SPEC CPU®2017 Floating Point Speed Result
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Fujitsu

PRIMERGY RX1330 M6,
Intel Xeon E-2488, 3.2 GHz

$SPECspeed®2017\_fp\_base =$ 89.2

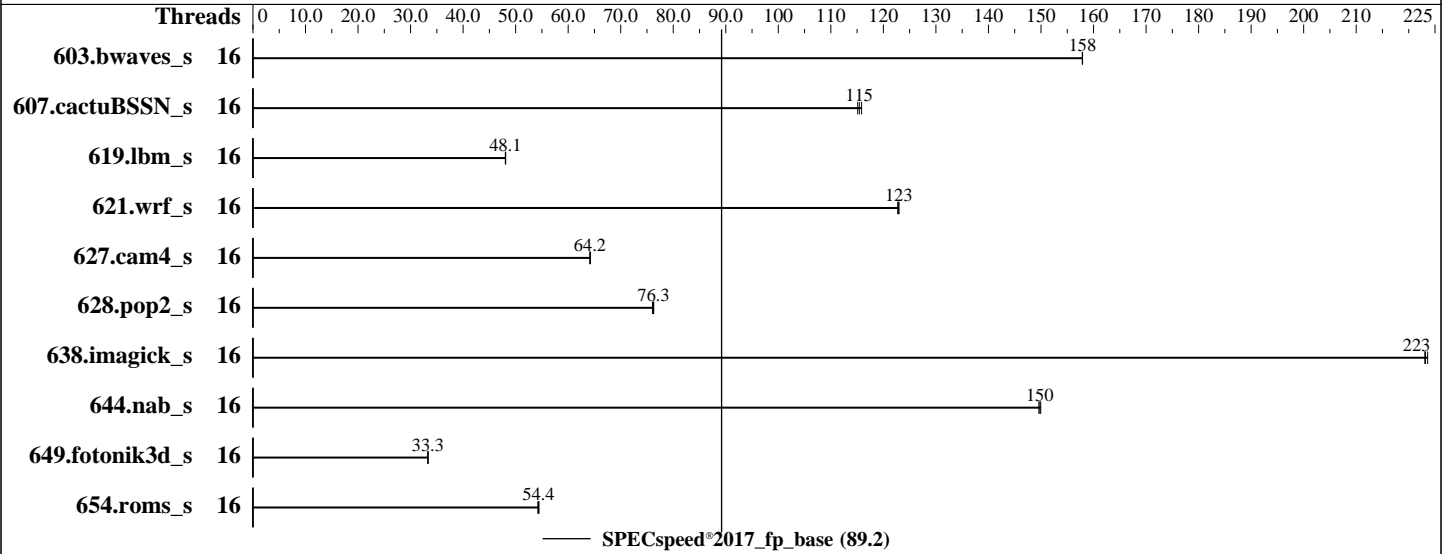$SPECspeed®2017\_fp\_peak =$ Not Run

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

Test Date: Apr-2024
Hardware Availability: Apr-2024
Software Availability: Dec-2023

Threads — scale 0 to 225

Benchmark	Threads	Result
603.bwaves_s	16	158
607.cactuBSSN_s	16	115
619.lbm_s	16	48.1
621.wrf_s	16	123
627.cam4_s	16	64.2
628.pop2_s	16	76.3
638.imagick_s	16	223
644.nab_s	16	150
649.fotonik3d_s	16	33.3
654.roms_s	16	54.4

SPECspeed®2017_fp_base (89.2)

Hardware

CPU Name: Intel Xeon E-2488
 Max MHz: 5600
 Nominal: 3200
Enabled: 8 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 24 MB I+D on chip per chip
 Other: None
Memory: 64 GB (2 x 32 GB 2Rx8 PC5-4800B-E,
 running at 4400)
Storage: 1 x SATA M.2 SSD, 960 GB
Other: CPU Cooling: Air

