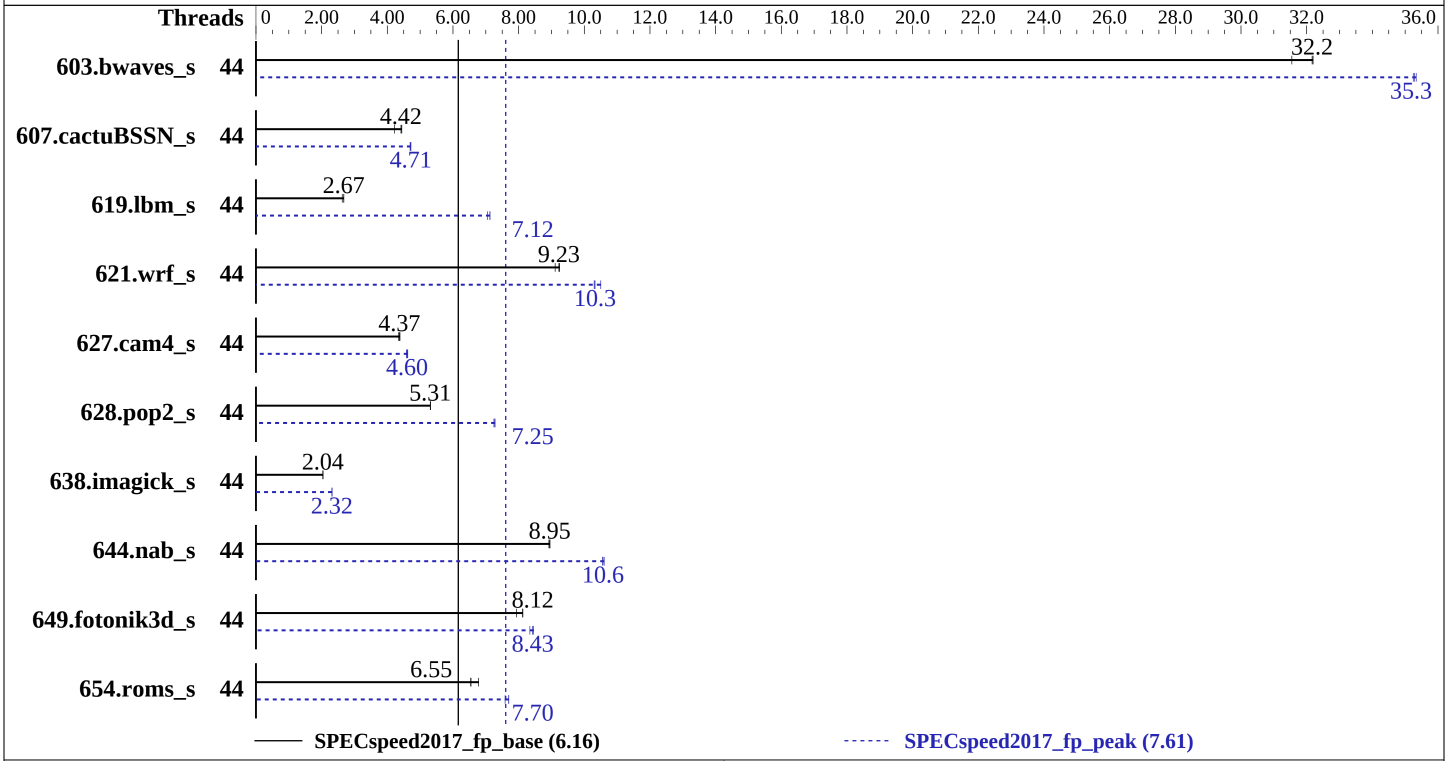
SPEC® CPU2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

SPECspeed2017_fp_base = 6.16

SPECspeed2017_fp_peak = 7.61

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



Hardware

CPU Name:	Intel Xeon E5-2699 v4
Max MHz.:	3600
Nominal:	2200
Enabled:	44 cores, 2 chips
Orderable:	1,2 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	256 KB I+D on chip per core
L3:	55 MB I+D on chip per chip
Other:	None
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
Storage:	1 x 800 GB SAS SSD, RAID 0
Other:	None

