SPEC® CFP2006 Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL580 Gen9
(3.20 GHz, Intel Xeon E7-8893 v4)

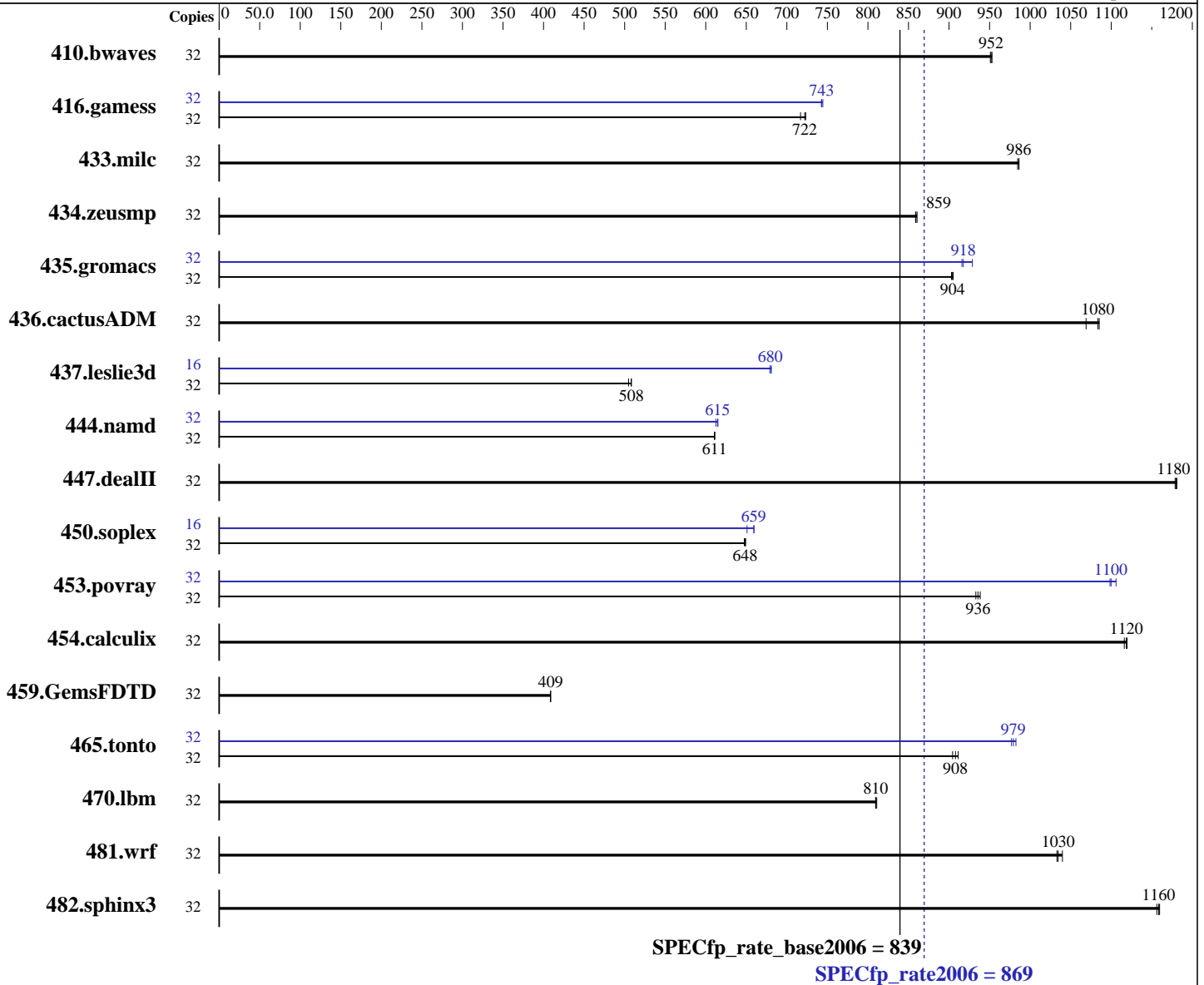$SPECfp®\_rate2006 =$ **869**

$SPECfp\_rate\_base2006 =$ **839**

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Nov-2016
Hardware Availability: Aug-2016
Software Availability: Sep-2016

Copies

Benchmark	Copies	Result
410.bwaves	32	952
416.gamess	32	743
416.gamess	32	722
433.milc	32	986
434.zeusmp	32	859
435.gromacs	32	918
435.gromacs	32	904
436.cactusADM	32	1080
437.leslie3d	16	680
437.leslie3d	32	508
444.namd	32	615
444.namd	32	611
447.dealII	32	1180
450.soplex	16	659
450.soplex	32	648
453.povray	32	1100
453.povray	32	936
454.calculix	32	1120
459.GemsFDTD	32	409
465.tonto	32	979
465.tonto	32	908
470.lbm	32	810
481.wrf	32	1030
482.sphinx3	32	1160

