SPEC CPU®2017 Floating Point Rate Result

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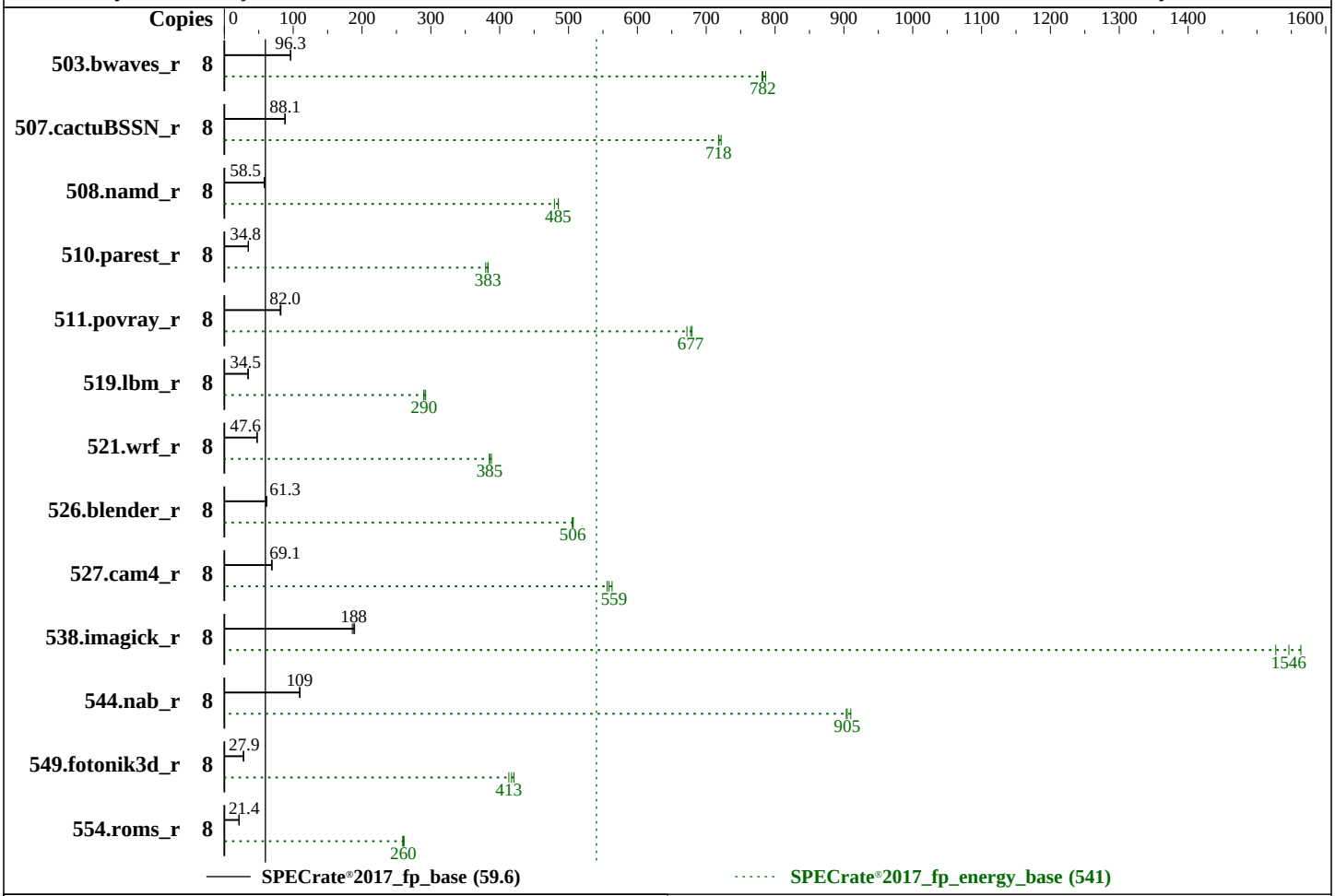
Fujitsu

PRIMERGY TX1330 M5, Intel Xeon E-2388G, 3.20GHz

SPECrate®2017_fp_base =	59.6
SPECrate®2017_fp_energy_base =	541
SPECrate®2017_fp_peak =	Not Run
SPECrate®2017_fp_energy_peak =	Not Run

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

Test Date: Dec-2021
Hardware Availability: Mar-2022
Software Availability: Jun-2021



