SPEC® CFP2006 Result
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Hewlett Packard Enterprise
(Test Sponsor: HPE)

$SPECfp^{®}2006 =$ 109

ProLiant DL580 Gen9
(2.00 GHz, Intel Xeon E7-4830 v4)

$SPECfp\_base2006 =$ 103

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

Test date: Sep-2016
Hardware Availability: Aug-2016
Software Availability: Dec-2015

410.bwaves 908
416.gamess 37.3 / 29.5
433.milc 57.0
434.zeusmp 182
435.gromacs 38.8 / 38.7
436.cactusADM 891
437.leslie3d 250
444.namd 25.4 / 24.8
447.dealII 54.2
450.soplex 38.7
453.povray 56.8 / 50.4
454.calculix 50.9 / 45.6
459.GemsFDTD 232 / 199
465.tonto 47.8 / 35.3
470.lbm 1360
481.wrf 96.7
482.sphinx3 61.8 / 61.0

SPECfp_base2006 = 103
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Hardware

CPU Name: Intel Xeon E7-4830 v4
CPU Characteristics: Intel Turbo Boost Technology up to 2.80 GHz
CPU MHz: 2000
FPU: Integrated
CPU(s) enabled: 56 cores, 4 chips, 14 cores/chip
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: Yes
File System: xfs
System State: Run level 3 (multi-user)

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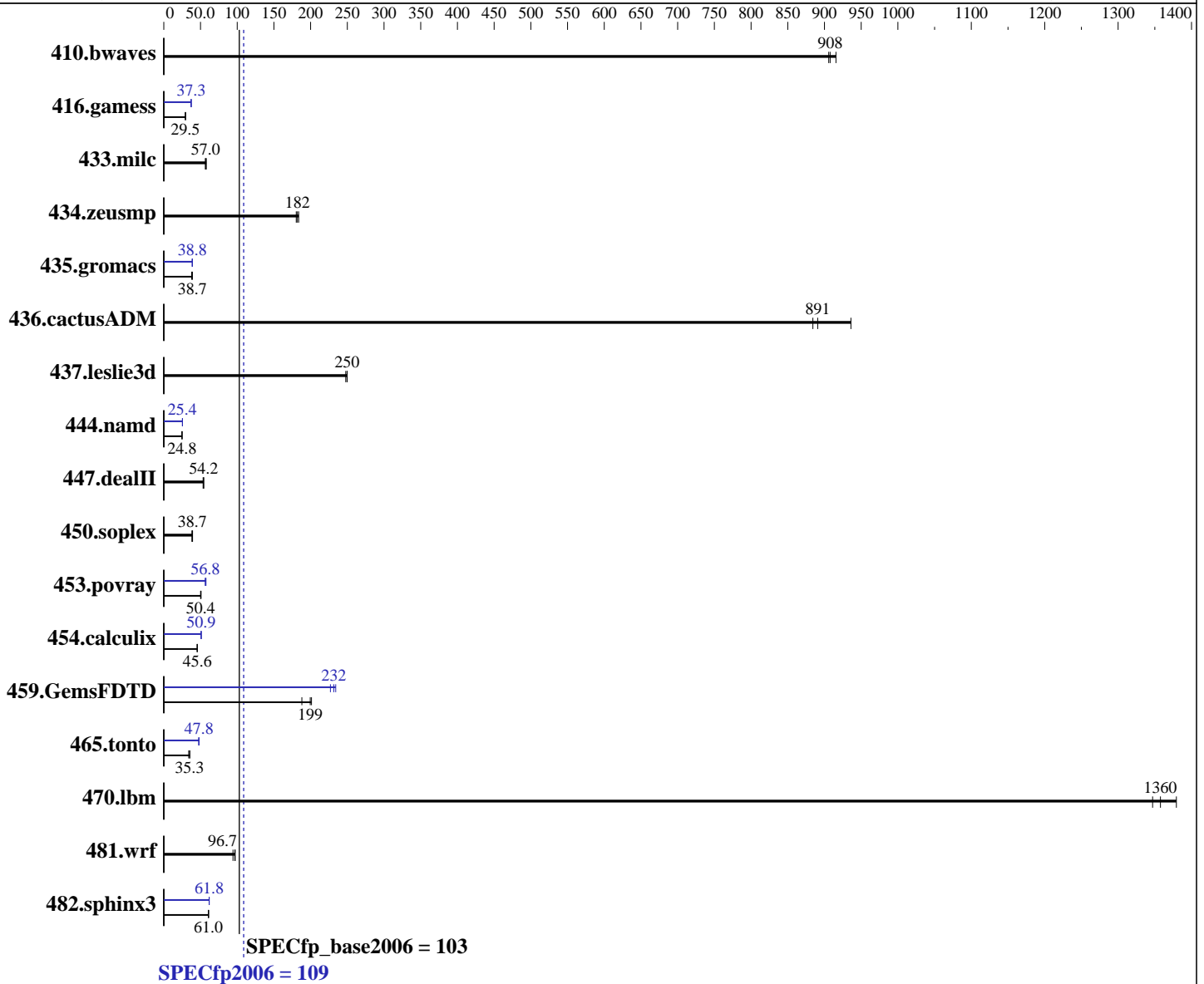
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L3 Cache:	35 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1333 MHz)	Other Software:	None
Disk Subsystem:	1 x 800 GB NVMe PCIe SSD, RAID 0		
Other Hardware:	DL580 Gen9 NVMe SSD Express Bay Enablement Kit		

