SPEC CPU®2017 Floating Point Speed Result

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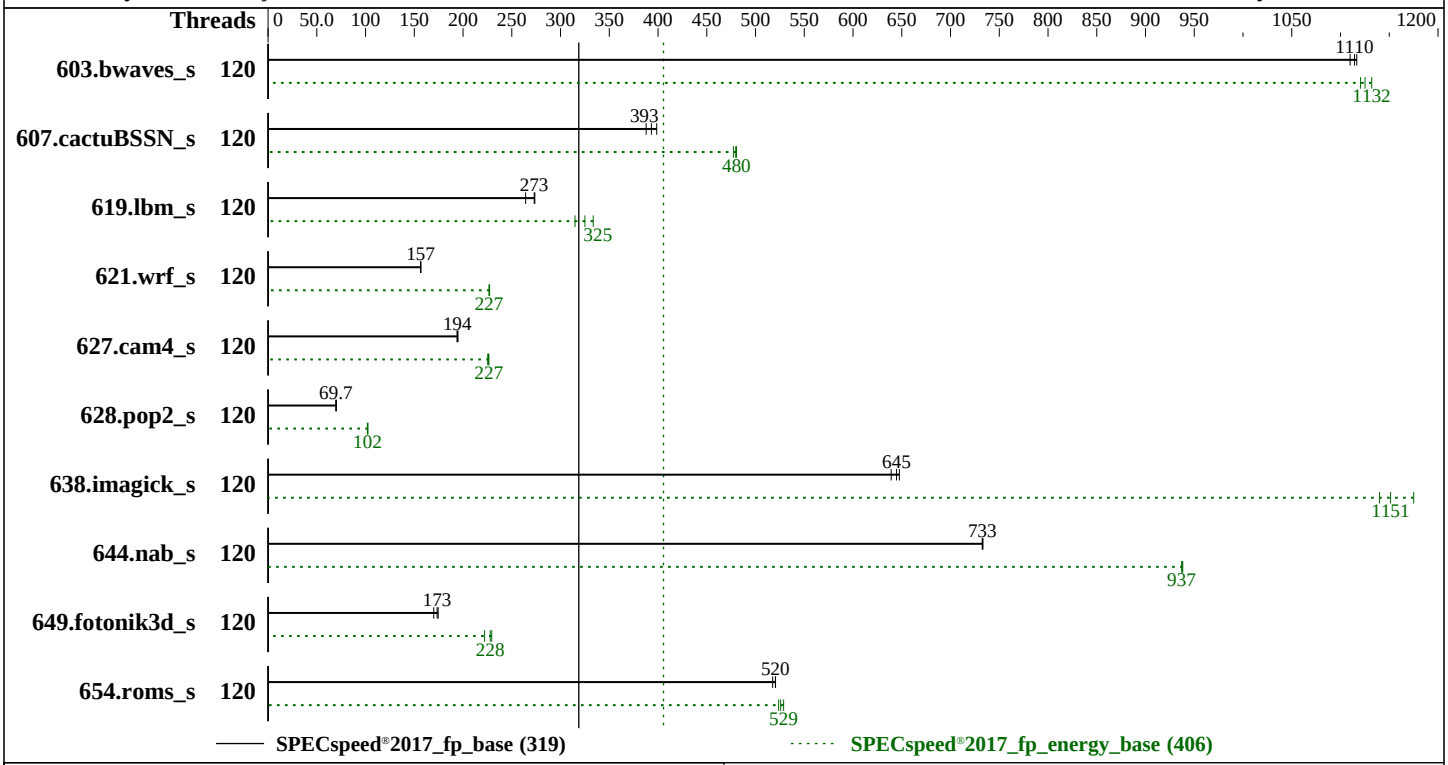
Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Platinum 8490H, 1.90GHz

SPECspeed®2017_fp_base =	319
SPECspeed®2017_fp_energy_base =	406
SPECspeed®2017_fp_peak =	Not Run
SPECspeed®2017_fp_energy_peak =	Not Run

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

Test Date: Jan-2023
Hardware Availability: Mar-2023
Software Availability: Jun-2022