Hardware

CPU Name:	Intel Xeon E-2388G
Max MHz:	5100
Nominal:	3200
Enabled:	8 cores, 1 chip
Orderable:	1 chip
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	512 KB I+D on chip per core
L3:	16 MB I+D on chip per chip
Other:	None
Memory:	32 GB (2 x 16 GB 2Rx8 PC4-3200AA-E)
Storage:	1 x SATA M.2 SSD, 240GB
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 SP3 5.3.18-57-default
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;
Parallel:	No
Firmware:	Fujitsu BIOS Version V5.0.0.22 R1.30.0 for D3931-A1x. Released Mar-2022 tested as V5.0.0.22 R1.15.0 for D3931-A1x Dec-2021
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

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PRIMERGY TX1330 M5, Intel Xeon E-2388G, 3.20GHz

SPECrate®2017_fp_base = 59.6

SPECrate®2017_fp_energy_base = 541

SPECrate®2017_fp_peak = Not Run

SPECrate®2017_fp_energy_peak = Not Run

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

Test Date: Dec-2021
Hardware Availability: Mar-2022
Software Availability: Jun-2021

Software (Continued)

Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

Power

Max. Power (W): 165.61
Idle Power (W): 26.41
Min. Temperature (C): 23.13
Elevation (m): 11
Line Standard: 200 V / 50 Hz / 1 phase / 2 wires
Provisioning: Line-powered

Power Settings

Management FW: Version 1.00m for D3931-A1x of Fujitsu BMC Firmware
Memory Mode: Normal

Power-Relevant Hardware

Power Supply: 1 x 500 W (non-redundant)
Details: Standard power supply part of base unit S26113-E627-V50-1
Backplane: 4 x 2.5inch HDD back plane
Other Storage: Embedded SATA Controller
Storage Model #s: S26361-F5787-E240
NICs Installed: 2 x Intel I210 @ 1 Gb
NICs Enabled (FW/OS): 2 / 2
NICs Connected/Speed: 1 @ 1 Gb
Other HW Model #s: None

Power Analyzer

Power Analyzer: 10.26.120.153:8888
Hardware Vendor: Hioki
Model: Hioki PW3336:1-Channel
Serial Number: 170130930
Input Connection: USB via USB-Serial CH340
Metrology Institute: NICT
Calibration By: HIOKI E.E. CORPORATION
Calibration Label: H06400086
Calibration Date: 08-Mar-2021
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: Connected to PSU 1
Current Ranges Used: 1A
Voltage Range Used: 300V

Temperature Meter

Temperature Meter: 10.26.120.153:8889
Hardware Vendor: Digi International Inc.
Model: DigiWATCHPORT_H
Serial Number: W 633 91704
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	Copies	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
503.bwaves_r	8	832	96.4	111	786	134	136	**833**	**96.3**	**112**	**782**	**134**	**140**	835	96.1	112	781	134	138
507.cactuBSSN_r	8	**115**	**88.1**	**15.5**	**718**	**135**	**148**	114	88.5	15.4	722	135	149	115	87.9	15.5	719	135	152
508.namd_r	8	131	57.9	17.3	479	132	156	130	58.6	17.1	485	132	163	**130**	**58.5**	**17.1**	**485**	**131**	**162**
510.parest_r	8	**601**	**34.8**	**59.5**	**383**	**99.0**	**154**	602	34.7	59.5	383	98.7	155	599	35.0	60.0	380	100	158
511.povray_r	8	227	82.2	29.8	679	131	146	**228**	**82.0**	**29.9**	**677**	**131**	**158**	230	81.1	30.2	672	131	166
519.lbm_r	8	243	34.6	32.8	292	135	158	**245**	**34.5**	**33.0**	**290**	**135**	**154**	245	34.4	33.1	290	135	151

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Base Results Table (Continued)

Benchmark	Copies	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
521.wrf_r	8	376	47.7	50.4	388	134	142	**377**	**47.6**	**50.8**	**385**	**135**	**141**	377	47.5	50.8	385	135	139
526.blender_r	8	199	61.1	26.0	507	131	154	199	61.3	26.1	505	131	158	**199**	**61.3**	**26.1**	**506**	**131**	**161**
527.cam4_r	8	202	69.3	27.1	563	134	155	**203**	**69.1**	**27.3**	**559**	**135**	**152**	204	68.6	27.4	556	134	155
538.imagick_r	8	105	189	13.8	1560	131	164	107	186	14.1	1530	132	164	**106**	**188**	**13.9**	**1550**	**132**	**164**
544.nab_r	8	**123**	**109**	**16.1**	**905**	**131**	**160**	123	109	16.2	903	131	158	122	110	16.0	910	131	155
549.fotonik3d_r	8	1118	27.9	83.2	417	74.4	162	**1119**	**27.9**	**84.0**	**413**	**75.1**	**162**	1119	27.9	82.5	421	73.8	155
554.roms_r	8	594	21.4	53.7	261	90.4	122	595	21.4	54.1	259	91.0	118	**594**	**21.4**	**53.9**	**260**	**90.7**	**118**