Results Table

Benchmark	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
410.bwaves	**15.0**	**908**	14.8	916	15.0	906	**15.0**	**908**	14.8	916	15.0	906
416.gamess	**665**	**29.5**	665	29.4	663	29.5	525	37.3	**525**	**37.3**	526	37.3
433.milc	162	56.6	158	57.9	**161**	**57.0**	162	56.6	158	57.9	**161**	**57.0**
434.zeusmp	**50.0**	**182**	50.4	180	49.5	184	**50.0**	**182**	50.4	180	49.5	184
435.gromacs	188	38.0	184	38.8	**184**	**38.7**	184	38.8	184	38.9	**184**	**38.8**
436.cactusADM	**13.4**	**891**	12.8	936	13.5	884	**13.4**	**891**	12.8	936	13.5	884
437.leslie3d	37.6	250	**37.7**	**250**	37.9	248	37.6	250	**37.7**	**250**	37.9	248
444.namd	**323**	**24.8**	323	24.8	323	24.8	315	25.4	316	25.4	**316**	**25.4**
447.dealII	**211**	**54.2**	210	54.4	214	53.5	**211**	**54.2**	210	54.4	214	53.5
450.soplex	213	39.2	**215**	**38.7**	217	38.4	213	39.2	**215**	**38.7**	217	38.4
453.povray	106	50.1	105	50.8	**106**	**50.4**	**93.7**	**56.8**	92.6	57.5	94.2	56.5
454.calculix	181	45.5	**181**	**45.6**	181	45.6	162	50.9	162	50.9	**162**	**50.9**
459.GemsFDTD	52.7	201	**53.2**	**199**	56.4	188	**45.8**	**232**	45.3	234	46.7	227
465.tonto	279	35.3	**279**	**35.3**	290	33.9	**206**	**47.8**	206	47.7	206	47.8
470.lbm	**10.1**	**1360**	9.96	1380	10.2	1350	**10.1**	**1360**	9.96	1380	10.2	1350
481.wrf	**115**	**96.7**	119	94.3	115	97.3	**115**	**96.7**	119	94.3	115	97.3
482.sphinx3	320	61.0	321	60.7	**320**	**61.0**	**315**	**61.8**	315	61.9	316	61.7

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:
  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 Home Snoop
  Collaborative Power Control set to Disabled
```

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Platform Notes (Continued)

```
    Thermal Configuration set to Maximum Cooling
    Processor Power and Utilization Monitoring set to Disabled
    Intel Hyperthreading set to Disabled

  Sysinfo program /home/experiment/fp/new/cpu2006/config/sysinfo.rev6914
  $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
  running on linux-vi0i Fri Sep 16 16:21:23 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 E7-4830 v4 @ 2.00GHz
       4 "physical id"s (chips)
       56 "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 : 14
       siblings  : 14
       physical 0: cores 0 2 4 5 6 8 9 10 11 12 13 14
       physical 1: cores 0 2 4 5 6 8 9 10 11 12 13 14
       physical 2: cores 0 2 4 5 6 8 9 10 11 12 13 14
       physical 3: cores 0 2 4 5 6 8 9 10 11 12 13 14
    cache size : 35840 KB

  From /proc/meminfo
    MemTotal:       529319640 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"
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp1"

  uname -a:
    Linux linux-vi0i 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
    (8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```
Continued on next page

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Platform Notes (Continued)

```
  run-level 3 Sep 16 16:17

  SPEC is set to: /home/experiment/fp/new/cpu2006
     Filesystem      Type   Size  Used Avail Use% Mounted on
     /dev/nvme0n1p4 xfs   703G  133G  571G  19% /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 U17 08/06/2016
     Memory:
      64x UNKNOWN NOT AVAILABLE
      32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1333 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 1333 MHz
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
OMP_NUM_THREADS = "56"
LD_LIBRARY_PATH = "/home/experiment/fp/new/cpu2006/libs/32:/home/experiment/fp/new/cpu2006/libs/64:/home/experiment/fp/new/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`

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

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

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Peak Optimization Flags (Continued)

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

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

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