Hardware

CPU Name:	Intel Xeon Platinum 8490H
Max MHz:	3500
Nominal:	1900
Enabled:	120 cores, 2 chips
Orderable:	1,2 chips
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	112.5 MB I+D on chip per chip
Other:	None
Memory:	1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	1 x SATA SSD, 1.92TB
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP4 5.14.21-150400.22-default
Compiler:	C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel:	Yes
Firmware:	Fujitsu BIOS Version V1.0.0.0 R1.10.0 for D3983-A1x. Released Mar-2023 tested as V1.0.0.0 R0.22.1 for D3983-A1x Jan-2023
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

Power

Max. Power (W):	1186.7
Idle Power (W):	356.72
Min. Temperature (C):	24.50

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Power (Continued)

Elevation (m): 11
Line Standard: 200 V / 50 Hz / 1 phase / 2 wires
Provisioning: Line-powered

Power Settings

Management FW: Version 2.00u for D3933-A1x of Fujitsu BMC Firmware
Memory Mode: Normal

Power-Relevant Hardware

Power Supply: 1 x 2200 W (non-redundant)
Details: Standard power supply part of base unit S26113-E646-V50-1
Backplane: 12 x 3.5inch HDD back plan
Other Storage: Embedded SATA Controller
Storage Model #s: S26361-F5776-E192
NICs Installed: 1 x Intel I210-T1 @ 1 Gb
NICs Enabled (FW/OS): 1 / 1
NICs Connected/Speed: 1 @ 1 Gb
Other HW Model #s: None

Power Analyzer

Power Analyzer: 10.118.163.191:8888
Hardware Vendor: Hioki
Model: Hioki PW3336:1-Channel
Serial Number: 170213562
Input Connection: USB via USB-Serial CH340
Metrology Institute: NICT
Calibration By: HIOKI E.E. CORPORATION
Calibration Label: H06400088
Calibration Date: 28-Jun-2022
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: Connected to PSU 1
Current Ranges Used: 10A
Voltage Range Used: 300V

Temperature Meter

Temperature Meter: 10.118.163.191:8889
Hardware Vendor: Digi International Inc.
Model: DigiWATCHPORT_H
Serial Number: W 640 45112
Input Connection: USB
PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: 5 mm in front of SUT main air intake

Base Results Table

Benchmark	Threads	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
603.bwaves_s	120	53.2	1110	57.4	1120	1080	1130	52.8	1120	57.2	1130	1080	1130	**52.9**	**1110**	**56.9**	**1130**	**1070**	**1130**
607.cactuBSSN_s	120	43.0	388	38.2	477	889	965	**42.4**	**393**	**38.0**	**480**	**895**	**969**	41.8	399	38.0	480	909	1130
619.lbm_s	120	19.8	264	18.9	315	953	1090	**19.2**	**273**	**18.3**	**325**	**954**	**1110**	19.1	274	17.8	334	932	1100
621.wrf_s	120	84.6	156	63.6	227	751	768	**84.4**	**157**	**63.7**	**227**	**755**	**769**	84.4	157	63.7	227	754	769
627.cam4_s	120	45.7	194	42.7	226	933	985	45.5	195	42.8	225	941	989	**45.6**	**194**	**42.6**	**227**	**933**	**988**
628.pop2_s	120	**170**	**69.7**	**128**	**102**	**750**	**975**	169	70.1	127	102	752	928	171	69.6	128	102	751	979
638.imagick_s	120	22.3	648	13.4	1180	601	1170	22.6	639	13.8	1140	611	1160	**22.4**	**645**	**13.7**	**1150**	**610**	**1150**
644.nab_s	120	**23.8**	**733**	**20.3**	**937**	**851**	**936**	23.8	733	20.3	938	850	937	23.8	733	20.3	938	850	935
649.fotonik3d_s	120	**52.6**	**173**	**44.9**	**228**	**855**	**1100**	53.6	170	46.1	222	859	1090	52.2	174	44.6	229	854	1100
654.roms_s	120	30.2	521	33.5	526	1110	1190	**30.3**	**520**	**33.3**	**529**	**1100**	**1180**	30.4	518	33.6	524	1100	1180

SPECspeed®2017_fp_base = 319

SPECspeed®2017_fp_energy_base = 406

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 =
     "/home/Benchmark/speccpu-1.1.8/lib/intel64:/home/Benchmark/speccpu-1.1.8
     /je5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

```
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB 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.
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
DCU IP Prefetcher = Disabled
Package C State limit = C0
LLC Prefetch = Enabled
DBP-F = Enabled
CPU Performance Boost = Aggressive
FAN Control = Full
Optimized Power Mode = Enable
```

