Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

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

Test Date: Jun-2021
Hardware Availability: Apr-2021
Software Availability: Dec-2020

SPECrater®2017_fp_base = 201
SPECrater®2017_fp_peak = 213

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<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
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<tbody>
<tr>
<td>OS: Red Hat Enterprise Linux 8.2 (Ootpa)</td>
<td>CPU Name: Intel Xeon Gold 6314U</td>
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<tr>
<td>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</td>
<td>Max MHz: 3400</td>
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<tr>
<td>Firmware: No</td>
<td>Nominal: 2300</td>
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<tr>
<td>File System: tmpfs</td>
<td>Enabled: 32 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>Orderable: 1 chip</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Cache L1: 32 KB I+48 KB D on chip per core</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>L2: 1.25 MB I+D on chip per core</td>
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<tr>
<td>Other: jemalloc memory allocator V5.0.1</td>
<td>L3: 48 MB I+D on chip per chip</td>
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<td>Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.</td>
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<td>Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)</td>
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<td>Storage: 125 GB on tmpfs</td>
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<td>Software Availability: Dec-2020</td>
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<td>SPEC CPU®2017 Floating Point Rate Result</td>
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<td>Test Date: Jun-2021</td>
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<td>Hardware Availability: Apr-2021</td>
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SPEC CPU®2017 Floating Point Rate Result

Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

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Results Table

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</tbody>
</table>

SPECrate®2017_fp_base = 201
SPECrate®2017_fp_peak = 213

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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
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"
MALLOCONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1

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

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
Filesystem page cache synced and cleared with:
```sh
csync; echo 3>/proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
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:**
- Sub NUMA Cluster: 2-Way Clustering
- 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 Mon Jun  7 23:26:23 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) Gold 6314U CPU @ 2.30GHz
- 1 "physical id"s (chips)

(Continued on next page)
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 201
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CPU2017 License: 55
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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 : 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

From 1scpu:
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:  2
Core(s) per socket:  32
Socket(s):           1
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Gold 6314U CPU @ 2.30GHz
Stepping:            6
CPU MHz:             2925.161
BogoMIPS:            4600.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            49152K
NUMA node0 CPU(s):   0-15,32-47
NUMA node1 CPU(s):   16-31,48-63
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 rdtsscp
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
xtrp 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 ssbd
mba ibrs ibpb ibrs_enabled tpr_shadow vnmi flexpriority ept vpid fsgsbase
scss_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq
rdseed adx smap avx512ifma clflushopt clwbintel pt avx512cd sha ni avx512bw
avx512vl xsaveopt xsaveopt xsave xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mmm_total
cqm_mbb_local wambinvd dtherm ida arat pln pts avx512vbmi umip pkum ospeke
avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq
1a57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data

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

Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

SPECrate®2017_fp_base = 201
SPECrate®2017_fp_peak = 213

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Jun-2021
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Platform Notes (Continued)

cache size : 49152 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 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 32 33 34 35 36 37 38 39 40 41 42 43
44 45 46 47
node 0 size: 257407 MB
node 0 free: 231017 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 1 size: 258038 MB
node 1 free: 245484 MB
node distances:
node   0   1
0:  10  11
1:  11  10

From /proc/meminfo
MemTotal:       527816924 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="8.2 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.2"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
CWE-2018-12207 (iTLB Multihit): Not affected

(Continued on next page)
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Platform Notes (Continued)

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/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): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jun 7 17:57

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

Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  125G   33G   93G  26% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge C6520
Product Family: PowerEdge
Serial: SDPT078

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
   8x Not Specified Not Specified

BIOS:
   BIOS Vendor: Dell Inc.
   BIOS Version: 1.1.3
   BIOS Date: 04/27/2021
   BIOS Revision: 1.1

(End of data from sysinfo program)

Compiler Version Notes

C | 519.lbm_r(base, peak) 538.imagick_r(base, peak)

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

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| 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. |

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| 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. |

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| Intel(R) C++ 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 C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

<table>
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<tr>
<th>SPECrate®2017_fp_base</th>
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</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>213</td>
</tr>
</tbody>
</table>

### Compiler Version Notes (Continued)

```plaintext
C++, C          | 511.povray_r(base) 526.blender_r(base, 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.  
```

```plaintext
C++, C, Fortran | 507.cactuBSSN_r(base, 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.  
```

