SPEC® CFP2006 Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

Synergy 480 Gen9
(3.50 GHz, Intel Xeon E5-2637 v4)

$SPECfp®\_rate2006 = \quad 458$

$SPECfp\_rate\_base2006 = \quad 443$

CPU2006 license: 3		**Test date:**	Oct-2016
Test sponsor:	HPE	**Hardware Availability:**	Dec-2016
Tested by:	HPE	**Software Availability:**	Sep-2016

Benchmark	Copies	Result
410.bwaves	16	462
416.gamess	16	418
416.gamess	16	406
433.milc	16	513
434.zeusmp	16	500
435.gromacs	16	498
435.gromacs	16	492
436.cactusADM	16	517
437.leslie3d	8	378
437.leslie3d	16	287
444.namd	16	326
444.namd	16	324
447.dealII	16	642
450.soplex	16	306
453.povray	16	622
453.povray	16	527
454.calculix	16	632
459.GemsFDTD	16	262
465.tonto	16	496
465.tonto	16	464
470.lbm	16	509
481.wrf	16	543
482.sphinx3	16	393

SPECfp_rate_base2006 = 443

SPECfp_rate2006 = 458

Hardware

CPU Name:	Intel Xeon E5-2637 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	3500
FPU:	Integrated
CPU(s) enabled:	8 cores, 2 chips, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 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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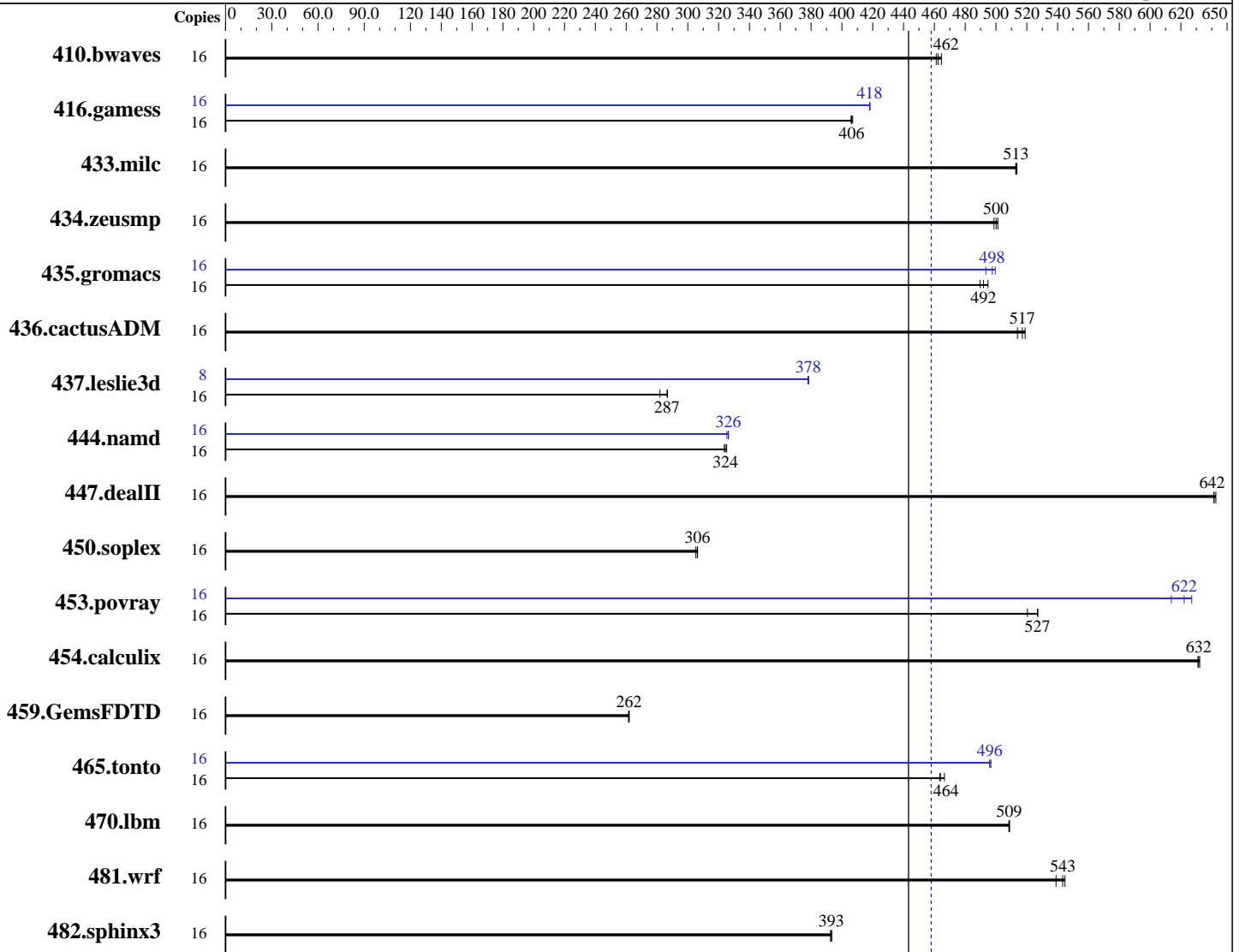$SPECfp\_rate\_base2006 =$ 443

