Dell Inc. PowerEdge R7525 (AMD EPYC 7763 64-Core Processor) SPECspeed®2017_int_base = 11.9
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Platform Notes (Continued)

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: 2785.771
BogoMIPS: 4890.79
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
NUMA node15 CPU(s): 120-127

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 rdtsscp 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
rdram 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 sme ssbd mba sev ibrs ibpb stibp vmmcall
fsgsbase bm1 avx2 smep bmi2 invpcid cmq rdrt_a rdseed adx smap clflushopt clwb
sha_ni xsaveopt xsavec xgetbv1 xsaves cmq_llc cmq_occupp_llc cmq_mbbm_total
cmq_mbbm_local clzero irperf xsaveerptr wbnoinvd amd_ppin arat npt lbrv svm_lock
nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfn_threshold
v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca

/proc/cpuinfo cache data

(Continued on next page)
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Platform Notes (Continued)

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: 128583 MB
node 0 free: 128494 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 129021 MB
node 1 free: 128925 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 129021 MB
node 2 free: 128963 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 129021 MB
node 3 free: 128970 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 129021 MB
node 4 free: 128971 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 129021 MB
node 5 free: 128972 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 129021 MB
node 6 free: 128890 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 116868 MB
node 7 free: 116782 MB
node 8 cpus: 64 65 66 67 68 69 70 71
node 8 size: 129021 MB
node 8 free: 128928 MB
node 9 cpus: 72 73 74 75 76 77 78 79
node 9 size: 129019 MB
node 9 free: 123968 MB
node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 129021 MB
node 10 free: 128742 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 129021 MB
node 11 free: 128960 MB
node 12 cpus: 96 97 98 99 100 101 102 103
node 12 size: 129021 MB
node 12 free: 128935 MB
node 13 cpus: 104 105 106 107 108 109 110 111
node 13 size: 129019 MB
node 13 free: 128969 MB

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

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Platform Notes (Continued)

node 14 cpus: 112 113 114 115 116 117 118 119
node 14 size: 129021 MB
node 14 free: 128844 MB
node 15 cpus: 120 121 122 123 124 125 126 127
node 15 size: 129017 MB
node 15 free: 128900 MB
node distances:

From /proc/meminfo
MemTotal: 2100999592 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/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

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

```
uname -a:
    Linux localhost.localdomain 4.18.0-240.10.1.el8_3.x86_64 #1 SMP Wed Dec 16 03:30:52 EST 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/swapgs barriers and __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBF: disabled, RSB filling
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected
- **CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

run-level 3 Mar 9 09:49 last=5

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5
```

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<td>4.8G</td>
<td>221G</td>
<td>3%</td>
<td>/mnt/ramdisk</td>
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</table>

From /sys/devices/virtual/dmi/id
- **Vendor:** Dell Inc.
- **Product:** PowerEdge R7525
- **Product Family:** PowerEdge
- **Serial:** 48LN333

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:**
- 16x 802C8632802C 72ASS16G72LZ-3G2B3 128 GB 4 rank 3200
- 16x Not Specified Not Specified

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

PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

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

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
** Tested by:** Dell Inc.

---

**Platform Notes (Continued)**

(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)
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++

(Continued on next page)
Dell Inc.

PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

**Base Compiler Invocation (Continued)**

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 -W1,-allow-multiple-definition
-W1,-mllvm -W1,-enable-licm-vrp -W1,-mllvm -W1,-region-vectorize
-W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -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
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -mno-adx -mno-sse4a
-W1,-mllvm -W1,-do-block-reorder=aggressive
-W1,-mllvm -W1,-region-vectorize -W1,-mllvm -W1,-function-specialize
-W1,-mllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mllvm -W1,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mllvm -mno-enable-partial-unswitch
-mllvm -unroll-threshold=100 -mllvm -inline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch

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

## Dell Inc.

PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)

<table>
<thead>
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<th>SPECspeed®2017_int_base = 11.9</th>
<th>SPECspeed®2017_int_peak = 11.9</th>
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<td>Hardware Availability: Mar-2021</td>
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<tr>
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<td>Software Availability: Mar-2021</td>
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<td>Tested by: Dell Inc.</td>
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</tbody>
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## Base Optimization Flags (Continued)

C++ benchmarks (continued):
-`-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,-lstdc++-libc++ -Wl,-Wl,-no-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`

## 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:

600.perlbench_s: basepeak = yes


605.mcf_s: basepeak = yes

625.x264_s: Same as 602.gcc_s

657.xz_s: Same as 602.gcc_s

C++ benchmarks:


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

### Dell Inc.

**PowerEdge R7525 (AMD EPYC 7763 64-Core Processor)**

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

### Peak Optimization Flags (Continued)

- 620.omnetpp_s (continued):
  - `ljemalloc` `-lflang`

- 623.xalancbmk_s:`basepeak = yes`

- 631.deepsjeng_s:`basepeak = yes`

- 641.leela_s:`basepeak = yes`

**Fortran benchmarks:**
- `-m64` `-mno-adx` `-mno-sse4a` `-Wl,-mllvm -Wl,-inline-recursion=4`
- `-Wl,-mllvm -Wl,-lsr-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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| Test Sponsor: Dell Inc. | Hardware Availability: Mar-2021 |
| Tested by: Dell Inc. | Software Availability: Mar-2021 |

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