



SPEC[®] CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL560 Gen9

(2.10 GHz, Intel Xeon E5-4620 v4)

SPECfp[®]_rate2006 = 1360

SPECfp_rate_base2006 = 1330

CPU2006 license: 3

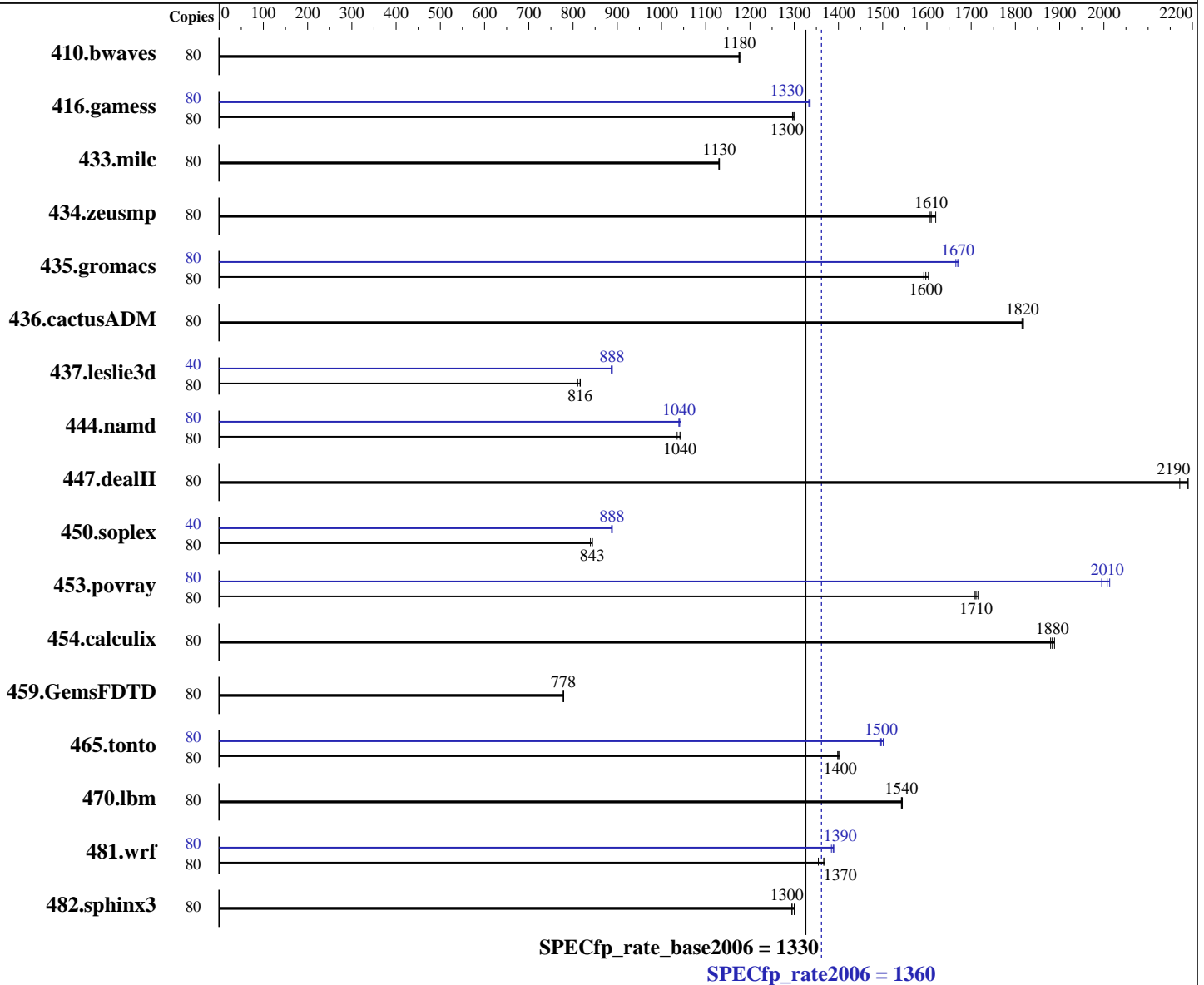
Test sponsor: HPE

Tested by: HPE

Test date: Sep-2016

Hardware Availability: Jul-2016

Software Availability: Dec-2015



Hardware

CPU Name: Intel Xeon E5-4620 v4
 CPU Characteristics: Intel Turbo Boost Technology up to 2.60 GHz
 CPU MHz: 2100
 FPU: Integrated
 CPU(s) enabled: 40 cores, 4 chips, 10 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 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: xfs
 System State: Run level 3 (multi-user)