SPECrate®2017_fp_base = 59.6

SPECrate®2017_fp_energy_base = 541

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"
echo madvise > /sys/kernel/mm/transparent_hugepage/enabled
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
      "/home/PVT/speccpu-1.1.8_b/lib/intel64:/home/PVT/speccpu-1.1.8_b/je5.0.1
      -64"
MALLOC_CONF = "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
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)

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.
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
C-States Auto Demotion = Disabled
C-States Un Demotion = Disabled
DDR Speed Control = Auto
DMI Gen3 ASPM = ASPM L0s

Sysinfo program /home/PVT/speccpu-1.1.8_b/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Mon Dec 20 19:02:06 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) E-2388G CPU @ 3.20GHz
      1  "physical id"s (chips)
      8 "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 : 8
      siblings  : 8
      physical 0: cores 0 1 2 3 4 5 6 7

From lscpu from util-linux 2.36.2:
     Architecture:                    x86_64
     CPU op-mode(s):                  32-bit, 64-bit
     Byte Order:                      Little Endian
     Address sizes:                   39 bits physical, 48 bits virtual
     CPU(s):                          8
     On-line CPU(s) list:             0-7
     Thread(s) per core:              1
     Core(s) per socket:              8
     Socket(s):                       1
```

(Continued on next page)

Platform Notes (Continued)

```
      NUMA node(s):                    1
      Vendor ID:                       GenuineIntel
      CPU family:                      6
      Model:                           167
      Model name:                      Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz
      Stepping:                        1
      CPU MHz:                         991.568
      CPU max MHz:                     5100.0000
      CPU min MHz:                     800.0000
      BogoMIPS:                        6384.00
      Virtualization:                  VT-x
      L1d cache:                       384 KiB
      L1i cache:                       256 KiB
      L2 cache:                        4 MiB
      L3 cache:                        16 MiB
      NUMA node0 CPU(s):               0-7
      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
      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
      smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt
      tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
      epb invpcid_single ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority
      ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx avx512f
      avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha_ni avx512bw
      avx512vl xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notify
      hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes
      vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrm md_clear flush_l1d
      arch_capabilities

  From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     384K   12 Data            1    64        1             64
```

(Continued on next page)

Platform Notes (Continued)

```
      L1i       32K     256K    8 Instruction     1    64        1             64
      L2       512K       4M    8 Unified         2  1024        1             64
      L3        16M      16M   16 Unified         3 16384        1             64

  /proc/cpuinfo cache data
     cache size : 16384 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
    node 0 size: 31515 MB
    node 0 free: 31059 MB
    node distances:
    node   0
      0:  10

  From /proc/meminfo
     MemTotal:       32272268 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-SP3"
        VERSION_ID="15.3"
        PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
        ID="sles"
        ID_LIKE="suse"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:15:sp3"

  uname -a:
     Linux localhost 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021
     (ba3c2e9/lp-5d9e8aa) 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
```

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Platform Notes (Continued)

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

 run-level 3 Dec 20 19:00

 SPEC is set to: /home/PVT/speccpu-1.1.8_b
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   180G   41G  140G  23% /home

 From /sys/devices/virtual/dmi/id
     Vendor:         FUJITSU
     Product:        PRIMERGY TX1330 M5
     Product Family: SERVER
     Serial:         EWBUxxxxxx

 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:
     2x Samsung M391A2K43DB1-CWE 16 GB 2 rank 3200

 BIOS:
    BIOS Vendor:       FUJITSU // American Megatrends International, LLC.
    BIOS Version:      V5.0.0.22 R1.15.0 for D3931-A1x
    BIOS Date:         12/03/2021
    BIOS Revision:     1.15

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
```

(Continued on next page)

Compiler Version Notes (Continued)

```
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++             | 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
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          | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
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.
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 | 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
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.
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.
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         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
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)

Compiler Version Notes (Continued)

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

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

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.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64

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Base Portability Flags (Continued)

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
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:
```
-w -m64 -std=c11 -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
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both C and C++:
```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
```

(Continued on next page)

Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
-L/usr/local/jemalloc64-5.0.1/lib

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

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-RKL-RevC.html
http://www.spec.org/cpu2017/flags/Intel-ic2021-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-RKL-RevC.xml
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.

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