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L3 Cache:	15 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)	Other Software:	None
Disk Subsystem:	1 x 600 GB 10 K SAS, RAID 0		
Other Hardware:	None		

Results Table

	Base						Peak						
Benchmark	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
410.bwaves	16	468	465	471	461	**470**	**462**	16	468	465	471	461	**470**	**462**
416.gamess	16	772	406	770	407	**771**	**406**	16	749	418	**749**	**418**	750	418
433.milc	16	286	513	286	514	**286**	**513**	16	286	513	286	514	**286**	**513**
434.zeusmp	16	**291**	**500**	291	501	292	499	16	**291**	**500**	291	501	292	499
435.gromacs	16	231	495	**232**	**492**	233	490	16	232	493	**230**	**498**	229	500
436.cactusADM	16	372	514	368	519	**370**	**517**	16	372	514	368	519	**370**	**517**
437.leslie3d	16	534	282	524	287	**525**	**287**	8	199	378	**199**	**378**	199	378
444.namd	16	395	325	397	324	**396**	**324**	16	394	325	393	326	**393**	**326**
447.dealII	16	285	641	**285**	**642**	285	643	16	285	641	**285**	**642**	285	643
450.soplex	16	**436**	**306**	437	305	436	306	16	**436**	**306**	437	305	436	306
453.povray	16	161	527	**162**	**527**	164	520	16	139	614	136	627	**137**	**622**
454.calculix	16	209	631	209	632	**209**	**632**	16	209	631	209	632	**209**	**632**
459.GemsFDTD	16	648	262	**648**	**262**	649	262	16	648	262	**648**	**262**	649	262
465.tonto	16	**339**	**464**	337	467	340	464	16	**317**	**496**	317	497	317	496
470.lbm	16	432	509	**432**	**509**	432	508	16	432	509	**432**	**509**	432	508
481.wrf	16	**329**	**543**	332	539	328	545	16	**329**	**543**	332	539	328	545
482.sphinx3	16	**793**	**393**	793	393	794	393	16	**793**	**393**	793	393	794	393

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

Test date: Oct-2016
Hardware Availability: Dec-2016
Software Availability: Sep-2016

Platform Notes

```
BIOS Configuration:
  Power Profile set to Custom
  Power Regulator to 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
  Energy/Performance Bias set to Maximum 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 Refresh Rate set to 1x Refresh

Sysinfo program /home/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-hiyk Wed Oct 19 22:20:25 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 E5-2637 v4 @ 3.50GHz
      2 "physical id"s (chips)
      16 "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 0 1 2 3
      physical 1: cores 0 1 2 3
   cache size : 15360 KB

From /proc/meminfo
   MemTotal:       264549336 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"
```

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Tested by: HPE

Test date: Oct-2016
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Software Availability: Sep-2016

Platform Notes (Continued)

```
        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-hiyk 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 Oct 19 14:21

  SPEC is set to: /home/cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda4       xfs   331G   78G  253G  24% /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 I37 09/14/2016
     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
```

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/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

Continued on next page

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Base Compiler Invocation (Continued)

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

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 -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
```

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Hardware Availability: Dec-2016
Software Availability: Sep-2016

Peak Compiler Invocation

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

C++ benchmarks:
```
icpc -m64
```

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

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`

  450.soplex: `basepeak = yes`

  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`

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Peak Optimization Flags (Continued)

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/HP-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64.xml

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

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