SPEC® CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise

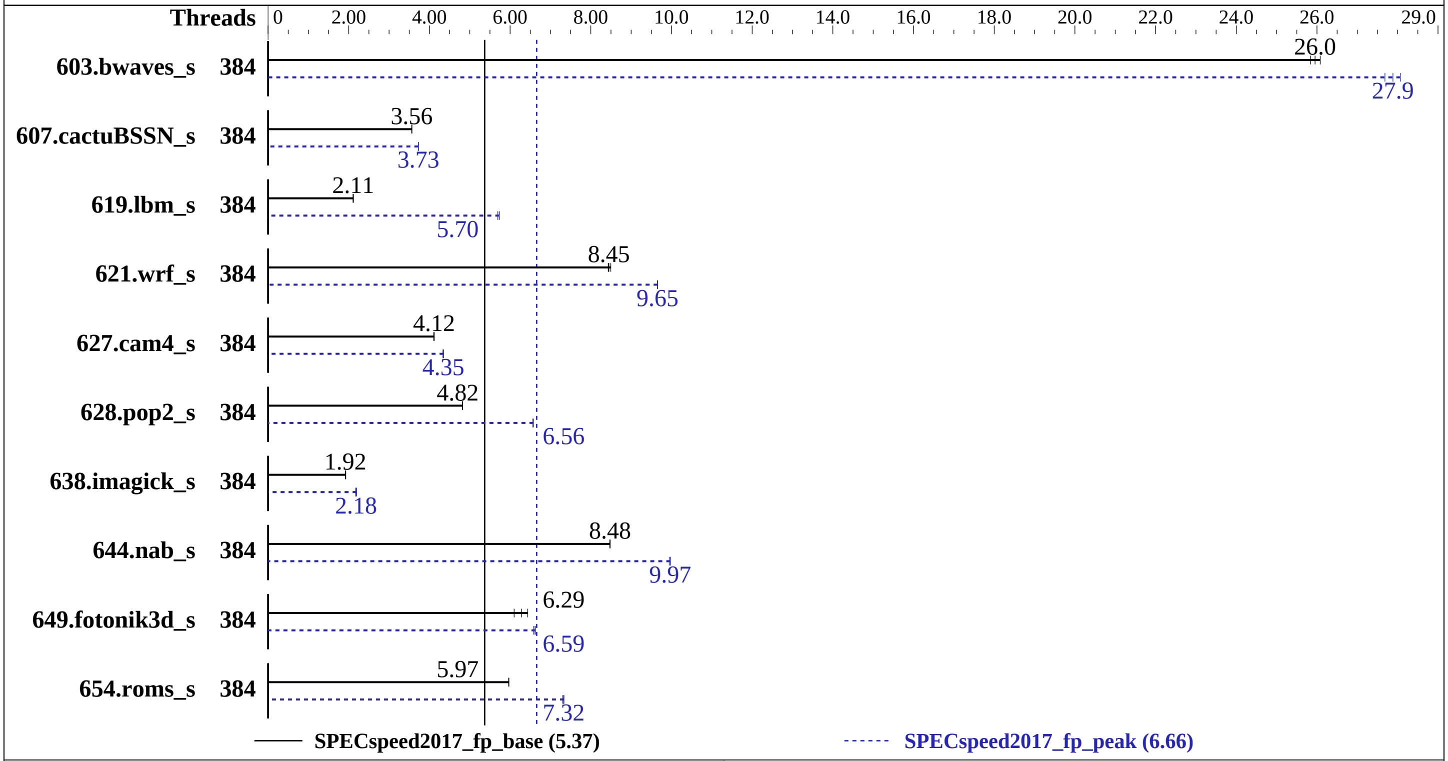
(Test Sponsor: HPE)

Integrity Superdome X
(384 core, 2.20 GHz, Intel Xeon E7-8890 v4)

SPECspeed2017_fp_base = 5.37

SPECspeed2017_fp_peak = 6.66

CPU2017 License:	3	**Test Date:**	Oct-2016
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2016
Tested by:	HPE	**Software Availability:**	Sep-2016



