SPEC® CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

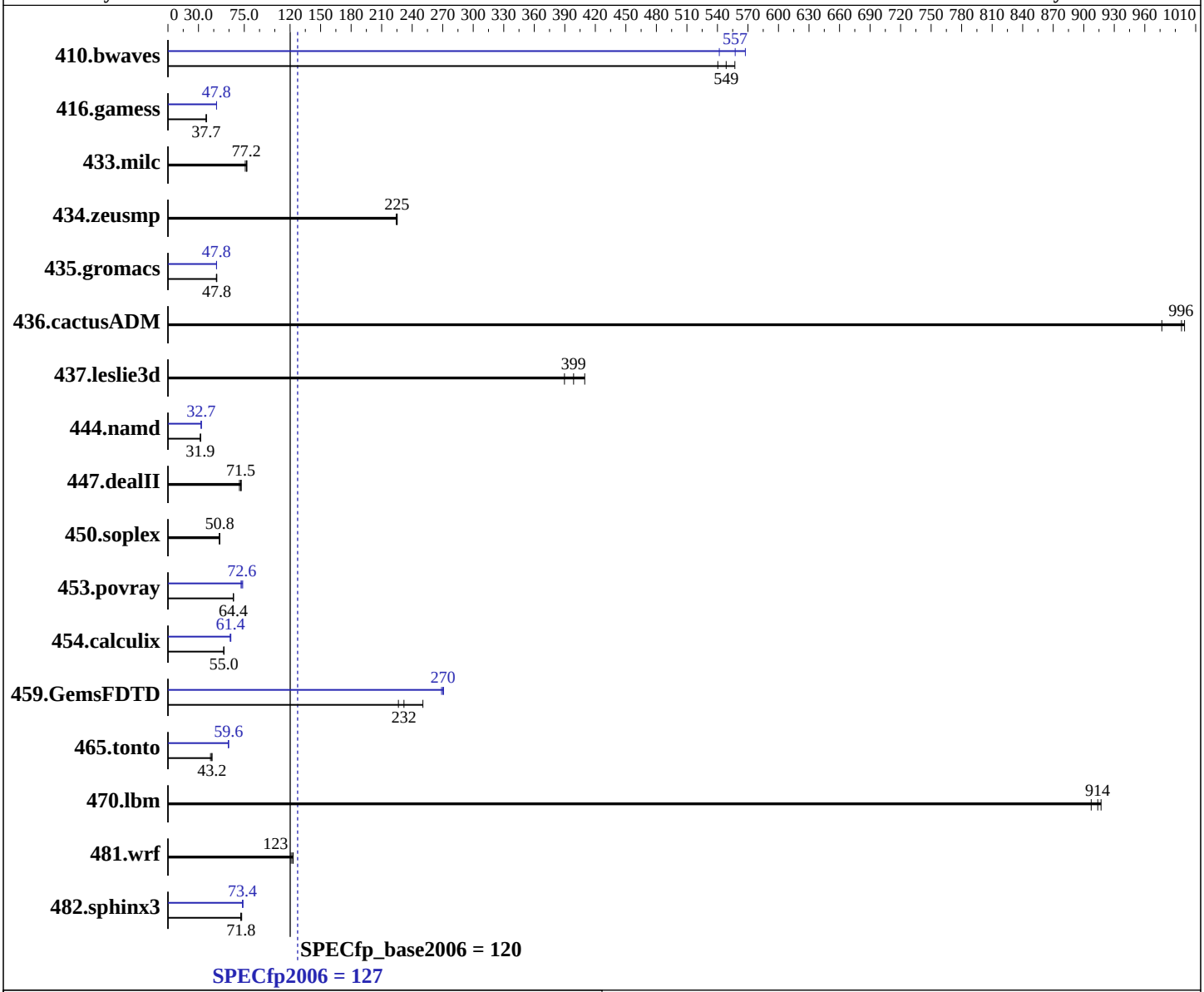
ProLiant DL380 Gen9
(2.40 GHz, Intel Xeon E5-2699A v4)

SPECfp®2006 = 127

SPECfp_base2006 = 120

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

Test date: Oct-2016
Hardware Availability: Oct-2016
Software Availability: Dec-2015



Hardware

CPU Name:	Intel Xeon E5-2699A v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz:	2400
FPU:	Integrated
CPU(s) enabled:	44 cores, 2 chips, 22 cores/chip
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

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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:	Yes
File System:	xfs
System State:	Run level 3 (multi-user)

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L3 Cache: 55 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0
Other Hardware: None

