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

ProLiant XL420 Gen9
(2.10 GHz, Intel Xeon E5-2683 v4)

$SPECfp®\_rate2006 =$ 946
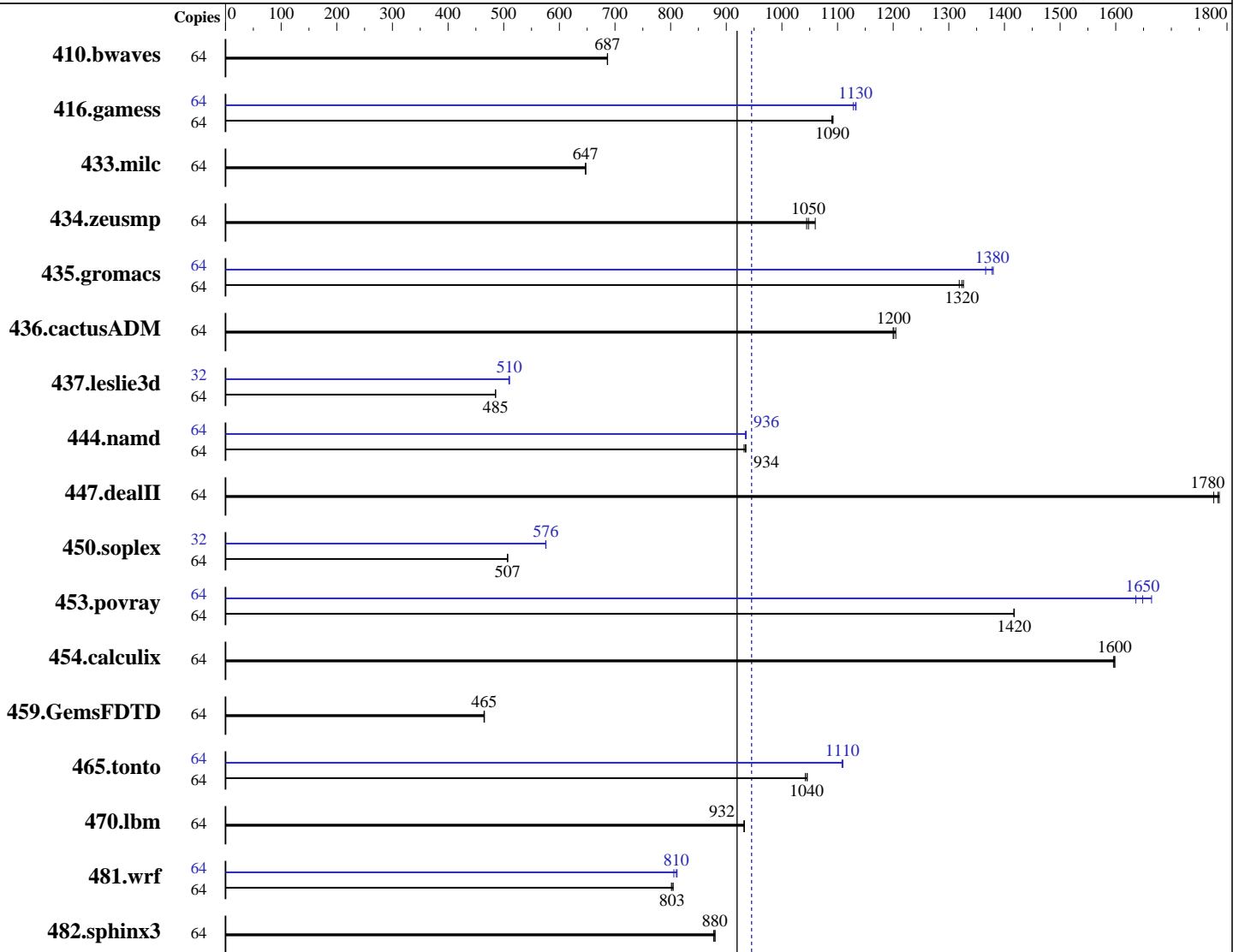
$SPECfp\_rate\_base2006 =$ 919

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

Test date: Jun-2016
Hardware Availability: Mar-2016
Software Availability: Dec-2015

Benchmark	Copies	Value
410.bwaves	64	687
416.gamess	64	1130
416.gamess	64	1090
433.milc	64	647
434.zeusmp	64	1050
435.gromacs	64	1380
435.gromacs	64	1320
436.cactusADM	64	1200
437.leslie3d	32	510
437.leslie3d	64	485
444.namd	64	936
444.namd	64	934
447.dealII	64	1780
450.soplex	32	576
450.soplex	64	507
453.povray	64	1650
453.povray	64	1420
454.calculix	64	1600
459.GemsFDTD	64	465
465.tonto	64	1110
465.tonto	64	1040
470.lbm	64	932
481.wrf	64	810
481.wrf	64	803
482.sphinx3	64	880