Hardware

CPU Name:	Intel Xeon E7-8890 v4
Max MHz.:	3400
Nominal:	2200
Enabled:	384 cores, 16 chips, 2 threads/core
Orderable:	2 to 16 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	256 KB I+D on chip per core
L3:	60 MB I+D on chip per chip
Other:	None
Memory:	4 TB (128 x 32 GB 2Rx4 PC4-2400T-L, running at 1600)
Storage:	8 x C8S59A, 900 GB 10 K RPM SAS
Other:	None

Software

OS:	SUSE Linux Enterprise Server 12 (x86_64) SP1 Kernel 3.12.53-60.30-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	HP Bundle: 008.004.084 SFW: 043.025.000 08/16/2016
File System:	xfs
System State:	Run level 5 (multi-user, w/GUI)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other:	Microquill SmartHeap V10.2

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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	384	2284	25.8	**2273**	**26.0**	2262	26.1	384	**2116**	**27.9**	2131	27.7	2102	28.1
607.cactuBSSN_s	384	4675	3.57	4682	3.56	**4678**	**3.56**	384	**4475**	**3.73**	4476	3.72	4474	3.73
619.lbm_s	384	2475	2.12	2486	2.11	**2482**	**2.11**	384	**920**	**5.70**	920	5.70	914	5.73
621.wrf_s	384	1557	8.50	1569	8.43	**1566**	**8.45**	384	**1370**	**9.65**	1370	9.66	1370	9.65
627.cam4_s	384	**2154**	**4.12**	2151	4.12	2158	4.11	384	2037	4.35	2045	4.33	**2039**	**4.35**
628.pop2_s	384	**2465**	**4.82**	2462	4.82	2465	4.82	384	1809	6.56	**1809**	**6.56**	1805	6.58
638.imagick_s	384	**7517**	**1.92**	7488	1.93	7534	1.91	384	6573	2.19	6640	2.17	**6609**	**2.18**
644.nab_s	384	**2061**	**8.48**	2060	8.48	2063	8.47	384	**1753**	**9.97**	1757	9.94	1752	9.97
649.fotonik3d_s	384	1416	6.44	**1450**	**6.29**	1495	6.10	384	**1383**	**6.59**	1384	6.59	1375	6.63
654.roms_s	384	2640	5.96	**2638**	**5.97**	2638	5.97	384	2155	7.30	**2150**	**7.32**	2146	7.34

SPECspeed2017_fp_base = 5.37

SPECspeed2017_fp_peak = 6.66

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"
intel_idle.max_cstate=3 appended in kernel command line
Power profile set with:
   cpupower -c all frequency-set -g performance
Setting the value of perf-bias:
  cpupower set -b 0
Tuned profile set with:
  tuned-adm profile throughput-performance
Transparent Huge Pages enabled by default
```

General Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/spec/cpu2017/lib/ia32:/spec/cpu2017/lib/intel64:/spec/cpu2017/sh10.2"
OMP_NUM_THREADS = "%{cores}"
OMP_STACKSIZE = "192M"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
```

Platform Notes

```
Firmware settings:
 Memory RAS Configuration set to Maximum Performance
 Sysinfo program /spec/cpu2017/Docs/sysinfo
 r4696 of 2016-07-28 da95b61906f345a0d9942e915810c155
```

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Platform Notes (Continued)

```
running on hawk049os1 Sat Oct 15 01:24:42 2016

This section contains SUT (System Under Test) info as seen by
some common utilities.  To remove or add to this section, see:
  http://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
      16 "physical id"s (chips)
      768 "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 : 24
      siblings  : 48
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 4: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 5: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 6: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 7: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 8: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 9: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 10: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 11: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 12: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 13: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 14: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
      physical 15: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
      27 28 29
```

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SPEC CPU2017 Floating Point Speed Result