Software

OS: SUSE Linux Enterprise Server 15 SP5
 5.14.21-150500.53-default
Compiler: C/C++: Version 2024.0.2 of Intel oneAPI
 DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.0.2 of Intel Fortran
 Compiler for Linux;
Parallel: Yes
Firmware: Fujitsu BIOS Version V5.0.0.27 R1.5.0 for
 D4132-A1x. Released Jul-2024
 tested as V5.0.0.27 R1.0.0 for D4132-A1x Mar-2024
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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CPU2017 License: 19	**Test Date:** Apr-2024
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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	16	**374**	**158**	374	158	374	158							
607.cactuBSSN_s	16	**144**	**115**	144	116	145	115							
619.lbm_s	16	109	48.1	**109**	**48.1**	109	48.0							
621.wrf_s	16	108	123	108	123	**108**	**123**							
627.cam4_s	16	138	64.2	138	64.1	**138**	**64.2**							
628.pop2_s	16	**156**	**76.3**	156	76.3	156	76.0							
638.imagick_s	16	**64.6**	**223**	64.5	224	64.7	223							
644.nab_s	16	117	150	**117**	**150**	117	150							
649.fotonik3d_s	16	**274**	**33.3**	274	33.3	273	33.3							
654.roms_s	16	290	54.2	289	54.4	**290**	**54.4**							
SPECspeed®2017_fp_base =		**89.2**												
SPECspeed®2017_fp_peak =		**Not Run**												

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

Submit Notes

```
 The taskset mechanism was used to bind copies to processors. The config file option 'submit'
 was used to generate taskset 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:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH =
     "/home/Benchmark/speccpu.ic2024.0.2/lib/intel64:/home/Benchmark/speccpu.ic2024.0.2/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 Red Hat Enterprise Linux 8.4
 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.
```

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General Notes (Continued)

```
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:
C-State Auto Demotion = Disabled
C-State un-demotion = Disabled
Fan Control = Full
Total Memory Encryption = Disabled

Sysinfo program /home/Benchmark/speccpu.ic2024.0.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Wed Apr  3 22:41:06 2024

SUT (System Under Test) info as seen by some common utilities.

------------------------------------------------------------
Table of contents
------------------------------------------------------------
 1. uname -a
 2. w
 3. Username
 4. ulimit -a
 5. sysinfo process ancestry
 6. /proc/cpuinfo
 7. lscpu
 8. numactl --hardware
 9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS
------------------------------------------------------------

------------------------------------------------------------
1. uname -a
  Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
  x86_64 x86_64 x86_64 GNU/Linux

------------------------------------------------------------
2. w
  22:41:06 up 13:07,  1 user,  load average: 0.99, 4.16, 3.40
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                09:36   13:00m  1.10s  0.41s -bash

------------------------------------------------------------
3. Username
```

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Platform Notes (Continued)

```
   From environment variable $USER:  root


    -----------------------------------------------------------
4. ulimit -a
   core file size          (blocks, -c) unlimited
   data seg size           (kbytes, -d) unlimited
   scheduling priority             (-e) 0
   file size               (blocks, -f) unlimited
   pending signals                 (-i) 254848
   max locked memory       (kbytes, -l) 64
   max memory size         (kbytes, -m) unlimited
   open files                      (-n) 1024
   pipe size            (512 bytes, -p) 8
   POSIX message queues     (bytes, -q) 819200
   real-time priority              (-r) 0
   stack size              (kbytes, -s) unlimited
   cpu time               (seconds, -t) unlimited
   max user processes              (-u) 254848
   virtual memory          (kbytes, -v) unlimited
   file locks                      (-x) unlimited


    -----------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 30
 login -- root
 -bash
 -bash
 runcpu --define default-platform-flags -c ic2024.0.2-lin-core-avx2-speed-20231213.cfg --define cores=16
   --tune base -o all --define drop_caches --define smt-on --reportable fpspeed
 runcpu --define default-platform-flags --configfile ic2024.0.2-lin-core-avx2-speed-20231213.cfg --define
   cores=16 --tune base --output_format all --define drop_caches --define smt-on --reportable --nopower
   --runmode speed --tune base --size refspeed fpspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.001/templogs/preenv.fpspeed.001.0.log --lognum 001.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/Benchmark/speccpu.ic2024.0.2


    -----------------------------------------------------------
6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) E E-2488
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 183
   stepping        : 1
   microcode       : 0x121
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
   cpu cores       : 8
   siblings        : 16
   1 physical ids (chips)
   16 processors (hardware threads)
   physical id 0: core ids 0-7
   physical id 0: apicids 0-15
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.


    -----------------------------------------------------------
7. lscpu

 From lscpu from util-linux 2.37.4:
   Architecture:                 x86_64
   CPU op-mode(s):               32-bit, 64-bit
```

