SPEC CPU®2017 Floating Point Speed Result

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xFusion

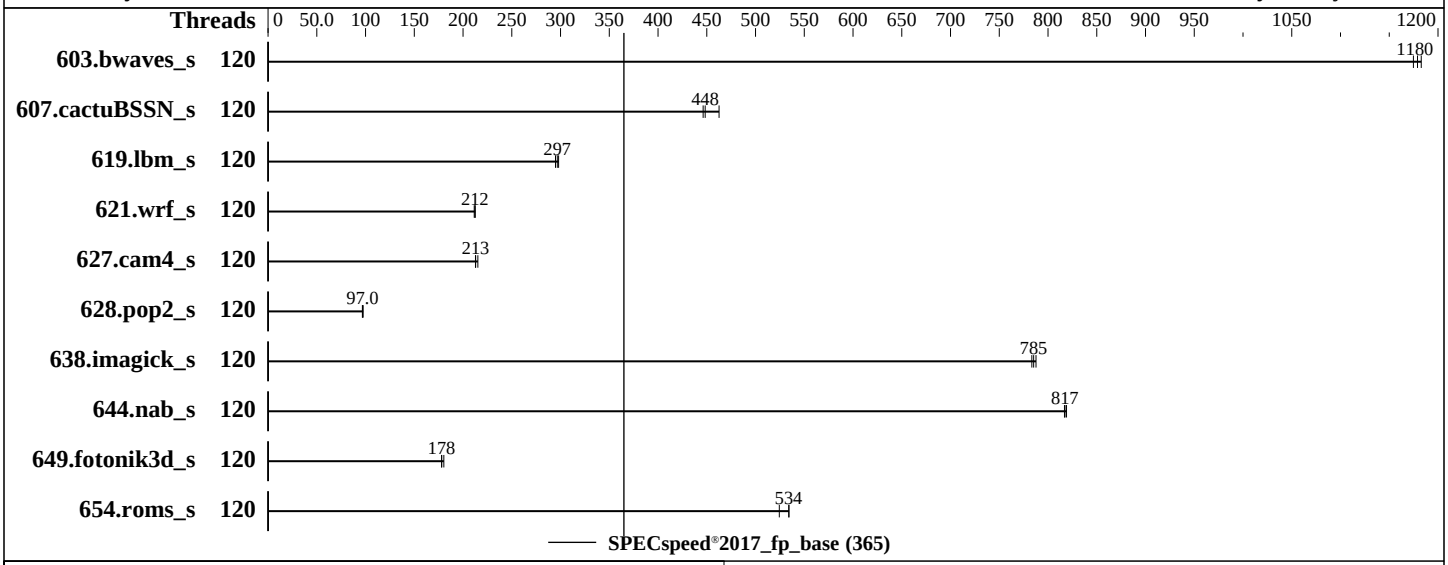
FusionServer 2288H V7 (Intel Xeon Platinum 8490H)

SPECspeed®2017_fp_base = 365

SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Dec-2022
Hardware Availability: Jan-2023
Software Availability: May-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:	512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage:	1 x 1920 GB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux release 9.0 (Plow) 5.14.0-70.13.1.el9_0.x86_64
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:	Version 2.00.35 Released Nov-2022
File System:	xfs
System State:	Run level 5 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	jemalloc memory allocator V5.0.1
Power Management:	OS set to prefer performance at the cost of additional power usage

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	120	49.9	1180	50.2	1170	**50.0**	**1180**							
607.cactuBSSN_s	120	**37.2**	**448**	37.4	446	36.0	463							
619.lbm_s	120	**17.7**	**297**	17.6	298	17.8	295							
621.wrf_s	120	62.5	211	**62.3**	**212**	62.3	212							
627.cam4_s	120	41.2	215	41.7	213	**41.6**	**213**							
628.pop2_s	120	**122**	**97.0**	123	96.7	122	97.5							
638.imagick_s	120	18.3	788	**18.4**	**785**	18.4	783							
644.nab_s	120	21.4	817	**21.4**	**817**	21.3	819							
649.fotonik3d_s	120	50.6	180	**51.2**	**178**	51.2	178							
654.roms_s	120	29.5	534	**29.5**	**534**	30.0	524							

SPECspeed®2017_fp_base = 365

SPECspeed®2017_fp_peak = Not Run

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 = "/spec2017-2022.1/lib/intel64:/spec2017-2022.1/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
```

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General Notes (Continued)

sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases

Platform Notes

```
BIOS configuration:
Performance Profile Set to Load Balance
Enable LP [Global] Set to Single LP

Sysinfo program /spec2017-2022.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Mon Dec  5 21:49:25 2022

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 2.37.4:
     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
     BIOS Vendor ID:                  Intel(R) Corporation
     Model name:                      Intel(R) Xeon(R) Platinum 8490H
     BIOS Model name:                 Intel(R) Xeon(R) Platinum 8490H
     CPU family:                      6
     Model:                           143
     Thread(s) per core:              1
     Core(s) per socket:              60
```

(Continued on next page)

Platform Notes (Continued)

```
      Socket(s):                       2
      Stepping:                        6
      Frequency boost:                 enabled
      CPU max MHz:                     1901.0000
      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
      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
      avx2 smep bmi2 erms invpcid 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 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
      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
```

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Platform Notes (Continued)

```
      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.
   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: 257060 MB
   node 0 free: 254034 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: 258024 MB
   node 1 free: 257269 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

 From /proc/meminfo
    MemTotal:       527447180 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 /sbin/tuned-adm active
     It seems that tuned daemon is not running, preset profile is not activated.
 Preset profile: throughput-performance

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

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="9.0 (Plow)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="9.0"
       PLATFORM_ID="platform:el9"
       PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
    system-release: Red Hat Enterprise Linux release 9.0 (Plow)
```

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Platform Notes (Continued)

```
    system-release-cpe: cpe:/o:redhat:enterprise_linux:9::baseos

 uname -a:
    Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14
    12:42:38 EDT 2022 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
 CVE-2018-3639 (Speculative Store Bypass):                Mitigation: Speculative Store
                                                          Bypass disabled via prctl
 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 5 Dec 5 21:18

 SPEC is set to: /spec2017-2022.1
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda3      xfs   420G  142G  278G  34% /

 From /sys/devices/virtual/dmi/id
     Product:        2288H V7
     Product Family: Eagle Stream

 Additional information from dmidecode 3.3 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:
     16x Hynix HMCG88AEBRA107N 32 GB 2 rank 4800

 BIOS:
    BIOS Vendor:
    BIOS Version:      2.00.35
    BIOS Date:         11/30/2022
    BIOS Revision:     0.35

 (End of data from sysinfo program)
```

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 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 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -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 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -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:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -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

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -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/Intel-ic2022-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.0-revB.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic2022-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.0-revB.xml

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