```plaintext
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(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.  
```

(Continued on next page)
Dell Inc.

PowerEdge C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

**SPEC CPU2017 Floating Point Rate Result**

<table>
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<td>SPECrate®2017.fp_peak = 213</td>
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</table>

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

**Compiler Version Notes (Continued)**

Fortran, C | 521.wrf_r(base) 527.cam4_r(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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---

Fortran, C | 521.wrf_r(peak)

---

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

Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)

---

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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---

**Base Compiler Invocation**

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

(Continued on next page)
## Dell Inc. PowerEdge C6520 (Intel Xeon Gold 6314U, 2.30 GHz)

<table>
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<th>Spec CPU®2017 Floating Point Rate Result</th>
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**CPU2017 License:** 55  
**Test Date:** Jun-2021  
**Test Sponsor:** Dell Inc.  
**Hardware Availability:** Apr-2021  
**Tested by:** Dell Inc.  
**Software Availability:** Dec-2020

### Base Compiler Invocation (Continued)

Benchmarks using both C and C++:
- icpx icx

Benchmarks using Fortran, C, and C++:
- icpx icx ifort

### Base Portability Flags

- 503.bwaves_r: -DSPEC_LP64
- 507.cactusbssn_r: -DSPEC_LP64
- 508.namd_r: -DSPEC_LP64
- 510.parest_r: -DSPEC_LP64
- 511.povray_r: -DSPEC_LP64
- 519.lbm_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
- 549.fotonik3d_r: -DSPEC_LP64
- 554.roms_r: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**
- `-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math`
- `-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

**C++ benchmarks:**
- `-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto`
- `-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-mbranches-within-32B-boundaries -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

**Fortran benchmarks:**
- `-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`
- `-qopt-prefetch -ffinite-math-only`
- `-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto`
- `-mbranches-within-32B-boundaries -ljemalloc`

(Continued on next page)
Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-\texttt{-L/usr/local/jemalloc64-5.0.1/lib}

Benchmarks using both Fortran and C:
-\texttt{-w -m64 -std=c11 -Wl,-z,muldefs \-xCORE-AVX512 \-Ofast \-ffast-math}
\texttt{-flto \-mfpmath=sse \-funroll-loops \-qopt-mem-layout-trans=4 \-O3 \-ipo}
\texttt{-no-prec-div \-qopt-prefetch \-ffinite-math-only}
\texttt{-qopt-multiple-gather-scatter-by-shuffles}
\texttt{-mbranches-within-32B-boundaries \-nostandard-realloc-lhs}
\texttt{-align array32byte \-auto \-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib}

Benchmarks using both C and C++:
-\texttt{-w -m64 -std=c11 -Wl,-z,muldefs \-xCORE-AVX512 \-Ofast \-ffast-math}
\texttt{-flto \-mfpmath=sse \-funroll-loops \-qopt-mem-layout-trans=4}
\texttt{-mbranches-within-32B-boundaries \-ljemalloc}
\texttt{-L/usr/local/jemalloc64-5.0.1/lib}

Benchmarks using Fortran, C, and C++:
-\texttt{-w -m64 -std=c11 -Wl,-z,muldefs \-xCORE-AVX512 \-Ofast \-ffast-math}
\texttt{-flto \-mfpmath=sse \-funroll-loops \-qopt-mem-layout-trans=4 \-O3}
\texttt{-no-prec-div \-qopt-prefetch \-ffinite-math-only}
\texttt{-qopt-multiple-gather-scatter-by-shuffles}
\texttt{-mbranches-within-32B-boundaries \-nostandard-realloc-lhs}
\texttt{-align array32byte \-auto \-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib}

Peak Compiler Invocation

C benchmarks:
\texttt{icx}

C++ benchmarks:
\texttt{icpx}

Fortran benchmarks:
\texttt{ifort}

Benchmarks using both Fortran and C:
\texttt{521.wrf_r:ifort icc}
\texttt{527.cam4_r:ifort icx}

Benchmarks using both C and C++:

(Continued on next page)
Peak Compiler Invocation (Continued)

511.povray_r: icpc icc
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto -Ofast -qopt-mem-layout-trans=4

C++ benchmarks:
508.namd_r: basepeak = yes

Fortran benchmarks:

(Continued on next page)
## Dell Inc.  
**PowerEdge C6520** (Intel Xeon Gold 6314U, 2.30 GHz)

**SPECrate®2017_fp_base** = 201  
**SPECrate®2017_fp_peak** = 213

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### Peak Optimization Flags (Continued)

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

- `521.wrf_r`: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3`  
- `ipo -no-prec-div -qopt-prefetch -ffinite-math-only`  
- `qopt-multiple-gather-scatter-by-shuffles`  
- `qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries`  
- `nostandard-realloc-lhs -align array32byte -auto`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

- `511.povray_r`: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3`  
- `ipo -no-prec-div -qopt-prefetch -ffinite-math-only`  
- `qopt-multiple-gather-scatter-by-shuffles`  
- `qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries`  
- `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

- `507.cactuBSSN_r`: basepeak = yes

---

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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