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Platform Notes (Continued)

```
  Address sizes:                46 bits physical, 48 bits virtual
  Byte Order:                   Little Endian
  CPU(s):                       16
  On-line CPU(s) list:          0-15
  Vendor ID:                    GenuineIntel
  Model name:                   Intel(R) Xeon(R) E E-2488
  CPU family:                   6
  Model:                        183
  Thread(s) per core:           2
  Core(s) per socket:           8
  Socket(s):                    1
  Stepping:                     1
  CPU max MHz:                  7200.0000
  CPU min MHz:                  800.0000
  BogoMIPS:                     6374.40
  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 rdseed adx smap clflushopt
                                clwb intel_pt sha_ni xsaveopt xsavec xgetbv1 xsaves split_lock_detect
                                avx_vnni dtherm ida arat pln pts hwp hwp_notify hwp_act_window hwp_epp
                                hwp_pkg_req hfi umip pku ospke waitpkg gfni vaes vpclmulqdq tme rdpid
                                movdiri movdir64b fsrm md_clear serialize pconfig arch_lbr flush_l1d
                                arch_capabilities
  Virtualization:               VT-x
  L1d cache:                    384 KiB (8 instances)
  L1i cache:                    256 KiB (8 instances)
  L2 cache:                     16 MiB (8 instances)
  L3 cache:                     24 MiB (1 instance)
  NUMA node(s):                 1
  NUMA node0 CPU(s):            0-15
  Vulnerability Itlb multihit:  Not affected
  Vulnerability L1tf:           Not affected
  Vulnerability Mds:            Not affected
  Vulnerability Meltdown:       Not affected
  Vulnerability Mmio stale data: Not affected
  Vulnerability Retbleed:       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, PBRSB-eIBRS SW
                                sequence
  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     384K   12 Data            1    64      1           64
    L1i     32K     256K    8 Instruction     1    64      1           64
    L2       2M      16M   16 Unified         2  2048      1           64
    L3      24M      24M   12 Unified         3 32768      1           64

  -------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 1 nodes (0)
```

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Platform Notes (Continued)

```
     node 0 cpus: 0-15
     node 0 size: 63745 MB
     node 0 free: 63269 MB
     node distances:
     node   0
       0:  10


   -------------------------------------------------------------
   9. /proc/meminfo
      MemTotal:        65275700 kB


   -------------------------------------------------------------
   10. who -r
      run-level 3 Apr 3 09:34


   -------------------------------------------------------------
   11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
     Default Target  Status
     multi-user      degraded


   -------------------------------------------------------------
   12. Failed units, from systemctl list-units --state=failed
       UNIT          LOAD   ACTIVE SUB    DESCRIPTION
     * sep5.service loaded failed failed systemd script to load sep5 driver at boot time


   -------------------------------------------------------------
   13. Services, from systemctl list-unit-files
     STATE           UNIT FILES
     enabled         YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager getty@ haveged
                     irqbalance issue-generator kbdsettings kdump kdump-early klog lvm2-monitor nscd postfix
                     purge-kernels rollback rsyslog sep5 smartd sshd systemd-pstore wicked wickedd-auto4
                     wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
     enabled-runtime systemd-remount-fs
     disabled        autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                     chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                     firewalld gpm grub2-once haveged-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load
                     lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd
                     serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
                     systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd udisks2
                     vncserver@
     indirect        pcscd wickedd


   -------------------------------------------------------------
   14. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
      root=UUID=7d6282e3-8e21-4b62-ab94-5941e54159d1
      splash=silent
      mitigations=auto
      quiet
      security=apparmor
      crashkernel=235M,high
      crashkernel=72M,low


   -------------------------------------------------------------
   15. cpupower frequency-info
      analyzing CPU 0:
        current policy: frequency should be within 800 MHz and 6.90 GHz.
                        The governor "powersave" may decide which speed to use
                        within this range.
        boost state support:
```