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

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**24.8**	**549**	24.4	557	25.1	540	23.9	567	**24.4**	**557**	25.1	542
416.gamess	519	37.7	521	37.6	**520**	**37.7**	**410**	**47.8**	410	47.8	410	47.8
433.milc	118	77.6	121	76.0	**119**	**77.2**	118	77.6	121	76.0	**119**	**77.2**
434.zeusmp	40.6	224	40.4	225	**40.4**	**225**	40.6	224	40.4	225	**40.4**	**225**
435.gromacs	150	47.6	149	48.0	**149**	**47.8**	150	47.8	**149**	**47.8**	149	47.8
436.cactusADM	12.0	999	**12.0**	**996**	12.2	977	12.0	999	**12.0**	**996**	12.2	977
437.leslie3d	23.0	410	**23.6**	**399**	24.1	390	23.0	410	**23.6**	**399**	24.1	390
444.namd	251	32.0	**251**	**31.9**	251	31.9	245	32.7	**245**	**32.7**	245	32.7
447.dealII	**160**	**71.5**	163	70.3	159	72.1	**160**	**71.5**	163	70.3	159	72.1
450.soplex	165	50.4	**164**	**50.8**	164	50.9	165	50.4	**164**	**50.8**	164	50.9
453.povray	82.9	64.2	82.6	64.4	**82.7**	**64.4**	74.1	71.8	72.4	73.5	**73.3**	**72.6**
454.calculix	150	55.1	151	54.8	**150**	**55.0**	**134**	**61.4**	133	61.8	135	61.2
459.GemsFDTD	42.3	251	**45.7**	**232**	46.8	226	**39.3**	**270**	39.2	271	39.5	269
465.tonto	227	43.3	235	41.8	**228**	**43.2**	165	59.6	166	59.3	**165**	**59.6**
470.lbm	15.0	917	**15.0**	**914**	15.1	907	15.0	917	**15.0**	**914**	15.1	907
481.wrf	92.3	121	**91.1**	**123**	90.8	123	92.3	121	**91.1**	**123**	90.8	123
482.sphinx3	272	71.5	269	72.5	**271**	**71.8**	**266**	**73.4**	264	73.7	266	73.2

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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
```

Platform Notes

```
BIOS Configuration:
  Intel Hyperthreading Option set to Disabled
  Power Profile set to Balanced Power and 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 Double Refresh Rate set to 1x Refresh
```

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Platform Notes (Continued)

```
Sysinfo program /home/HP_recompiled_binaries/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on dl380-gen9-2699a Thu Oct 13 09:22:47 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 E5-2699A v4 @ 2.40GHz
      2 "physical id"s (chips)
      44 "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 : 22
      siblings  : 22
      physical 0: cores 0 2 3 4 8 10 11 12 16 17 18 19 20 21 24 25 26 27 28
      physical 1: cores 0 2 3 4 8 10 11 12 16 17 18 19 20 21 24 25 26 27 28
   cache size : 56320 KB

From /proc/meminfo
   MemTotal:       528960968 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"
      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 dl380-gen9-2699a 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 13 09:14
```

Continued on next page

Platform Notes (Continued)

```
SPEC is set to: /home/HP_recompiled_binaries/cpu2006
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda4      xfs   331G   93G  238G  29% /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 P89 09/12/2016
  Memory:
   8x UNKNOWN NOT AVAILABLE
   16x 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 512 GB and the dmidecode description should have one line reading as:
16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
OMP_NUM_THREADS = "44"
 Binaries compiled on a system with 1x Intel Xeon E5 2660 v4 CPU + 128GB RAM
 memory using Redhat Enterprise Linux 7.2
LD_LIBRARY_PATH = "/home/HP_recompiled_binaries/cpu2006/libs/32:/home/HP_recompiled_binaries/cpu2006/libs/64:/home/HP_recompiled_binaries/cpu2006/sh"
```

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`

Continued on next page

Base Portability Flags (Continued)

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 -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint -auto-ilp32

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
-qopt-calloc

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

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

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

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Peak Compiler Invocation (Continued)

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: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel
-opt-prefetch -ansi-alias
-fp-model fast=2 -nofor-main
-qopt-prefetch-issue-excl-hint -funroll-all-loops

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) -prof-use(pass 2) -fno-alias
-auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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) -prof-use(pass 2) -unroll4
-ansi-alias

Fortran benchmarks:

410.bwaves: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel
-opt-prefetch
-fp-model fast=2
-qopt-prefetch-issue-excl-hint -funroll-all-loops

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Peak Optimization Flags (Continued)

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) -prof-use(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -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) -prof-use(pass 2) -unroll2 -inline-level=0 -opt-prefetch -parallel

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) -prof-use(pass 2) -inline-calloc -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch -ansi-alias -fp-model fast=2 -nofor-main -qopt-prefetch-issue-excl-hint -funroll-all-loops -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

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-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

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