SPEC® CFP2006 Result
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Hewlett-Packard Company

ProLiant DL180 Gen9
(2.60 GHz, Intel Xeon E5-2640 v3)

$SPECfp®_rate2006 = $ 597

$SPECfp_rate_base2006 = $ 582

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

Test date: Sep-2014
Hardware Availability: Sep-2014
Software Availability: Jun-2014

Copies	Benchmark	Result
32	410.bwaves	507
32	416.gamess	627
32	416.gamess	598
32	433.milc	492
32	433.milc	492
32	434.zeusmp	672
32	435.gromacs	715
32	435.gromacs	704
32	436.cactusADM	781
16	437.leslie3d	384
32	437.leslie3d	352
32	444.namd	486
32	444.namd	478
32	447.dealII	903
16	450.soplex	378
32	450.soplex	349
32	453.povray	931
32	453.povray	828
32	454.calculix	910
32	459.GemsFDTD	339
32	465.tonto	669
32	465.tonto	629
32	470.lbm	653
32	481.wrf	602
32	481.wrf	595
32	482.sphinx3	553
32	482.sphinx3	550

SPECfp_rate_base2006 = 582

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Hardware

CPU Name: Intel Xeon E5-2640 v3
CPU Characteristics: Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz: 2600
FPU: Integrated
CPU(s) enabled: 16 cores, 2 chips, 8 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: Red Hat Enterprise Linux Server release 7.0 (Maipo)
Kernel 3.10.0-123.el7.x86_64
Compiler: C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux;
Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: xfs

Continued on next page

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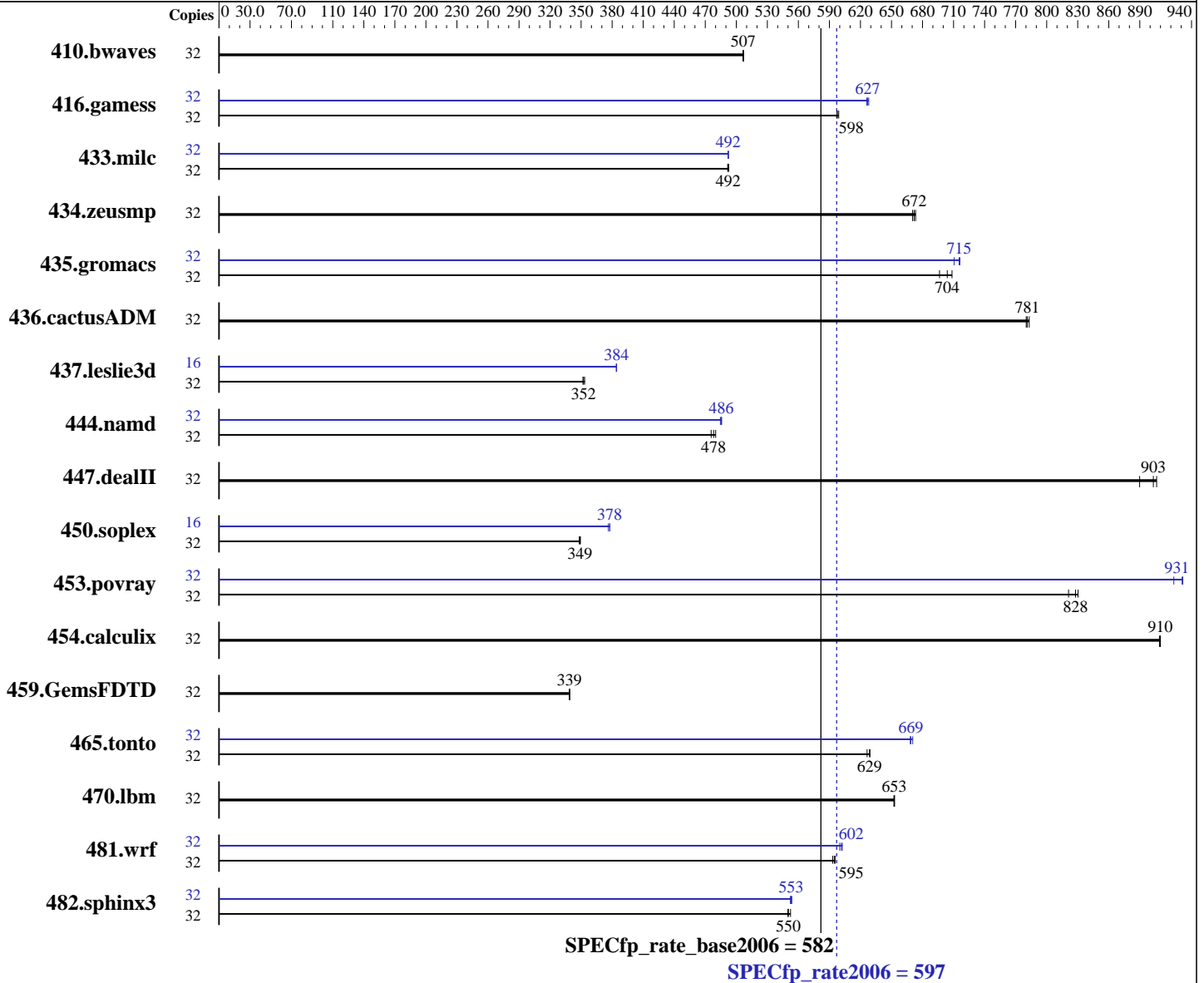|	
CPU2006 license: 3	**Test date:** Sep-2014
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L3 Cache:	20 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	32/64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)	Peak Pointers:	32/64-bit
		Other Software:	None
Disk Subsystem:	1 x 400 GB SAS SSD, 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	32	858	507	859	506	**858**	**507**	32	858	507	859	506	**858**	**507**
416.gamess	32	**1048**	**598**	1049	597	1046	599	32	**1000**	**627**	1001	626	998	628
433.milc	32	**597**	**492**	596	493	597	492	32	597	492	597	492	**597**	**492**
434.zeusmp	32	433	673	**433**	**672**	434	670	32	433	673	**433**	**672**	434	670
435.gromacs	32	**325**	**704**	328	696	322	709	32	319	716	322	711	**319**	**715**
436.cactusADM	32	**490**	**781**	488	783	490	780	32	**490**	**781**	488	783	490	780
437.leslie3d	32	851	353	**854**	**352**	855	352	16	391	384	392	384	**391**	**384**
444.namd	32	535	480	539	476	**537**	**478**	32	**529**	**486**	528	486	530	485
447.dealII	32	411	890	**405**	**903**	404	906	32	411	890	**405**	**903**	404	906
450.soplex	32	**765**	**349**	764	349	766	348	16	**353**	**378**	355	376	353	378
453.povray	32	205	830	207	821	**206**	**828**	32	**183**	**931**	183	932	184	923
454.calculix	32	290	910	290	909	**290**	**910**	32	290	910	290	909	**290**	**910**
459.GemsFDTD	32	1002	339	**1002**	**339**	1001	339	32	1002	339	**1002**	**339**	1001	339
465.tonto	32	**501**	**629**	503	626	500	629	32	471	668	**471**	**669**	470	671
470.lbm	32	673	653	**674**	**653**	674	652	32	673	653	**674**	**653**	674	652
481.wrf	32	**601**	**595**	603	593	600	596	32	593	602	**594**	**602**	596	600
482.sphinx3	32	1129	552	**1133**	**550**	1134	550	32	**1128**	**553**	1129	552	1126	554