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Platform Notes (Continued)

```
        Supported: yes
        Active: yes


      ----------------------------------------------------------
      16. sysctl
        kernel.numa_balancing           0
        kernel.randomize_va_space       2
        vm.compaction_proactiveness     20
        vm.dirty_background_bytes       0
        vm.dirty_background_ratio       10
        vm.dirty_bytes                  0
        vm.dirty_expire_centisecs       3000
        vm.dirty_ratio                  20
        vm.dirty_writeback_centisecs    500
        vm.dirtytime_expire_seconds     43200
        vm.extfrag_threshold            500
        vm.min_unmapped_ratio           1
        vm.nr_hugepages                 0
        vm.nr_hugepages_mempolicy       0
        vm.nr_overcommit_hugepages      0
        vm.swappiness                   60
        vm.watermark_boost_factor       15000
        vm.watermark_scale_factor       10
        vm.zone_reclaim_mode            0


      ----------------------------------------------------------
      17. /sys/kernel/mm/transparent_hugepage
        defrag          always defer defer+madvise [madvise] never
        enabled         [always] madvise never
        hpage_pmd_size  2097152
        shmem_enabled   always within_size advise [never] deny force


      ----------------------------------------------------------
      18. /sys/kernel/mm/transparent_hugepage/khugepaged
        alloc_sleep_millisecs   60000
        defrag                  1
        max_ptes_none           511
        max_ptes_shared         256
        max_ptes_swap           64
        pages_to_scan           4096
        scan_sleep_millisecs    10000


      ----------------------------------------------------------
      19. OS release
        From /etc/*-release /etc/*-version
        os-release SUSE Linux Enterprise Server 15 SP5


      ----------------------------------------------------------
      20. Disk information
      SPEC is set to: /home/Benchmark/speccpu.ic2024.0.2
        Filesystem     Type  Size  Used Avail Use% Mounted on
        /dev/sda2      xfs   223G   98G  126G  44% /


      ----------------------------------------------------------
      21. /sys/devices/virtual/dmi/id
          Vendor:         FUJITSU
          Product:        PRIMERGY TX1330 M6
          Product Family: SERVER
          Serial:         xxxxxxxxxx
```

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Platform Notes (Continued)

```
   ----------------------------------------------------------
   22. dmidecode
     Additional information from dmidecode 3.4 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 M324R4GA3BB0-CQKOD 32 GB 2 rank 4800, configured at 4400


   ----------------------------------------------------------
   23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       FUJITSU // American Megatrends International, LLC.
     BIOS Version:      V5.0.0.27 R1.0.0 for D4132-A1x
     BIOS Date:         03/13/2024
     BIOS Revision:     1.0
```

Compiler Version Notes

```
==============================================================================================
C              | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 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 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 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 2024.0.2 Build 20231213
Copyright (C) 1985-2023 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 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
----------------------------------------------------------------------------------------------
```

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Base Compiler Invocation

C benchmarks:
`icx`

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:
`-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp`
`-DSPEC_OPENMP -Wno-implicit-int -L/usr/local/jemalloc64-5.0.1/lib`
`-ljemalloc`

Fortran benchmarks:
`-w -m64 -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`

Benchmarks using both Fortran and C:
`-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math`

(Continued on next page)

Fujitsu

PRIMERGY RX1330 M6,
Intel Xeon E-2488, 3.2 GHz

SPECspeed®2017_fp_base = 89.2

SPECspeed®2017_fp_peak = Not Run

CPU2017 License:	19	**Test Date:**	Apr-2024
Test Sponsor:	Fujitsu	**Hardware Availability:**	Apr-2024
Tested by:	Fujitsu	**Software Availability:**	Dec-2023

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
```
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-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-RPL-RevA.html
  http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.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-RPL-RevA.xml
  http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml

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

Tested with SPEC CPU®2017 v1.1.9 on 2024-04-03 09:41:06-0400.
Report generated on 2024-04-24 14:36:54 by CPU2017 PDF formatter v6716.
Originally published on 2024-04-24.