# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.

PowerEdge R750xa (Intel Xeon Platinum 8362, 2.80 GHz)

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

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>222</td>
<td>225</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td></td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
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<td>64</td>
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<tr>
<td>638.imagick_s</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td></td>
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</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Platinum 8362
- **Max MHz:** 3600
- **Nominal:** 2800
- **Enabled:** 64 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 1.25 MB I+D on chip per core
- **L3:** 48 MB I+D on chip per chip
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  Compiler Build 20201113 for Linux;
  Fortran: Version 2021.1 of Intel Fortran Compiler
  Classic Build 20201112 for Linux;
  C/C++: Version 2021.1 of Intel C/C++ Compiler
  Classic Build 20201112 for Linux
- **Parallel:** Yes
- **Firmware:** Version 1.3.8 released Aug-2021
- **File System:** tmpfs
- **System State:** Run level 5 (graphical multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
## 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>
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<td>603.bwaves_s</td>
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<td>82.2</td>
<td>718</td>
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<td>60.1</td>
<td>277</td>
<td>60.8</td>
<td>274</td>
<td>64</td>
<td>59.6</td>
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<td>220</td>
<td>59.8</td>
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<td>649.fotonik3d_s</td>
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<td>281</td>
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<td>56.4</td>
<td>279</td>
<td>56.0</td>
<td>281</td>
</tr>
</tbody>
</table>

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0

Transparent Huge Pages enabled by default

Prior to runcpu invocation

Filesystem page cache synced and cleared with:

```
sync; echo 3> /proc/sys/vm/drop_caches
```


NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

(Continued on next page)
SPECCPU®2017 Floating Point Speed Result
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Dell Inc.
PowerEdge R750xa (Intel Xeon Platinum 8362, 2.80 GHz)

SPECspeed®2017_fp_base = 222
SPECspeed®2017_fp_peak = 225

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

Test Date: Sep-2021
Hardware Availability: Sep-2021
Software Availability: Feb-2021

General Notes (Continued)

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"

Platform Notes

BIOS Settings:
Logical Processor : Disabled
Virtualization Technology : Disabled

System Profile : Custom
CPU Power Management : Maximum Performance
C1E : Disabled
C States : Autonomous
Memory Patrol Scrub : Disabled
Energy Efficiency Policy : Performance
CPU Interconnect Bus Link
Power Management : Disabled
PCI ASPM L1 Link
Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Wed Sep 22 13:26:05 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 : Intel(R) Xeon(R) Platinum 8362 CPU @ 2.80GHz
 2 "physical id"s (chips)
 64 "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 : 32
siblings : 32
physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

(Continued on next page)
From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8362 CPU @ 2.80GHz
Stepping: 6
CPU MHz: 800.979
BogoMIPS: 5600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58
,60,62
NUMA node1 CPU(s):
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59
,61,63
Flags:

tpm vme de pse tsc msr xsave cmov pat pse36 clflush dts clflushopt nc wdt ms nx tsc
	tm pe sse pkgid mce lm tss普查 cpl flush_mtu debug fpu mmufpu_mdisbgcolor
	record ts syscall
	arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a

physical chip.

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

available: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50
52 54 56 58 60 62
node 0 size: 243683 MB
node 0 free: 228784 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
53 55 57 59 61 63
node 1 size: 245362 MB
node 1 free: 250885 MB
node distances:
node 0 1
0: 10 20
1: 20 10

From /proc/meminfo
  MemTotal: 527808480 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

uname -a:
  Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 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

(Continued on next page)
Dell Inc.
PowerEdge R750xa (Intel Xeon Platinum 8362, 2.80 GHz)

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SPECspeed®2017_fp_peak = 225

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

Test Date: Sep-2021
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Software Availability: Feb-2021

Platform Notes (Continued)

CVE-2017-5753 (Spectre variant 1):
Bypass disabled via prctl and seccomp
Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):
Not affected
CVE-2019-11135 (TSX Asynchronous Abort):
Not affected

run-level 5 Sep 22 09:36
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  225G   19G  207G   9% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor:         Dell Inc.
Product:        PowerEdge R750xa
Product Family: PowerEdge
Serial:         1234567