Platform Notes (Continued)

```
    cache size : 61440 KB

 From /proc/meminfo
    MemTotal:       4235891396 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 /usr/bin/lsb_release -d
    SUSE Linux Enterprise Server 12 SP1

 From /etc/*release* /etc/*version*
    SuSE-release:
       SUSE Linux Enterprise Server 12 (x86_64)
       VERSION = 12
       PATCHLEVEL = 1
       # This file is deprecated and will be removed in a future service pack or
       release.
       # Please check /etc/os-release for details about this release.
    os-release:
       NAME="SLES"
       VERSION="12-SP1"
       VERSION_ID="12.1"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp1"

 uname -a:
    Linux hawk049os1 3.12.53-60.30-default #1 SMP Wed Feb 10 14:41:46 UTC 2016
    (e57129f) x86_64 x86_64 x86_64 GNU/Linux

 run-level 5 Oct 14 14:07

 SPEC is set to: /spec/cpu2017
    Filesystem                                          Type  Size  Used Avail
    Use% Mounted on
    /dev/mapper/3600c0ff0001e1834e672ee5701000000-part1 xfs   1.9T   64G  1.8T
    4% /spec
 Additional information from dmidecode:

    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.

   BIOS HP Bundle: 008.004.084 SFW: 043.025.000 08/16/2016
   Memory:
```

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Platform Notes (Continued)

```
    128x HP HMA84GL7MFR4N-UH 32 GB 2 rank 1067 MHz, configured at 1600 MHz
    256x not defined not defined

 (End of data from sysinfo program)
 Regarding the sysinfo display about the memory installed, the correct amount of
 memory is 4 TB and the dmidecode description should have one line reading as:
 128x HP HMA84GL7MFR4N-UH 32 GB 2 rank 1067 MHz, configured at 1600 MHz
```

Compiler Version Notes

```
==============================================================================
CC   607.cactuBSSN_s(base, peak) 619.lbm_s(base, peak) 621.wrf_s(base, peak)
     627.cam4_s(base, peak) 628.pop2_s(base, peak) 638.imagick_s(base, peak)
     644.nab_s(base, peak)
------------------------------------------------------------------------------
icc (ICC) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
icpc (ICC) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC   603.bwaves_s(base, peak) 607.cactuBSSN_s(base, peak) 621.wrf_s(base,
     peak) 627.cam4_s(base, peak) 628.pop2_s(base, peak)
     649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
------------------------------------------------------------------------------
ifort (IFORT) 17.0.0 20160721
Copyright (C) 1985-2016 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

Fortran benchmarks:
`ifort -m64`

Benchmarks using both Fortran and C:
`ifort -m64 icc -m64 -std=c11`

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Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
`icpc -m64 icc -m64 -std=c11 ifort -m64`

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:
`-qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP`

Fortran benchmarks:
`-DSPEC_SUPPRESS_OPENMP -qopt-prefetch -qopt-mem-layout-trans=3 -nostandard-realloc-lhs`

Benchmarks using both Fortran and C:
`-qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -nostandard-realloc-lhs`

Benchmarks using Fortran, C, and C++:
`-Wl,-z,muldefs -qopt-prefetch -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -nostandard-realloc-lhs -L/sh10.2 -lsmartheap64`

Peak Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
`ifort -m64`

Benchmarks using both Fortran and C:
`ifort -m64 icc -m64 -std=c11`

Benchmarks using Fortran, C, and C++:
`icpc -m64 icc -m64 -std=c11 ifort -m64`

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -auto-p32 -ipo
-qopt-prefetch -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -O2
-xCORE-AVX2 -qopt-prefetch -ipo -O3 -qopt-mem-layout-trans=3
-no-prec-div -nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -auto-p32 -ipo
-qopt-prefetch -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-auto-p32 -ipo -qopt-prefetch -O3 -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -nostandard-realloc-lhs
-L/sh10.2 -lsmartheap64

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.html
http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-Integrity-revC.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic17.0-official-linux64-revD.xml
http://www.spec.org/cpu2017/flags/HP-Platform-Flags-Intel-V1.2-Integrity-revC.xml

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