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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Test date: Sep-2014
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Software Availability: Jun-2014

Platform Notes

```
BIOS Configuration:
 HP Power Profile set to Maximum Performance
 Collaborative Power Control set to Disabled
 QPI Snoop Configuration set to Cluster on Die
 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 kokomotop Wed Sep 24 06:39:31 2014

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 E5-2640 v3 @ 2.60GHz
      2 "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 : 8
      siblings  : 16
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7
   cache size : 20480 KB

From /proc/meminfo
   MemTotal:       263714124 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.0 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.0"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.0 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.0:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.0:ga:server

uname -a:
   Linux kokomotop 3.10.0-123.el7.x86_64 #1 SMP Mon May 5 11:16:57 EDT 2014
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Sep 24 06:30
```

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Test date: Sep-2014

Hardware Availability: Sep-2014

Software Availability: Jun-2014

Platform Notes (Continued)

```
  SPEC is set to: /home/cpu2006
    Filesystem              Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   318G  5.8G  313G   2% /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 U20 07/12/2014
  Memory:
   16x HP NOT AVAILABLE 16 GB 2 rank 2133 MHz, configured at 1866 MHz

 (End of data from sysinfo program)
```

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 Core i5-4670K CPU + 16GB
 memory using RedHat EL 7.0
```

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
```

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
```

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Base Portability Flags (Continued)

```
   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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-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/composer_xe_2015/lib/ia32
```

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

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

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Tested by: Hewlett-Packard Company		**Software Availability:**	Jun-2014

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
     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: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2)
                 -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
                 -auto-ilp32

       470.lbm: basepeak = yes

    482.sphinx3: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-mem-layout-trans=3
                 -unroll2
```

C++ benchmarks:

```
      444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(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(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(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(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2)
                 -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -unroll4
                 -ansi-alias
```

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Software Availability: Jun-2014

Peak Optimization Flags (Continued)

Fortran benchmarks:

　　410.bwaves: basepeak = yes

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

　　434.zeusmp: basepeak = yes

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

　459.GemsFDTD: basepeak = yes

　　465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
　　　　　　　　-O3(pass 2) -no-prec-div(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(pass 1) -ipo(pass 2)
　　　　　　　　-O3(pass 2) -no-prec-div(pass 2)
　　　　　　　　-opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
　　　　　　　　-opt-prefetch -auto-ilp32

　436.cactusADM: basepeak = yes

　　454.calculix: basepeak = yes

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html

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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.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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