SPECfp_rate_base2006 = 919

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Hardware

CPU Name: Intel Xeon E5-2683 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 32 cores, 2 chips, 16 cores/chip, 2 threads/core
CPU(s) orderable: 1,2 chips
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 16.0.0.101 of Intel C++
Studio XE for Linux;
Fortran: Version 16.0.0.101 of Intel Fortran
Studio XE for Linux
Auto Parallel: No
File System: btrfs
System State: Run level 5 (multi-user, w/GUI)

Continued on next page

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L3 Cache:	40 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	256 GB (8 x 32 GB 2Rx4 PC4-2400T-R)	Other Software:	None
Disk Subsystem:	2 x 480 GB SATA SSD, RAID 1		
Other Hardware:	None		

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	64	1267	687	**1267**	**687**	1267	686	64	1267	687	**1267**	**687**	1267	686
416.gamess	64	1150	1090	1148	1090	**1149**	**1090**	64	1111	1130	1106	1130	**1107**	**1130**
433.milc	64	908	647	**908**	**647**	908	647	64	908	647	**908**	**647**	908	647
434.zeusmp	64	549	1060	558	1040	**556**	**1050**	64	549	1060	558	1040	**556**	**1050**
435.gromacs	64	347	1320	**345**	**1320**	344	1330	64	331	1380	**332**	**1380**	334	1370
436.cactusADM	64	**637**	**1200**	635	1200	637	1200	64	**637**	**1200**	635	1200	637	1200
437.leslie3d	64	**1240**	**485**	1240	485	1239	485	32	589	510	591	509	**590**	**510**
444.namd	64	549	935	**549**	**934**	551	932	64	548	936	**549**	**936**	549	934
447.dealII	64	412	1780	410	1790	**410**	**1780**	64	412	1780	410	1790	**410**	**1780**
450.soplex	64	1053	507	1053	507	**1053**	**507**	32	463	576	**464**	**576**	464	576
453.povray	64	240	1420	**240**	**1420**	240	1420	64	**207**	**1650**	208	1640	205	1660
454.calculix	64	331	1600	**330**	**1600**	330	1600	64	331	1600	**330**	**1600**	330	1600
459.GemsFDTD	64	1459	465	1462	465	**1460**	**465**	64	1459	465	1462	465	**1460**	**465**
465.tonto	64	604	1040	602	1050	**603**	**1040**	64	568	1110	568	1110	**568**	**1110**
470.lbm	64	943	933	**943**	**932**	944	932	64	943	933	**943**	**932**	944	932
481.wrf	64	888	805	**891**	**803**	892	801	64	**882**	**810**	881	812	887	806
482.sphinx3	64	1418	880	1422	877	**1418**	**880**	64	1418	880	1422	877	**1418**	**880**

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 with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
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:
  Power Profile set to Custom
  Power Regulator to HP Static High Performance Mode
  Minimum Processor Idle Power Core C-State set to C6 State
  Minimum Processor Idle Power Package C-State set to No Package State
  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/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on xl420-g9-mvb Wed Jun 22 17:37:07 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 E5-2683 v4 @ 2.10GHz
      2 "physical id"s (chips)
      64 "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 : 16
      siblings  : 32
      physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
      physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
   cache size : 20480 KB

From /proc/meminfo
   MemTotal:      264214384 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"
```

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CPU2006 license: 3		**Test date:**	Jun-2016
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Platform Notes (Continued)

```
        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 xl420-g9-mvb 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 5 Jun 22 17:34

 SPEC is set to: /home/cpu2006
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda3       btrfs  370G   15G  355G   5% /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 U19 03/10/2016
  Memory:
    8x UNKNOWN NOT AVAILABLE
    8x UNKNOWN NOT AVAILABLE 32 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:
 8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

General Notes

```
 Environment variables set by runspec before the start of the run:
 LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

  Binaries compiled on a system with 1x Intel Xeon E5-2660 v4 CPU + 128GB
  memory using RedHat EL 7.2
```

Base Compiler Invocation

C benchmarks:
    icc   -m64

C++ benchmarks:
    icpc   -m64

Fortran benchmarks:
    ifort -m64

Continued on next page

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Base Compiler Invocation (Continued)

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

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 -static -opt-prefetch -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-fp-model fast=2                          -auto-ilp32 -ansi-alias
```

Fortran benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-qopt-prefetch-issue-excl-hint
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint
```

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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_2016/linux/lib/ia32_lin

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:

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Peak Optimization Flags (Continued)

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

447.dealII: basepeak = yes

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

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

Fortran benchmarks:

410.bwaves: basepeak = yes

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

434.zeusmp: basepeak = yes

437.leslie3d: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-static`(pass 2) `-prof-use`(pass 2)
`-opt-malloc-options=3` `-opt-prefetch`

459.GemsFDTD: basepeak = yes

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

Benchmarks using both Fortran and C:

435.gromacs: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2)
`-par-num-threads=1`(pass 1) `-static`(pass 2)
`-opt-mem-layout-trans=3`(pass 2) `-prof-use`(pass 2)
`-opt-prefetch` `-auto-ilp32`

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Peak Optimization Flags (Continued)

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -auto-ilp32

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

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

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