SPECfp_rate_base2006 = 839

SPECfp_rate2006 = 869

Hardware

CPU Name:	Intel Xeon E7-8893 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.50 GHz
CPU MHz:	3200
FPU:	Integrated
CPU(s) enabled:	16 cores, 4 chips, 4 cores/chip, 2 threads/core
CPU(s) orderable:	2,4 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core

Continued on next page

Software

Operating System:	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++ Studio XE for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Studio XE for Linux
Auto Parallel:	No
File System:	xfs
System State:	Run level 3 (multi-user)

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L3 Cache:	60 MB I+D on chip per chip	Base Pointers:	32-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1600 MHz)	Other Software:	Microquill SmartHeap V10.2
Disk Subsystem:	1 x 800 GB NVMe PCIe SSD, RAID 0		
Other Hardware:	DL580 Gen9 NVMe SSD Express Bay Enablement Kit		

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	32	457	951	**457**	**952**	456	953	32	457	951	**457**	**952**	456	953
416.gamess	32	**868**	**722**	866	723	874	717	32	**843**	**743**	842	744	844	743
433.milc	32	298	986	**298**	**986**	298	985	32	298	986	**298**	**986**	298	985
434.zeusmp	32	**339**	**859**	338	861	339	859	32	**339**	**859**	338	861	339	859
435.gromacs	32	253	903	252	905	**253**	**904**	32	246	929	**249**	**918**	249	916
436.cactusADM	32	352	1090	358	1070	**353**	**1080**	32	352	1090	358	1070	**353**	**1080**
437.leslie3d	32	592	508	596	505	**592**	**508**	16	221	679	221	681	**221**	**680**
444.namd	32	420	611	420	611	**420**	**611**	32	417	615	**418**	**615**	419	613
447.dealII	32	**310**	**1180**	310	1180	311	1180	32	**310**	**1180**	310	1180	311	1180
450.soplex	32	412	648	411	649	**412**	**648**	16	**202**	**659**	205	651	202	659
453.povray	32	181	938	182	933	**182**	**936**	32	154	1110	**155**	**1100**	155	1100
454.calculix	32	**236**	**1120**	236	1120	237	1120	32	**236**	**1120**	236	1120	237	1120
459.GemsFDTD	32	**831**	**409**	830	409	831	408	32	**831**	**409**	830	409	831	408
465.tonto	32	346	911	348	904	**347**	**908**	32	320	983	**322**	**979**	322	977
470.lbm	32	542	811	**543**	**810**	543	809	32	542	811	**543**	**810**	543	809
481.wrf	32	344	1040	346	1030	**346**	**1030**	32	344	1040	346	1030	**346**	**1030**
482.sphinx3	32	**538**	**1160**	538	1160	539	1160	32	**538**	**1160**	538	1160	539	1160

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"
Transparent Huge Pages enabled by default.
Filesystem page cache cleared with:
 echo 1 >   /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>

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Platform Notes

```
BIOS Configuration:
  HP Power Profile set to Balanced Power and Performance
  QPI Snoop Configuration set to Cluster On Die
  Collaborative Power Control set to Disabled
  Thermal Configuration set to Maximum Cooling
  Processor Power and Utilization Monitoring set to Disabled
  Memory Refresh Rate set to 1x Refresh
Sysinfo program /home/IC17/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-vi0i Sat Nov  5 11:01:40 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/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E7-8893 v4 @ 3.20GHz
      4 "physical id"s (chips)
      32 "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 : 4
      siblings  : 8
      physical 0: cores 12 13 25 26
      physical 1: cores 12 13 25 26
      physical 2: cores 12 13 25 26
      physical 3: cores 12 13 25 26
   cache size : 30720 KB

From /proc/meminfo
   MemTotal:       529321652 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

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"
```

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Platform Notes (Continued)

```
    uname -a:
       Linux linux-vi0i 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
       (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

    run-level 3 Nov 5 10:59

    SPEC is set to: /home/IC17
       Filesystem      Type   Size  Used Avail Use% Mounted on
       /dev/nvme0n1p4 xfs    703G  259G  444G  37% /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 U17 08/06/2016
      Memory:
       64x UNKNOWN NOT AVAILABLE
       32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 MHz

    (End of data from sysinfo program)
    Regarding the sysinfo display about the memory installed, the correct amount of
    memory is 512 GB and the dmidecode description should have one line reading as:
    32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 MHz
```

