SPEC CPU®2017 Floating Point Rate Result

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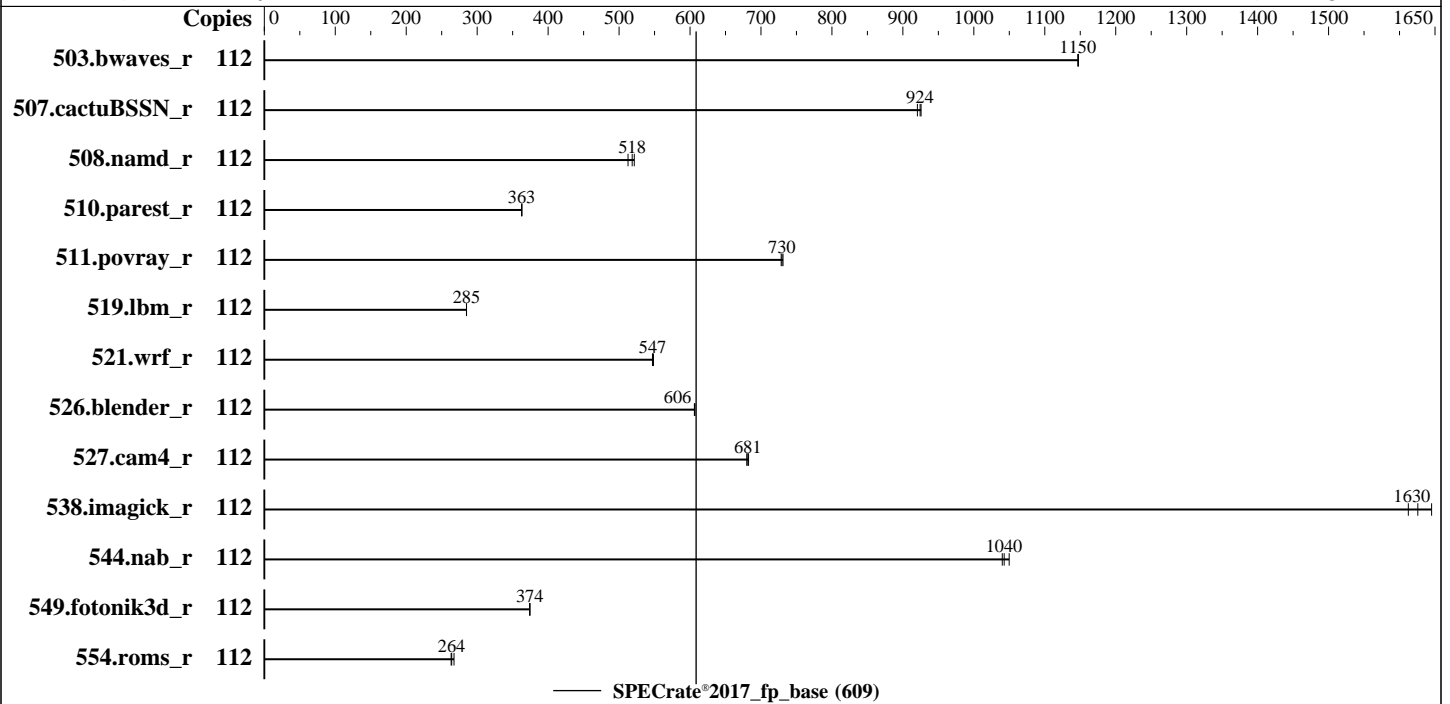## Fujitsu

PRIMERGY RX4770 M6, Intel Xeon Platinum 8376HL, 2.60GHz

$SPECrate®2017\_fp\_base =$ **609**

$SPECrate®2017\_fp\_peak =$ Not Run

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Test Date: Dec-2020
Hardware Availability: Nov-2020
Software Availability: Aug-2020

Benchmark	Copies	Result
503.bwaves_r	112	1150
507.cactuBSSN_r	112	924
508.namd_r	112	518
510.parest_r	112	363
511.povray_r	112	730
519.lbm_r	112	285
521.wrf_r	112	547
526.blender_r	112	606
527.cam4_r	112	681
538.imagick_r	112	1630
544.nab_r	112	1040
549.fotonik3d_r	112	374
554.roms_r	112	264

SPECrate®2017_fp_base (609)