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L3 Cache: 25 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 2133 MHz)
Disk Subsystem: 1 x 400 GB SAS SSD, 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	80	925	1180	923	1180	925	1180	80	925	1180	923	1180	925	1180
416.gamess	80	1209	1300	1206	1300	1205	1300	80	1174	1330	1172	1340	1175	1330
433.milc	80	649	1130	650	1130	650	1130	80	649	1130	650	1130	650	1130
434.zeusmp	80	449	1620	453	1610	452	1610	80	449	1620	453	1610	452	1610
435.gromacs	80	359	1590	358	1600	356	1600	80	342	1670	343	1670	342	1670
436.cactusADM	80	526	1820	527	1810	526	1820	80	526	1820	527	1810	526	1820
437.leslie3d	80	928	811	921	817	922	816	40	423	888	423	889	424	886
444.namd	80	616	1040	615	1040	620	1040	80	617	1040	615	1040	617	1040
447.dealII	80	418	2190	421	2170	418	2190	80	418	2190	421	2170	418	2190
450.soplex	80	791	843	791	844	795	839	40	376	887	375	889	376	888
453.povray	80	249	1710	248	1720	249	1710	80	213	2000	212	2010	211	2010
454.calculix	80	350	1880	351	1880	349	1890	80	350	1880	351	1880	349	1890
459.GemsFDTD	80	1094	776	1090	779	1091	778	80	1094	776	1090	779	1091	778
465.tonto	80	562	1400	563	1400	561	1400	80	524	1500	526	1500	526	1500
470.lbm	80	712	1540	712	1540	713	1540	80	712	1540	712	1540	713	1540
481.wrf	80	653	1370	654	1370	660	1350	80	643	1390	644	1390	646	1380
482.sphinx3	80	1204	1290	1199	1300	1204	1300	80	1204	1290	1199	1300	1204	1300

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:

```

HP Power Profile set to Custom
HP 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/custom/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on sles12biswadl560 Thu Sep 22 20:45:47 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 E5-4620 v4 @ 2.10GHz
 4 "physical id"s (chips)
 80 "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 : 10
  siblings  : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12
  physical 2: cores 0 1 2 3 4 8 9 10 11 12
  physical 3: cores 0 1 2 3 4 8 9 10 11 12
cache size : 12800 KB

```

From /proc/meminfo

```

MemTotal:      529306040 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"

```

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Platform Notes (Continued)

```
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"
```

```
uname -a:
Linux sles12biswadl560 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 Sep 21 23:57
```

```
SPEC is set to: /home/custom/cpu2006
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4        xfs   331G  132G  199G  40% /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 P85 07/01/2016

Memory:

16x UNKNOWN NOT AVAILABLE

32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 2133 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 2133 MHz

General Notes

Environment variables set by runspec before the start of the run:

```
LD_LIBRARY_PATH = "/home/custom/cpu2006/libs/32:/home/custom/cpu2006/libs/64:/home/custom/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
```

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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 -no-prec-sqrt -static -auto-ilp32
 -ansi-alias -opt-mem-layout-trans=3 -opt-prefetch
 -qopt-prefetch-issue-excl-hint

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -no-prec-sqrt -static -auto-ilp32
 -ansi-alias -opt-mem-layout-trans=3 -qopt-calloc

Fortran benchmarks:

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



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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.deallI: -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) -no-prec-sqrt(pass 2)
-static(pass 2) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -fno-alias -auto-ilp32

447.dealll: 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) -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) -no-prec-sqrt(pass 2)
-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) -no-prec-sqrt(pass 2)
-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) -no-prec-sqrt(pass 2)
-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) -no-prec-sqrt(pass 2)
-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) -no-prec-sqrt(pass 2)

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Peak Optimization Flags (Continued)

435.gromacs (continued):

```
-static(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 -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/HP-Compiler-Flags-Intel-V1.2-HSW-revG.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-revG.xml>

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml>

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