(Continued on next page)

Platform Notes (Continued)

```
Sysinfo program /home/Benchmark/speccpu-1.1.8/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Sat Jan 14 11:07:34 2023

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 8490H
      2  "physical id"s (chips)
      120 "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 : 60
      siblings  : 60
      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 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
      53 54 55 56 57 58 59
      physical 1: 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 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
      53 54 55 56 57 58 59

From lscpu from util-linux 2.37.2:
     Architecture:                    x86_64
     CPU op-mode(s):                  32-bit, 64-bit
     Address sizes:                   46 bits physical, 57 bits virtual
     Byte Order:                      Little Endian
     CPU(s):                          120
     On-line CPU(s) list:             0-119
     Vendor ID:                       GenuineIntel
     Model name:                      Intel(R) Xeon(R) Platinum 8490H
     CPU family:                      6
     Model:                           143
     Thread(s) per core:              1
     Core(s) per socket:              60
     Socket(s):                       2
     Stepping:                        8
     CPU max MHz:                     3500.0000
     CPU min MHz:                     800.0000
     BogoMIPS:                        3800.00
     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 aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx
```

(Continued on next page)

Platform Notes (Continued)

```
      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 cat_l2 cdp_l3 invpcid_single intel_ppin cdp_l2 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 rdt_a avx512f avx512dq rdseed adx smap
      avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
      xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
      split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
      hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke waitpkg avx512_vbmi2
      gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid
      bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk
      pconfig arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities
      Virtualization:                  VT-x
      L1d cache:                       5.6 MiB (120 instances)
      L1i cache:                       3.8 MiB (120 instances)
      L2 cache:                        240 MiB (120 instances)
      L3 cache:                        225 MiB (2 instances)
      NUMA node(s):                    2
      NUMA node0 CPU(s):               0-59
      NUMA node1 CPU(s):               60-119
      Vulnerability Itlb multihit:     Not affected
      Vulnerability L1tf:              Not affected
      Vulnerability Mds:               Not affected
      Vulnerability Meltdown:          Not affected
      Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
      prctl and seccomp
      Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user
      pointer sanitization
      Vulnerability Spectre v2:        Mitigation; Enhanced IBRS, IBPB conditional, RSB
      filling
      Vulnerability Srbds:             Not affected
      Vulnerability Tsx async abort:   Not affected

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     5.6M   12 Data            1     64        1             64
      L1i       32K     3.8M    8 Instruction     1     64        1             64
      L2         2M     240M   16 Unified         2   2048        1             64
      L3     112.5M     225M   15 Unified         3 122880        1             64

  /proc/cpuinfo cache data
     cache size : 115200 KB

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

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Platform Notes (Continued)

```
  available: 2 nodes (0-1)
  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 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
  57 58 59
  node 0 size: 515661 MB
  node 0 free: 514145 MB
  node 1 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
  85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109
  110 111 112 113 114 115 116 117 118 119
  node 1 size: 515695 MB
  node 1 free: 514840 MB
  node distances:
  node   0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
   MemTotal:       1056109444 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
   powersave

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP4"
      VERSION_ID="15.4"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp4"

uname -a:
   Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18
   UTC 2022 (49db222/lp) 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
```

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Platform Notes (Continued)

```
 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
 CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

 run-level 3 Jan 14 11:07

 SPEC is set to: /home/Benchmark/speccpu-1.1.8
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   1.8T   76G  1.7T   5% /

 From /sys/devices/virtual/dmi/id
     Vendor:          FUJITSU
     Product:         PRIMERGY RX2540 M7
     Product Family: SERVER
     Serial:          EWCExxxxxx

 Additional information from dmidecode 3.2 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:
     10x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
     6x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800

 BIOS:
    BIOS Vendor:       FUJITSU
    BIOS Version:      V1.0.0.0 R0.22.1 for D3983-A1x
    BIOS Date:         12/01/2022
    BIOS Revision:     0.22
    Firmware Revision: 2.0

 (End of data from sysinfo program)
```

Compiler Version Notes

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

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
  2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
  2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version
  2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
  Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

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Base Compiler Invocation (Continued)

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

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

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 -g -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -g -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-m64 -g -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -g -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-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-SPR-RevA.html
http://www.spec.org/cpu2017/flags/Intel-ic2022-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-SPR-RevA.xml
http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml

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