Software

OS:	SUSE Linux Enterprise Server 12 (x86_64) SP1 Kernel 3.12.49-11-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:	P92 v2.20 04/12/2016
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other:	Microquill SmartHeap V10.2

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Results Table

Benchmark	Base Threads	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Threads	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
603.bwaves_s	44	1832	32.2	1870	31.5	**1834**	**32.2**	44	1674	35.2	1670	35.3	**1672**	**35.3**
607.cactuBSSN_s	44	**3775**	**4.42**	3952	4.22	3753	4.44	44	3551	4.69	3533	4.72	**3537**	**4.71**
619.lbm_s	44	**1959**	**2.67**	1958	2.67	1993	2.63	44	**735**	**7.12**	735	7.13	742	7.06
621.wrf_s	44	1451	9.11	1430	9.25	**1433**	**9.23**	44	1284	10.3	**1281**	**10.3**	1259	10.5
627.cam4_s	44	**2028**	**4.37**	2039	4.35	2021	4.39	44	1917	4.62	**1926**	**4.60**	1935	4.58
628.pop2_s	44	2234	5.31	**2236**	**5.31**	2236	5.31	44	1638	7.25	**1638**	**7.25**	1630	7.28
638.imagick_s	44	**7071**	**2.04**	7089	2.03	7064	2.04	44	6225	2.32	**6230**	**2.32**	6235	2.31
644.nab_s	44	**1953**	**8.95**	1951	8.96	1958	8.92	44	1647	10.6	1655	10.6	**1653**	**10.6**
649.fotonik3d_s	44	1149	7.93	**1123**	**8.12**	1121	8.13	44	1093	8.34	**1082**	**8.43**	1078	8.46
654.roms_s	44	2322	6.78	**2404**	**6.55**	2408	6.54	44	2045	7.70	**2046**	**7.70**	2075	7.59

SPECspeed2017_fp_base = 6.16
SPECspeed2017_fp_peak = 7.61

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"
Transparent Huge Pages enabled by default
```

General Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/specuser/cpu2006/cpu2017/lib/ia32:/home/specuser/cpu2006/cpu2017/lib/intel64:/home/specuser/cpu2006/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

```
BIOS Configuration:
  Intel Hyperthreading Option set to Disabled
  Power Profile set to Balanced Power and Performance
  Collaborative Power Control set to Disabled
  QPI Snoop Configuration set to Home Snoop
  Thermal Configuration set to Maximum Cooling
  Processor Power and Utilization Monitoring set to Disabled
  Memory Double Refresh Rate set to 1x Refresh
Sysinfo program /home/specuser/cpu2006/cpu2017/Docs/sysinfo
r4696 of 2016-07-28 da95b61906f345a0d9942e915810c155
running on linux-szds Mon Oct 17 09:13:02 2016
```

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Platform Notes (Continued)

```
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 E5-2699 v4 @ 2.20GHz
      2 "physical id"s (chips)
      44 "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 : 22
      siblings  : 22
      physical 0: cores 0 2 3 4 8 10 11 12 16 17 18 19 20 21 24 25 26 27 28
      physical 1: cores 0 2 3 4 8 10 11 12 16 17 18 19 20 21 24 25 26 27 28
   cache size : 56320 KB

From /proc/meminfo
   MemTotal:       264326744 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 linux-szds 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
   (8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

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Platform Notes (Continued)

```
 run-level 3 Oct 17 09:12

 SPEC is set to: /home/specuser/cpu2006/cpu2017
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   703G  214G  489G  31% /home
 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 P92 04/12/2016
   Memory:
    8x UNKNOWN NOT AVAILABLE
    16x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz

 (End of data from sysinfo program)
   Regarding the sysinfo display about the memory installed, the correct amount of
   memory is 256 GB and the dmidecode description should have one line reading as:
   16x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 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
```

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Compiler Version Notes (Continued)

```
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`

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`

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Base Optimization Flags (Continued)

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`

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`

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-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-HSW-revE.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-HSW-revE.xml

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

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