Hardware

CPU Name: Intel Xeon Platinum 8376HL
 Max MHz: 4300
 Nominal: 2600
Enabled: 112 cores, 4 chips
Orderable: 2,4 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 38.5 MB I+D on chip per chip
 Other: None
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-3200AA-R)
Storage: 1 x SATA M.2 SSD, 480GB
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP2
5.3.18-22-default
Compiler: C/C++: Version 19.1.2.275 of Intel
C/C++ Compiler for Linux;
Fortran: Version 19.1.2.275 of
Intel Fortran Compiler for Linux
Parallel: No
Firmware: Fujitsu BIOS Version V1.0.0.0 R1.8.0 for D3892-A1x. Released Jan-2021 tested as V1.0.0.0 R1.1.1 for D3892-A1x Sep-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage

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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	112	979	1150	979	1150	**979**	**1150**							
507.cactuBSSN_r	112	**153**	**924**	154	920	153	926							
508.namd_r	112	**205**	**518**	208	513	204	521							
510.parest_r	112	807	363	808	363	**808**	**363**							
511.povray_r	112	358	731	359	728	**358**	**730**							
519.lbm_r	112	414	285	414	285	**414**	**285**							
521.wrf_r	112	**458**	**547**	457	548	459	547							
526.blender_r	112	281	607	281	606	**281**	**606**							
527.cam4_r	112	287	683	**287**	**681**	288	680							
538.imagick_r	112	**171**	**1630**	173	1610	169	1650							
544.nab_r	112	**181**	**1040**	180	1050	181	1040							
549.fotonik3d_r	112	1166	374	1167	374	**1166**	**374**							
554.roms_r	112	**674**	**264**	676	263	666	267							

SPECrate®2017_fp_base =	**609**	
SPECrate®2017_fp_peak =	**Not Run**	

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

Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler.
The correct version of C/C++ compiler is: Version 19.1.2.275 Build 20200623 Compiler for Linux
The correct version of Fortran compiler is: Version 19.1.2.275 Build 20200623 Compiler for Linux

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"
Kernel Boot Parameter set with : nohz_full=1-111
Irqbalance disabled with "systemctl stop irqbalance"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
    "/home/Benchmark/speccpu-ic19_1u2/lib/intel64:/home/Benchmark/speccpu-ic
    19_1u2/je5.0.1-64"

(Continued on next page)

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Environment Variables Notes (Continued)

```
MALLOC_CONF = "retain:true"
```

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
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)
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
BIOS configuration:
Hyper Threading = Disabled
Utilization Profile = Unbalanced
Stale AtoS = Enabled
LLC Deadline Alloc = Disabled
SNC = Enabled
FAN Control = Full

Sysinfo program /home/Benchmark/speccpu-ic19_1u2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on localhost Sat Dec 26 21:12:48 2020

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 8376HL CPU @ 2.60GHz
       4  "physical id"s (chips)
       112 "processors"
   cores, siblings (Caution: counting these is hw and system dependent. The following
```

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CPU2017 License: 19		**Test Date:**	Dec-2020
Test Sponsor:	Fujitsu	**Hardware Availability:**	Nov-2020
Tested by:	Fujitsu	**Software Availability:**	Aug-2020

Platform Notes (Continued)

```
     excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)
       cpu cores : 28
       siblings  : 28
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30

   From lscpu:
       Architecture:        x86_64
       CPU op-mode(s):      32-bit, 64-bit
       Byte Order:          Little Endian
       Address sizes:       46 bits physical, 48 bits virtual
       CPU(s):              112
       On-line CPU(s) list: 0-111
       Thread(s) per core:  1
       Core(s) per socket:  28
       Socket(s):           4
       NUMA node(s):        8
       Vendor ID:           GenuineIntel
       CPU family:          6
       Model:               85
       Model name:          Intel(R) Xeon(R) Platinum 8376HL CPU @ 2.60GHz
       Stepping:            11
       CPU MHz:             1000.243
       CPU max MHz:         4300.0000
       CPU min MHz:         1000.0000
       BogoMIPS:            5200.00
       Virtualization:      VT-x
       L1d cache:           32K
       L1i cache:           32K
       L2 cache:            1024K
       L3 cache:            39424K
       NUMA node0 CPU(s):   0-3,7-9,14-17,21-23
       NUMA node1 CPU(s):   4-6,10-13,18-20,24-27
       NUMA node2 CPU(s):   28-31,35-37,42-45,49-51
       NUMA node3 CPU(s):   32-34,38-41,46-48,52-55
       NUMA node4 CPU(s):   56-59,63-65,70-73,77-79
       NUMA node5 CPU(s):   60-62,66-69,74-76,80-83
       NUMA node6 CPU(s):   84-87,91-93,98-101,105-107
       NUMA node7 CPU(s):   88-90,94-97,102-104,108-111
       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
```

(Continued on next page)

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Software Availability: Aug-2020

Platform Notes (Continued)