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 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200
16x Not Specified Not Specified

BIOS:
BIOS Vendor:    Dell Inc.
BIOS Version:   1.3.8
BIOS Date:      08/31/2021
BIOS Revision:  1.3

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
   644.nab_s(base)
==============================================================================

Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000

(Continued on next page)
Dell Inc.  
PowerEdge R750xa (Intel Xeon Platinum 8362, 2.80 GHz)

| SPECspeed®2017_fp_base = 222 |
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Tested by: Dell Inc.  
Software Availability: Feb-2021

Compiler Version Notes (Continued)

Copyright (c) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
| C               | 644.nab_s(peak) |
------------------------------------------------------------------------------
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, |
| Version 2021.1 Build 20201113 |
| Copyright (c) 1985-2020 Intel Corporation. All rights reserved. |
------------------------------------------------------------------------------

-----------------------------------------------------------------------------
| C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base) |
-----------------------------------------------------------------------------
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000 |
| Copyright (c) 1985-2020 Intel Corporation. All rights reserved. |

-----------------------------------------------------------------------------
| C               | 644.nab_s(peak) |
-----------------------------------------------------------------------------
| Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, |
| Version 2021.1 Build 20201113 |
| Copyright (c) 1985-2020 Intel Corporation. All rights reserved. |

-----------------------------------------------------------------------------
| C++, C, Fortran | 607.cactuBSSN_s(base, peak) |
-----------------------------------------------------------------------------
| Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on |
| Intel(R) 64, Version 2021.1 Build 20201112_000000 |
| Copyright (c) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000 |
| Copyright (c) 1985-2020 Intel Corporation. All rights reserved. |
| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on |
| Intel(R) 64, Version 2021.1 Build 20201112_000000 |
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-----------------------------------------------------------------------------
| Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak) |
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| Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on |

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Compiler Version Notes (Continued)

Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

-------------------------------------------------------------------------------
Fortran, C          | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                    | 628.pop2_s(base, peak)
-------------------------------------------------------------------------------

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
ic

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
          -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
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Base Optimization Flags

C benchmarks:
- m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
  -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP
  -mbranches-within-32B-boundaries

Fortran benchmarks:
- m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
  -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-mem-layout-trans=4 -gopenmp -nostandard-realloc-lhs
  -mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
    -ljemalloc

Benchmarks using both Fortran and C:
- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
  -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp
  -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
- m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
  -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp
  -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
  icc

  644.nab_s: icx

Fortran benchmarks:
  ifort

Benchmarks using both Fortran and C:
  ifort icc

Benchmarks using Fortran, C, and C++:
  icpc icc ifort
**SPEC CPU®2017 Floating Point Speed Result**

**Dell Inc.**

PowerEdge R750xa (Intel Xeon Platinum 8362, 2.80 GHz)

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
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**Test Date:** Sep-2021  
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**Software Availability:** Feb-2021

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

- `619.lbm_s`: basepeak = yes
- `638.imagick_s`: basepeak = yes
- `644.nab_s`: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
  -flto -mfpmath=sse -funroll-loops -fiopenmp  
  -DSPEC_OPENMP -qopt-mem-layout-trans=4  
  -fimf-accuracy-bits=14:sqrt  
  -mbranches-within-32B-boundaries  
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**Fortran benchmarks:**

- `603.bwaves_s`: basepeak = yes
- `649.fotonik3d_s`: basepeak = yes
- `654.roms_s`: basepeak = yes

**Benchmarks using both Fortran and C:**

- `621.wrf_s`: basepeak = yes
- `627.cam4_s`: basepeak = yes
- `628.pop2_s`: basepeak = yes

**Benchmarks using Fortran, C, and C++:**

- `607.cactuBSSN_s`: basepeak = yes

The flags files that were used to format this result can be browsed at

Dell Inc.
PowerEdge R750xa (Intel Xeon Platinum 8362, 2.80 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
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Dell Inc.

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

Test Date: Sep-2021
Hardware Availability: Sep-2021
Software Availability: Feb-2021

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.xml

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

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