**SPEC® CFP2006 Result**

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

**ProLiant DL380 Gen9**
(1.70 GHz, Intel Xeon E5-2609 v4)

**CPU2006 license:** 3  
**Test date:** Mar-2016  
**Test sponsor:** HPE  
**Hardware Availability:** Mar-2016  
**Tested by:** HPE  
**Software Availability:** Nov-2015

- **SPECfp®2006 =** 70.9  
- **SPECfp_base2006 =** 69.3

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**Hardware**

- **CPU Name:** Intel Xeon E5-2609 v4  
- **CPU Characteristics:**  
  - CPU MHz: 1700  
  - FPU: Integrated  
  - CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip  
  - CPU(s) orderable: 1.2 chip  
  - 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 release 7.2, (Maipo)  
  - Kernel 3.10.0-327.el7.x86_64  
- **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

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L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R, running at 1866 MHz)
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0
Other Hardware: None

System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

Benchmark | Base Seconds | Ratio | Base Seconds | Ratio | Base Seconds | Ratio | Peak Seconds | Ratio | Peak Seconds | Ratio | Peak Seconds | Ratio
--- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | ---
410.bwaves | 33.8 | 403 | 34.2 | 398 | 34.4 | 395 | 33.8 | 403 | 34.2 | 398 | 34.4 | 395
416.gamess | 914 | 21.4 | 914 | 21.4 | 914 | 21.4 | 862 | 22.7 | 862 | 22.7 | 862 | 22.7
433.milc | 186 | 49.4 | 185 | 49.7 | 185 | 49.5 | 186 | 49.4 | 185 | 49.7 | 185 | 49.5
434.zeusmp | 61.3 | 148 | 61.8 | 147 | 61.7 | 148 | 61.3 | 148 | 61.8 | 147 | 61.7 | 148
435.gromacs | 230 | 31.0 | 232 | 30.8 | 234 | 30.4 | 230 | 31.0 | 232 | 30.8 | 234 | 30.4
436.cactusADM | 237 | 505 | 23.9 | 499 | 23.0 | 518 | 237 | 505 | 23.9 | 499 | 23.0 | 518
437.leslie3d | 48.9 | 192 | 46.9 | 200 | 47.3 | 199 | 48.9 | 192 | 46.9 | 200 | 47.3 | 199
444.namd | 532 | 15.1 | 532 | 15.1 | 532 | 15.1 | 520 | 15.4 | 521 | 15.4 | 521 | 15.4
447.dealII | 326 | 35.1 | 328 | 34.9 | 326 | 35.0 | 326 | 35.1 | 328 | 34.9 | 326 | 35.0
450.soplex | 294 | 28.4 | 293 | 28.4 | 293 | 28.4 | 294 | 28.4 | 293 | 28.4 | 293 | 28.4
453.povray | 173 | 30.8 | 173 | 30.7 | 174 | 30.5 | 153 | 34.7 | 155 | 34.4 | 155 | 34.4
454.calculix | 260 | 31.7 | 260 | 31.7 | 260 | 31.7 | 254 | 32.5 | 254 | 32.5 | 254 | 32.5
459.GemsFDTD | 65.2 | 163 | 66.2 | 160 | 68.9 | 154 | 61.1 | 174 | 60.7 | 175 | 61.5 | 172
465.tonto | 358 | 27.5 | 358 | 27.5 | 358 | 27.5 | 330 | 29.8 | 331 | 29.7 | 331 | 29.8
470.lbm | 280 | 491 | 27.5 | 500 | 28.7 | 478 | 280 | 491 | 27.5 | 500 | 28.7 | 478
481.wrf | 177 | 63.1 | 174 | 64.3 | 173 | 64.7 | 177 | 63.1 | 174 | 64.3 | 173 | 64.7
482.sphinx3 | 388 | 50.2 | 387 | 50.4 | 387 | 50.4 | 388 | 50.2 | 387 | 50.4 | 387 | 50.4

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 C1E 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
Continued on next page
### Platform Notes (Continued)

- 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 DL380Gen9allbin Thu Mar 24 02:05:29 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 E5-2609 v4 @ 1.70GHz
 2 "physical id"s (chips)
 16 "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 : 8
  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:       528068704 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

#### From /etc/*release* /etc/*version*

```
NAME="Red Hat Enterprise Linux Server"
VERSION="7.2 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="7.2"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
ANSI_COLOR="0;31"
CPE_NAME="cpe:/o:redhat:enterprise_linux:7.2:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
```

#### uname -a:

```
Linux DL380Gen9allbin 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT 2015 x86_64 x86_64 x86_64 GNU/Linux
```

#### run-level:

```
3
```

### SPEC is set to: /home/cpu2006

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
</table>

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Platform Notes (Continued)
/dev/sda5 xfs 318G 78G 241G 25% /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 02/22/2016
Memory:
8x UNKNOWN NOT AVAILABLE
16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz, configured at 1866 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, configured at 1866 MHz

General Notes
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
OMP_NUM_THREADS = "16"
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/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

Base Portability Flags

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

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Base Portability Flags (Continued)

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 -nofor_main
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64 -nofor_main
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFD: -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 -fp-model fast=2
-qopt-prefetch-issue-excl-hint

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
 -fp-model fast=2
-qopt-prefetch-issue-excl-hint

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 -fp-model fast=2
-qopt-prefetch-issue-excl-hint

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: 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) -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) -unroll14
-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) -unroll12
-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) -03(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) -03(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: basepeak = yes

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -03 -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-BDW-revE.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-AMD-V1.2-revC.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-BDW-revE.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-AMD-V1.2-revC.xml

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