General Notes

```
  Environment variables set by runspec before the start of the run:
  LD_LIBRARY_PATH = "/home/IC17/libs/32:/home/IC17/libs/64:/home/IC17/sh10.2"

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

Base Compiler Invocation

C benchmarks:
    icc -m64

C++ benchmarks:
    icpc -m64

Fortran benchmarks:
    ifort -m64

Benchmarks using both Fortran and C:
    icc -m64 ifort -m64

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Base Portability Flags

```
      410.bwaves: -DSPEC_CPU_LP64
      416.gamess: -DSPEC_CPU_LP64
        433.milc: -DSPEC_CPU_LP64
      434.zeusmp: -DSPEC_CPU_LP64
     435.gromacs: -DSPEC_CPU_LP64 -nofor_main
   436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
     437.leslie3d: -DSPEC_CPU_LP64
        444.namd: -DSPEC_CPU_LP64
       447.dealII: -DSPEC_CPU_LP64
      450.soplex: -DSPEC_CPU_LP64
      453.povray: -DSPEC_CPU_LP64
     454.calculix: -DSPEC_CPU_LP64 -nofor_main
    459.GemsFDTD: -DSPEC_CPU_LP64
       465.tonto: -DSPEC_CPU_LP64
        470.lbm: -DSPEC_CPU_LP64
         481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
     482.sphinx3: -DSPEC_CPU_LP64
```

Base Optimization Flags

C benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
    -qopt-mem-layout-trans=3
```

C++ benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
    -qopt-mem-layout-trans=3
```

Fortran benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

Benchmarks using both Fortran and C:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
    -qopt-mem-layout-trans=3
```

Peak Compiler Invocation

C benchmarks:
```
    icc -m64
```

C++ benchmarks (except as noted below):
```
    icpc -m64
```

```
  450.soplex: icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

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Peak Compiler Invocation (Continued)

Fortran benchmarks:
```
ifort -m64
```

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

Peak Portability Flags

```
      410.bwaves: -DSPEC_CPU_LP64
      416.gamess: -DSPEC_CPU_LP64
        433.milc: -DSPEC_CPU_LP64
      434.zeusmp: -DSPEC_CPU_LP64
     435.gromacs: -DSPEC_CPU_LP64 -nofor_main
   436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
     437.leslie3d: -DSPEC_CPU_LP64
        444.namd: -DSPEC_CPU_LP64
       447.dealII: -DSPEC_CPU_LP64
       450.soplex: -D_FILE_OFFSET_BITS=64
      453.povray: -DSPEC_CPU_LP64
     454.calculix: -DSPEC_CPU_LP64 -nofor_main
    459.GemsFDTD: -DSPEC_CPU_LP64
        465.tonto: -DSPEC_CPU_LP64
         470.lbm: -DSPEC_CPU_LP64
         481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
      482.sphinx3: -DSPEC_CPU_LP64
```

Peak Optimization Flags

C benchmarks:

```
        433.milc: basepeak = yes
```

```
         470.lbm: basepeak = yes
```

```
      482.sphinx3: basepeak = yes
```

C++ benchmarks:

```
        444.namd: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
                  -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                  -no-prec-div(pass 2) -fno-alias -auto-ilp32
                  -qopt-mem-layout-trans=3
```

```
       447.dealII: basepeak = yes
```

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Peak Optimization Flags (Continued)

    450.soplex: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
                -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                -no-prec-div(pass 2) -qopt-malloc-options=3
                -qopt-mem-layout-trans=3

    453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
                -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                -no-prec-div(pass 2) -unroll4 -qopt-mem-layout-trans=3

  Fortran benchmarks:

    410.bwaves: basepeak = yes

    416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
                -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                -no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-

    434.zeusmp: basepeak = yes

    437.leslie3d: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch

  459.GemsFDTD: basepeak = yes

      465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
                 -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                 -no-prec-div(pass 2) -unroll4 -auto -inline-calloc
                 -qopt-malloc-options=3

  Benchmarks using both Fortran and C:

    435.gromacs: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
                 -par-num-threads=1(pass 1) -qopt-prefetch -auto-ilp32
                 -qopt-mem-layout-trans=3

  436.cactusADM: basepeak = yes

    454.calculix: basepeak = yes

       481.wrf: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revD.html
http://www.spec.org/cpu2006/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/cpu2006/flags/Intel-ic17.0-official-linux64-revD.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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

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