## Dell Inc. PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>Dell Inc.</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>133</td>
<td>Dell Inc.</td>
<td>135</td>
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</table>

### CPU2017 License: 55

### Test Date: Apr-2021

### Hardware Availability: Apr-2021

### Software Availability: Feb-2021

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>36</td>
<td>188</td>
<td>356</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>36</td>
<td>73.4</td>
<td>165</td>
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<tr>
<td>619.lbm_s</td>
<td>36</td>
<td>155</td>
<td>356</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>36</td>
<td>103</td>
<td>264</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>36</td>
<td>94.6</td>
<td>287</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>36</td>
<td>124</td>
<td>264</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>36</td>
<td>66.3</td>
<td>287</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>36</td>
<td>66.3</td>
<td>287</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>36</td>
<td>105</td>
<td>287</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>36</td>
<td>105</td>
<td>287</td>
</tr>
</tbody>
</table>

### 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 1.1.2 released Apr-2021

**File System:** tmpfs

**System State:** Run level 3 (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.

### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon Platinum 8351N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3500</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2400</td>
</tr>
<tr>
<td>Enabled:</td>
<td>36 cores, 1 chip</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>54 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R, running at 2933)</td>
</tr>
<tr>
<td>Storage:</td>
<td>125 GB on tmpfs</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>
SPECCPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

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

SPECspeed®2017_fp_base = 133
SPECspeed®2017_fp_peak = 135

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>73.4</td>
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<td>85.5</td>
<td>155</td>
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<td>85.6</td>
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<td>126</td>
<td>94.6</td>
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SPECspeed®2017_fp_base = 133
SPECspeed®2017_fp_peak = 135

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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/cpu2017-1.1.7-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.7-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

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.

Transparent Huge Pages enabled by default
Prior to runcpu invocation

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

**Dell Inc.**  
PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)  

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

---

**General Notes (Continued)**

Filesystem page cache synced and cleared with:
```
sync; echo 3 > /proc/sys/vm/drop_caches
```

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Benchmark run from a 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G 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

**Sysinfo program /mnt/ramdisk/cpu2017-1.1.7-ic2021.1/bin/sysinfo**  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost.localdomain Sat Apr 24 06:03:23 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 8351N CPU @ 2.40GHz
1 "physical id"s (chips)
36 "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 : 36
siblings : 36
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

From lscpu:
    Architecture:   x86_64
```

---

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

Dell Inc.
PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECspeed®2017_fp_base = 133
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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

Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 1
Core(s) per socket: 36
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8351N CPU @ 2.40GHz
Stepping: 6
CPU MHz: 3125.963
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 55296K
NUMA node0 CPU(s): 0-35
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single
intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 hle avx2
smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
cflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xgetbv1
xsave crqm lwc llc cqm_occup llc cqm_mbm_total cqm_mbm_local split_lock_detect
wbnoinvd dtherm ida arat pln pts avx512v bmi umip pkv ospe avx512_v bmi2 gfn i vaes
vclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig
flush_lid arch_capabilities

/cache data

cache size : 55296 KB

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

available: 1 nodes (0)
node 0 cpus: 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
node 0 size: 482187 MB
node 0 free: 498865 MB
node distances:
node 0

(Continued on next page)
## Dell Inc.

PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

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**Test Sponsor:** Dell Inc.  
**Test Date:** Apr-2021  
**Hardware Availability:** Apr-2021  
**Tested by:** Dell Inc.  
**Software Availability:** Feb-2021

### Platform Notes (Continued)

```
0:  10
From /proc/meminfo
  MemTotal:   527812888 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.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 Bypass disabled via prctl and seccomp  
**CVE-2018-3639 (Speculative Store Bypass):** Mitigation: usercopy.swapsgs barriers and __user pointer sanitization  
**CVE-2017-5753 (Spectre variant 1):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling  
**CVE-2017-5715 (Spectre variant 2):** Not affected  
**CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected  
**CVE-2019-11135 (TSX Asynchronous Abort):** Not affected

run-level 3 Apr 24 02:28

(Continued on next page)
### Dell Inc.

**PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)**

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</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>135</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.7-ic2021.1

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use% Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>tmpfs</td>
<td>tmpfs</td>
<td>125G</td>
<td>11G</td>
<td>115G</td>
<td>9% /mnt/ramdisk</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

<table>
<thead>
<tr>
<th>Vendor:</th>
<th>Dell Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Product:</td>
<td>PowerEdge MX750c</td>
</tr>
<tr>
<td>Product Family:</td>
<td>PowerEdge</td>
</tr>
<tr>
<td>Serial:</td>
<td>1234567</td>
</tr>
</tbody>
</table>

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 00AD063200AD HMAA8GR7A4N-XN 64 GB 2 rank 3200, configured at 2933
- 24x Not Specified Not Specified

**BIOS:**

- BIOS Vendor: Dell Inc.
- BIOS Version: 1.1.2
- BIOS Date: 04/09/2021
- BIOS Revision: 1.1

(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

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.

(Continued on next page)
Compiler Version Notes (Continued)

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

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Fortran
| 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_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.

------------------------------------------------------------------------------------------------------------------

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
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Dell Inc.
PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

SPECspeed®2017_fp_base = 133
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Compiler Version Notes (Continued)

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

Base Compiler Invocation

C benchmarks:
icc

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

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 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3

(Continued on next page)
Dell Inc.  
PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)  

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**SPECspeed®2017_fp_base = 133**

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<td>Feb-2021</td>
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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
- `-no-prec-div`  
- `-qopt-prefetch`  
- `-ffinite-math-only`  
- `-qopt-mem-layout-trans=4`  
- `-qopenmp`  
- `-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`  
- `-qopenmp`  
- `-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):
```bash
icc
644.nab_s: icx
```

Fortran benchmarks:
```bash
ifort
```

Benchmarks using both Fortran and C:
```bash
ifort icc
```

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

**Peak Portability Flags**

Same as Base Portability Flags
# SPEC CPU®2017 Floating Point Speed Result

## Dell Inc.
PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
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<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
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<td>Tested by:</td>
<td>Dell Inc.</td>
</tr>
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<td>Test Date:</td>
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<td>Software Availability:</td>
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</tbody>
</table>

## 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
- -fno-mathlib=sse -funroll-loops -fopenmp
- -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: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
- -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
- -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
- -mbranches-within-32B-boundaries
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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

### Benchmarks using both Fortran and C:

- 621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
- -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
- -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
- -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

- 627.cam4_s: basepeak = yes
- 628.pop2_s: basepeak = yes

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

- 607.cactuBSSN_s: basepeak = yes
**SPEC CPU®2017 Floating Point Speed Result**

Dell Inc.

PowerEdge MX750c (Intel Xeon Platinum 8351N, 2.40 GHz)

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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:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml


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

Tested with SPEC CPU®2017 v1.1.7 on 2021-04-24 06:03:23-0400.


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