SPEC® CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

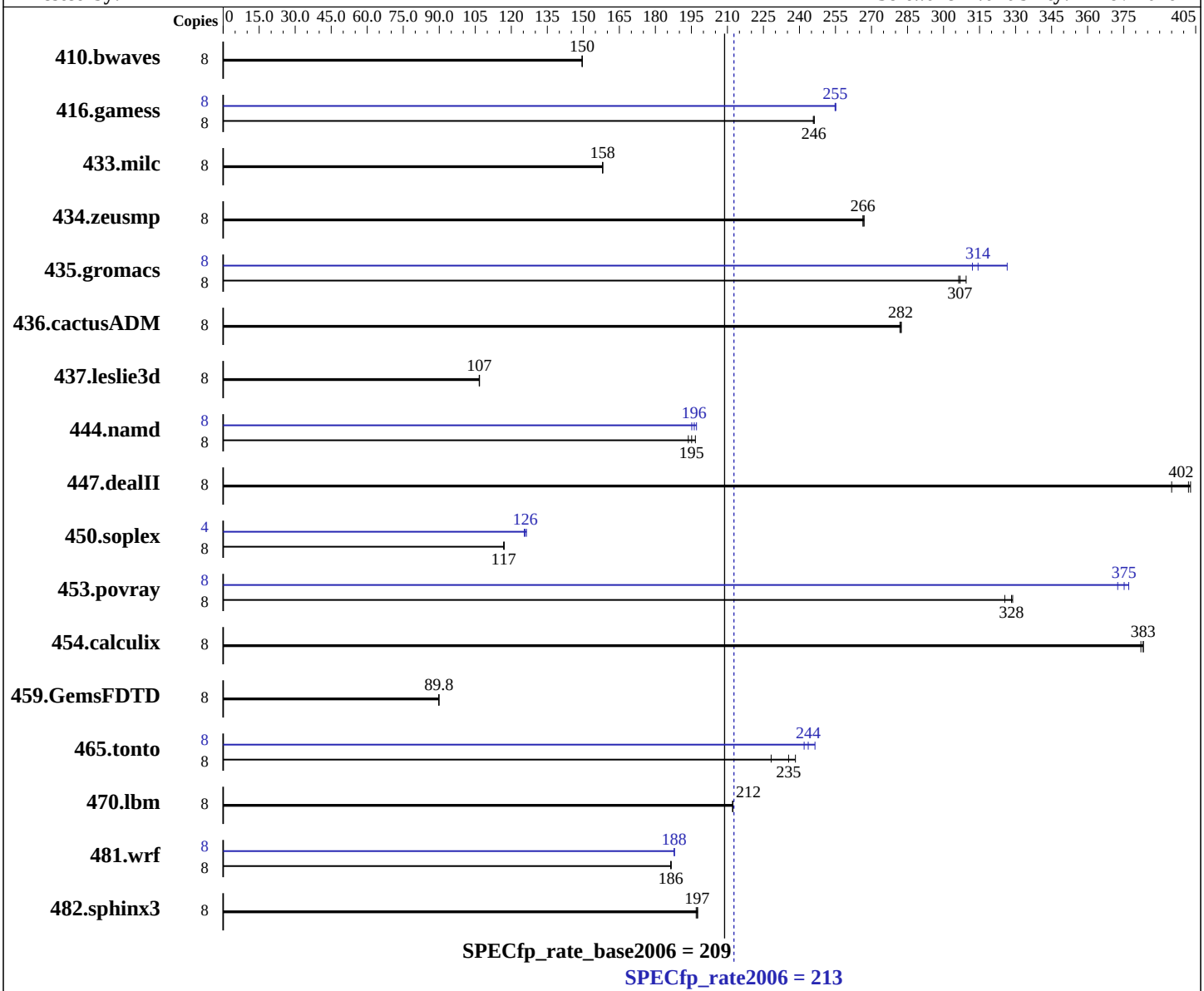
ProLiant ML30 Gen9
(3.90 GHz, Intel Xeon E3-1280 v6)

SPECfp®_rate2006 = 213

SPECfp_rate_base2006 = 209

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

Test date: Mar-2017
Hardware Availability: May-2017
Software Availability: Nov-2016



Hardware

CPU Name:	Intel Xeon E3-1280 v6
CPU Characteristics:	Intel Turbo Boost Technology up to 4.20 GHz
CPU MHz:	3900
FPU:	Integrated
CPU(s) enabled:	4 cores, 1 chip, 4 cores/chip, 2 threads/core
CPU(s) orderable:	1 chips
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core

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Software

Operating System:	Red Hat Enterprise Linux Server 7.3 Kernel 3.10.0-514
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
Auto Parallel:	No
File System:	xfs
System State:	Run level 3 (multi-user)

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L3 Cache: 8 MB I+D on chip per chip
Other Cache: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2400T-E)
Disk Subsystem: 1 x 1 TB SATA 7.2 K RPM, RAID 0
Other Hardware: None

Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	8	**727**	**150**	727	149	727	150	8	**727**	**150**	727	149	727	150
416.gamess	8	637	246	**637**	**246**	636	246	8	**614**	**255**	615	255	614	255
433.milc	8	465	158	465	158	**465**	**158**	8	465	158	465	158	**465**	**158**
434.zeusmp	8	273	266	273	267	**273**	**266**	8	273	266	273	267	**273**	**266**
435.gromacs	8	**186**	**307**	186	306	185	309	8	183	312	**182**	**314**	175	327
436.cactusADM	8	338	282	**339**	**282**	339	282	8	338	282	**339**	**282**	339	282
437.leslie3d	8	705	107	705	107	**705**	**107**	8	705	107	705	107	**705**	**107**
444.namd	8	331	194	**329**	**195**	326	197	8	329	195	325	197	**327**	**196**
447.dealII	8	227	403	232	395	**228**	**402**	8	227	403	232	395	**228**	**402**
450.soplex	8	570	117	571	117	**571**	**117**	4	264	126	**265**	**126**	266	125
453.povray	8	**130**	**328**	131	326	129	329	8	**113**	**375**	113	377	114	373
454.calculix	8	**172**	**383**	172	383	173	382	8	**172**	**383**	172	383	173	382
459.GemsFDTD	8	**945**	**89.8**	945	89.8	945	89.8	8	**945**	**89.8**	945	89.8	945	89.8
465.tonto	8	**334**	**235**	345	228	330	238	8	325	242	319	246	**323**	**244**
470.lbm	8	**518**	**212**	518	212	518	212	8	**518**	**212**	518	212	518	212
481.wrf	8	479	186	**479**	**186**	479	187	8	**476**	**188**	476	188	476	188
482.sphinx3	8	792	197	**790**	**197**	789	198	8	792	197	**790**	**197**	789	198

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>
```

Platform Notes

```
BIOS Configuration:
   Power Profile set to Custom
   Minimum Processor Idle Power Core C-State set to C3 State
   Minimum Processor Idle Power Package C-State set to No Package State
   Energy/Performance Bias set to Maximum Performance
   Thermal Configuration set to Maximum Cooling
   Processor Power and Utilization Monitoring set to Disabled
   Memory Double Refresh Rate set to 1x Refresh
   NUMA Group Size Optimization set to Flat

Sysinfo program /hpe/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on RHEL73-ML30-G9 Fri Mar  3 17:37:44 2017

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 E3-1280 v6 @ 3.90GHz
      1 "physical id"s (chips)
      8 "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
   cache size : 8192 KB

From /proc/meminfo
   MemTotal:       65753508 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.3 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.3"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server

uname -a:
   Linux RHEL73-ML30-G9 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT
   2016 x86_64 x86_64 x86_64 GNU/Linux
```

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Platform Notes (Continued)

```
 run-level 3 Mar 3 17:20

 SPEC is set to: /hpe/cpu2006
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda3      xfs   500G   34G  466G   7% /
 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 U23 01/17/2017
   Memory:
    4x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz

 (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/hpe/cpu2006/libs/32:/hpe/cpu2006/libs/64:/hpe/cpu2006/sh10.2"

 Binaries compiled on a system with 1x Intel Core i7-4790K 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

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64

Continued on next page

Base Portability Flags (Continued)

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 -no-prec-sqrt -static
-qopt-prefetch -fp-model fast=2
-qopt-prefetch-issue-excl-hint -auto-ilp32 -ansi-alias
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static
-qopt-prefetch -fp-model fast=2
-qopt-prefetch-issue-excl-hint -auto-ilp32 -ansi-alias
-qopt-mem-layout-trans=3 -qopt-calloc

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static
-qopt-prefetch -fp-model fast=2
-qopt-prefetch-issue-excl-hint

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static
-qopt-prefetch -fp-model fast=2
-qopt-prefetch-issue-excl-hint -auto-ilp32 -ansi-alias
-qopt-mem-layout-trans=3

Peak Compiler Invocation

C benchmarks:
icc -m64

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Peak Compiler Invocation (Continued)

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

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

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: -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) -no-prec-sqrt(pass 2)
-static(pass 2) -qopt-mem-layout-trans=3(pass 2)

Continued on next page

Peak Optimization Flags (Continued)

444.namd (continued):
-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) -no-prec-sqrt(pass 2)
-static(pass 2) -qopt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -qopt-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) -no-prec-sqrt(pass 2)
-static(pass 2) -qopt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -prof-gen=threadsafe(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) -no-prec-sqrt(pass 2)
-static(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: basepeak = yes

465.tonto: -prof-gen=threadsafe(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) -no-prec-sqrt(pass 2)
-static(pass 2) -unroll4 -auto -inline-calloc
-qopt-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) -no-prec-sqrt(pass 2)
-static(pass 2) -qopt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -qopt-prefetch -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

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Peak Optimization Flags (Continued)

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

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/HPE-Compiler-Flags-Intel-V1.2-HSW-revI.html`
`http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-HSW-revG.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2006/flags/HPE-Compiler-Flags-Intel-V1.2-HSW-revI.xml`
`http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-HSW-revG.xml`

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