Dell Inc.  
PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

<table>
<thead>
<tr>
<th>Specify CPU2017 Floating Point Rate Result</th>
<th>SPECrate2017_fp_base = 54.8</th>
<th>SPECrate2017_fp_peak = 56.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dell Inc.</td>
<td>Test Date: Jun-2019</td>
<td>Hardware Availability: Jun-2019</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Hardware Availability: May-2019</td>
<td></td>
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<tr>
<td>12</td>
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<td>37.2</td>
</tr>
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<td>37.1</td>
</tr>
<tr>
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<td>508.namd_r</td>
<td>28.4</td>
</tr>
<tr>
<td>12</td>
<td>510.parest_r</td>
<td>36.3</td>
</tr>
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<td>511.povray_r</td>
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<tr>
<td>12</td>
<td>521.wrf_r</td>
<td>59.2</td>
</tr>
<tr>
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<td>526.blender_r</td>
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</tr>
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</tr>
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<td>538.imagick_r</td>
<td>97.8</td>
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<tr>
<td>12</td>
<td>544.nab_r</td>
<td>57.5</td>
</tr>
<tr>
<td>12</td>
<td>549.fotonik3d_r</td>
<td>77.6</td>
</tr>
<tr>
<td>12</td>
<td>554.roms_r</td>
<td>36.9</td>
</tr>
</tbody>
</table>

Hardware:
- CPU Name: Intel Xeon Bronze 3204
- Max MHz.: 1900
- Nominal: 1900
- Enabled: 12 cores, 2 chips
- Orderable: 1.2 chips
- Cache L1: 32 KB I + 32 KB D on chip per core
- L2: 1 MB I+D on chip per core
- L3: 8.25 MB I+D on chip per chip
- Other: None
- Memory: 384 GB (24 x 16 GB 2Rx4 PC4-2933Y-R, running at 2133)
- Storage: 1 x 960 GB SATA SSD
- Other: None

Software:
- OS: Ubuntu 18.04.2 LTS
- kernel 4.15.0-45
- Compiler: C/C++: Version 19.0.4.227 of Intel C/C++
- Compiler Build 20190416 for Linux;
- Fortran: Version 19.0.4.227 of Intel Fortran
- Compiler Build 20190416 for Linux
- Parallel: No
- Firmware: Version 2.2.10 released May-2019
- File System: ext4
- System State: Run level 5 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: 64-bit
- Other: None
SPEC CPU2017 Floating Point Rate Result

Dell Inc. PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

SPECrate2017_fp_base = 54.8
SPECrate2017_fp_peak = 56.1

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Jun-2019
Tested by: Dell Inc.
Hardware Availability: Jun-2019
Software Availability: May-2019

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds Base</th>
<th>Seconds Ratio</th>
<th>Seconds Peak</th>
<th>Seconds Ratio</th>
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<tr>
<td>503.bwaves_r</td>
<td>12</td>
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<td>228</td>
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<td>507.cactuBSSN_r</td>
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<td>508.namd_r</td>
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<td>437</td>
<td>41.9</td>
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<td>527.cam4_r</td>
<td>12</td>
<td>508</td>
<td>41.3</td>
<td>509</td>
<td><strong>41.3</strong></td>
</tr>
<tr>
<td>538.imagick_r</td>
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<td><strong>97.8</strong></td>
</tr>
<tr>
<td>544.nab_r</td>
<td>12</td>
<td>352</td>
<td><strong>57.5</strong></td>
<td>351</td>
<td>57.5</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>12</td>
<td>603</td>
<td>77.6</td>
<td>603</td>
<td><strong>77.6</strong></td>
</tr>
<tr>
<td>554.roms_r</td>
<td>12</td>
<td>516</td>
<td><strong>36.9</strong></td>
<td>516</td>
<td>37.0</td>
</tr>
</tbody>
</table>

SPECrate2017_fp_base = 54.8
SPECrate2017_fp_peak = 56.1

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

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

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"
Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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
runcpu command invoked through numactl i.e.:
    numactl --interleave=all runcpu <etc>
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)

(Continued on next page)
Dell Inc.
PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

SPECrate2017_fp_base = 54.8
SPECrate2017_fp_peak = 56.1

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

General Notes (Continued)

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.

Platform Notes

BIOS settings:
Virtualization Technology disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1E disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on intel-sut Wed Jun 19 03:25:13 2019

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) Bronze 3204 CPU @ 1.90GHz
  2 "physical id"s (chips)
  12 "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 : 6
siblings : 6
physical 0: cores 0 1 2 3 4 5
physical 1: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 2
NUMA node(s): 2

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Dell Inc.

PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

SPECrate2017_fp_base = 54.8
SPECrate2017_fp_peak = 56.1

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

Test Date: Jun-2019
Hardware Availability: Jun-2019
Software Availability: May-2019

Platform Notes (Continued)

Vendor ID:    GenuineIntel
CPU family:   6
Model:        85
Model name:   Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
Stepping:     6
CPU MHz:      1699.059
BogoMIPS:     3800.00
Virtualization: VT-x
L1d cache:    32K
L1i cache:    32K
L2 cache:     1024K
L3 cache:     8448K
NUMA node0 CPU(s):  0,2,4,6,8,10
NUMA node1 CPU(s):  1,3,5,7,9,11
Flags:  fpu vme de pse tsc msr pae mce cmov
        pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpesgb rdtscp
        lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
        aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
        xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand
        lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppin
        ssbd mba ibrs ibrd ibrs_enhanced tpr_shadow vmi flexpriority ept vpid
        fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ermal rdm cqm mpx rd_t a avx512f
        avx512dq rdsed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
        xsaveopt xsavevc xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
        dtherm arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data
cache size : 8448 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10
node 0 size: 191896 MB
node 0 free: 191117 MB
node 1 cpus: 1 3 5 7 9 11
node 1 size: 193534 MB
node 1 free: 192778 MB
node distances:
node 0 1
0:  10  21
1:  21  10

From /proc/meminfo
MemTotal:         394680860 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

**Platform Notes (Continued)**

```
/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS
```

From `/etc/*release*` /etc/*version*

debian_version: buster/sid

```
os-release:
 NAME="Ubuntu"
 VERSION="18.04.2 LTS (Bionic Beaver)"
 ID=ubuntu
 ID_LIKE=debian
 PRETTY_NAME="Ubuntu 18.04.2 LTS"
 VERSION_ID="18.04"
 HOME_URL="https://www.ubuntu.com/
 SUPPORT_URL="https://help.ubuntu.com/
```

```
uname -a:
Linux intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 x86_64
x86_64 x86_64 GNU/Linux
```

**Kernel self-reported vulnerability status:**

- **CVE-2017-5754** (Meltdown): Not affected
- **CVE-2017-5753** (Spectre variant 1): Mitigation: __user pointer sanitization
- **CVE-2017-5715** (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

**run-level 5 Jun 18 21:34**

**SPEC is set to:** /home/cpu2017

```
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      ext4  439G   21G  396G   5% /
```

**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.**

**BIOS Dell Inc. 2.2.10 05/15/2019**

**Memory:**

- 24x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2133

(End of data from sysinfo program)

---

**Compiler Version Notes**

```
CC 519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base, peak)
```

(Continued on next page)
Dell Inc.  
PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

**SPEC CPU2017 Floating Point Rate Result**

| SPECrate2017_fp_base | 54.8 |
| SPECrate2017_fp_peak | 56.1 |

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

---

**Compiler Version Notes (Continued)**

---

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

```
CC  519.lbm_r(peak)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

```
CXXC 508.namd_r(base) 510.parest_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

```
CXXC 508.namd_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

```
CC  511.povray_r(base) 526.blender_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

```
CC  511.povray_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

```
CC  511.povray_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

---

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

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

FC 507.cactuBSSN_r(base, peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

FC 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

FC 554.roms_r(peak)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

CC 521.wrf_r(base) 527.cam4_r(base)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
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---

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

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PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

SPECrate2017_fp_base = 54.8
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Jun-2019
Tested by: Dell Inc.
Hardware Availability: Jun-2019
Software Availability: May-2019

Compiler Version Notes (Continued)

CC  521.wrf_r(peak) 527.cam4_r(peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

503.bwaves_r -DSPEC_LP64
507.cactuBSSN_r -DSPEC_LP64
508.namd_r -DSPEC_LP64
510.parest_r -DSPEC_LP64
511.povray_r -DSPEC_LP64
519.ibm_r -DSPEC_LP64
521.wrf_r -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r -DSPEC_LP64
544.nab_r -DSPEC_LP64

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

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SPECrate2017_fp_base = 54.8
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Jun-2019
Hardware Availability: Jun-2019
Software Availability: May-2019

Base Portability Flags (Continued)
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags
C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

Peak Compiler Invocation
C benchmarks:
icc -m64 -std=c11

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

(Continued on next page)
Dell Inc. PowerEdge R740xd (Intel Xeon Bronze 3204, 1.90GHz)

SPECrate2017_fp_base = 54.8
SPECrate2017_fp_peak = 56.1

CPU2017 License: 55  Test Date:       Jun-2019
Test Sponsor: Dell Inc.  Hardware Availability: Jun-2019
Tested by: Dell Inc.    Software Availability: May-2019

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:
icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

544.nab_r: Same as 538.imagick_r

C++ benchmarks:
508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:
503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

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

549.fotonik3d_r: Same as 503.bwaves_r

554.roms_r: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte`

Benchmarks using both Fortran and C:

```
503.bwaves_r
```

```
504.roms_r: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte`
```

Benchmarks using both C and C++:

```
511.povray_r: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`
```

```
526.blender_r: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`
```

Benchmarks using Fortran, C, and C++:

```
554.roms_r: `-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte`
```

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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