```
     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 tsc_deadline_timer aes xsave
     avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
     invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
     flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms
     invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt
     avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
     cqm_mbm_total cqm_mbm_local avx512_bf16 dtherm ida arat pln pts hwp hwp_act_window
     hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

  /proc/cpuinfo cache data
     cache size : 39424 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 8 nodes (0-7)
    node 0 cpus: 0 1 2 3 7 8 9 14 15 16 17 21 22 23
    node 0 size: 192129 MB
    node 0 free: 191926 MB
    node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27
    node 1 size: 193532 MB
    node 1 free: 193316 MB
    node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51
    node 2 size: 193532 MB
    node 2 free: 193319 MB
    node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55
    node 3 size: 193532 MB
    node 3 free: 193355 MB
    node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79
    node 4 size: 193532 MB
    node 4 free: 193363 MB
    node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83
    node 5 size: 193532 MB
    node 5 free: 193388 MB
    node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107
    node 6 size: 193498 MB
    node 6 free: 193303 MB
    node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111
    node 7 size: 193306 MB
    node 7 free: 193057 MB
    node distances:
    node   0   1   2   3   4   5   6   7
      0:  10  11  20  20  20  20  20  20
      1:  11  10  20  20  20  20  20  20
      2:  20  20  10  11  20  20  20  20
      3:  20  20  11  10  20  20  20  20
```

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Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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SPECrate®2017_fp_base = 609

PRIMERGY RX4770 M6, Intel Xeon Platinum 8376HL, 2.60GHz

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Platform Notes (Continued)

```
    4:  20  20  20  20  10  11  20  20
    5:  20  20  20  20  11  10  20  20
    6:  20  20  20  20  20  20  10  11
    7:  20  20  20  20  20  20  11  10

 From /proc/meminfo
    MemTotal:       1583714908 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="SLES"
       VERSION="15-SP2"
       VERSION_ID="15.2"
       PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
       ID="sles"
       ID_LIKE="suse"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:15:sp2"

 uname -a:
    Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64
    x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 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: Enhanced IBRS, IBPB: conditional,
                                        RSB filling
 srbds:                                 Not affected
 tsx_async_abort:                       Not affected

 run-level 3 Dec 26 21:11

 SPEC is set to: /home/Benchmark/speccpu-ic19_1u2
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sdb3      xfs   376G   94G  282G  25% /home

 From /sys/devices/virtual/dmi/id
```

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Platform Notes (Continued)

```
     BIOS:    FUJITSU V1.0.0.0 R1.1.1 for D3892-A1x          09/25/2020
     Vendor:  FUJITSU
     Product: PRIMERGY RX4770 M6
     Product Family: SERVER
     Serial:  MABTxxxxxx

 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:
     48x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200


 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C                 | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
Intel(R) C Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++               | 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C            | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
```

(Continued on next page)

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Compiler Version Notes (Continued)

```
--------------------------------------------------------------------------
Intel(R) C++ Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==========================================================================
Fortran        | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
--------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
--------------------------------------------------------------------------


==========================================================================
Fortran, C     | 521.wrf_r(base) 527.cam4_r(base)
--------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
```
icc
```

C++ benchmarks:
```
icpc
```

Fortran benchmarks:
```
ifort
```

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

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Base Compiler Invocation (Continued)

Benchmarks using both C and C++:
`icpc icc`

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

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.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:
`-m64 -qnextgen -std=c11`
`-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs`
`-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

C++ benchmarks:
`-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries`
`-Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse`
`-funroll-loops -qopt-mem-layout-trans=4`
`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Fortran benchmarks:
`-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -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`

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
```
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using both Fortran and C:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc
```

Benchmarks using both C and C++:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -O3 -ipo -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-multiple-gather-scatter-by-shuffles
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc
```

The flags files that were used to format this result can be browsed at
  http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-CPL-RevA.html
  http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html

You can also download the XML flags sources by saving the following links:
  http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-CPL-RevA.xml
  http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml

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

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