Hewlett-Packard Company
ProLiant DL580 Gen9
(2.00 GHz, Intel Xeon E7-4809 v3)

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

CPU Name: Intel Xeon E7-4809 v3
CPU Characteristics:
FPU: Integrated
CPU(s) enabled: 32 cores, 4 chips, 8 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

Operating System: SUSE Linux Enterprise Server 12 (x86_64)
Kernel 3.12.28-4-default
Compiler:
C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux;
Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: xfs
System State: Run level 3 (multi-user)

Hewlett-Packard Company
(2.00 GHz, Intel Xeon E7-4809 v3)

SPECfp®_rate2006 = 892
SPECfp_rate_base2006 = 870

Test date: Jul-2015
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Continued on next page

Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
Hewlett-Packard Company

ProLiant DL580 Gen9
(2.00 GHz, Intel Xeon E7-4809 v3)

CPU2006 license: 3
Test date: Jul-2015

Hewlett-Packard Company
Test sponsor:
Hardware Availability: Jun-2015

L3 Cache: 20 MB I+D on chip per chip
Tested by: Hewlett-Packard Company
Other Cache: None
Software Availability: Oct-2014
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1333 MHz)
Disk Subsystem: 2 x 400 GB SAS SSD,RAID 1
Other Hardware: None

L3 Cache: 20 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1333 MHz)
Disk Subsystem: 2 x 400 GB SAS SSD,RAID 1
Other Hardware: None

SPEC CFP2006 Result

SPECfp_rate2006 = 892
SPECfp_rate_base2006 = 870

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base Pointers</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak Pointers</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>410.bwaves</td>
<td>64</td>
<td>1048</td>
<td>830</td>
<td>32/64-bit</td>
<td>1048</td>
<td>830</td>
<td>32/64-bit</td>
<td>1048</td>
<td>830</td>
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<tr>
<td>416.gamess</td>
<td>64</td>
<td>1472</td>
<td>851</td>
<td>32/64-bit</td>
<td>1473</td>
<td>851</td>
<td>32/64-bit</td>
<td>1473</td>
<td>851</td>
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<td>693</td>
<td>847</td>
<td>32/64-bit</td>
<td>694</td>
<td>847</td>
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<td>847</td>
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<td>576</td>
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<td>436.cactusADM</td>
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<td>704</td>
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<td>704</td>
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<td>32/64-bit</td>
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<td>566</td>
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<tr>
<td>465.tonto</td>
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<td>687</td>
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<tr>
<td>470.lbm</td>
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<tr>
<td>481.wrf</td>
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<td>978</td>
<td>32/64-bit</td>
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<tr>
<td>482.sphinx3</td>
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<td>1559</td>
<td>800</td>
<td>32/64-bit</td>
<td>1557</td>
<td>801</td>
<td>32/64-bit</td>
<td>1557</td>
<td>801</td>
</tr>
</tbody>
</table>

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>
Hewlett-Packard Company

ProLiant DL580 Gen9
(2.00 GHz, Intel Xeon E7-4809 v3)

SPECfp_rate2006 = 892
SPECfp_rate_base2006 = 870

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

Platform Notes

BIOS Configuration:
- HP Power Profile set to Custom
- HP Power Regulator to HP Static High Performance Mode
- Minimum Processor Idle Power Core State set to C6 State
- Energy/Performance Bias set to Maximum Performance
- 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/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on dl580gen9jks Tue Jul  7 02:20:19 2015

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 E7-4809 v3 @ 2.00GHz
- 4 "physical id"s (chips)
- 64 "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 : 16
- physical 0: cores 0 1 2 3 4 5 6 7
- physical 1: cores 0 1 2 3 4 5 6 7
- physical 2: cores 0 1 2 3 4 5 6 7
- physical 3: cores 0 1 2 3 4 5 6 7
- cache size : 20480 KB

From /proc/meminfo
- MemTotal: 529318888 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /usr/bin/lsb_release -d
- SUSE Linux Enterprise Server 12

From /etc/*release* /etc/*version*
- SuSE-release:
  - SUSE Linux Enterprise Server 12 (x86_64)
  - VERSION = 12
  - PATCHLEVEL = 0
  - # 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"
  - VERSION_ID="12"

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Hewlett-Packard Company

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Test date: Jul-2015
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Platform Notes (Continued)

PRETTY_NAME="SUSE Linux Enterprise Server 12"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12"

uname -a:
Linux dl580gen9jks 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014
(9879bd4) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jul 6 10:39

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>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>331G</td>
<td>5.4G</td>
<td>325G</td>
<td>2%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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 03/13/2015
Memory:
32x HP 752369-081 16 GB 2 rank 2133 MHz, configured at 1333 MHz
64x UNKNOWN NOT AVAILABLE

(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 HP 752369-081 16 GB 2 rank 2133 MHz, configured at 1333 MHz

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB
memory using RedHat EL 7.0

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  -opt-prefetch  -auto-p32
  -ansi-alias  -opt-mem-layout-trans=3

C++ benchmarks:
  -xCORE-AVX2  -ipo  -O3  -no-prec-div  -opt-prefetch  -auto-p32
  -ansi-alias  -opt-mem-layout-trans=3

Fortran benchmarks:
  -xCORE-AVX2  -ipo  -O3  -no-prec-div  -opt-prefetch

Benchmarks using both Fortran and C:
  -xCORE-AVX2  -ipo  -O3  -no-prec-div  -opt-prefetch  -auto-p32
  -ansi-alias  -opt-mem-layout-trans=3

Peak Compiler Invocation

C benchmarks:
  icc  -m64

Continued on next page
### Peak Compiler Invocation (Continued)

- **C++ benchmarks:**
  - `icpc -m64`

- **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`: `-xCORE-AVX2` (pass 2) `-prof-gen` (pass 1) `-ipo` (pass 2)
  - `-O3` (pass 2) `-no-prec-div` (pass 2)
  - `-opt-mem-layout-trans=3` (pass 2) `-prof-use` (pass 2)
  - `-ipo` (pass 2)

- `470.lbm`: `basepeak = yes`

- `482.sphinx3`: `-xCORE-AVX2 -ipo -O3` `-no-prec-div -opt-mem-layout-trans=3 -unroll12`

**C++ benchmarks:**

- `444.namd`: `-xCORE-AVX2` (pass 2) `-prof-gen` (pass 1) `-ipo` (pass 2)
  - `-O3` (pass 2) `-no-prec-div` (pass 2)
  - `-opt-mem-layout-trans=3` (pass 2) `-prof-use` (pass 2) `-fno-alias`
  - `-auto-ilp32`

- `447.dealII`: `basepeak = yes`

- `450.soplex`: `basepeak = yes`

- `453.povray`: `-xCORE-AVX2` (pass 2) `-prof-gen` (pass 1) `-ipo` (pass 2)
  - `-O3` (pass 2) `-no-prec-div` (pass 2)
  - `-opt-mem-layout-trans=3` (pass 2) `-prof-use` (pass 2) `-unroll14 -ansi-alias`

**Fortran benchmarks:**

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Test date: Jul-2015
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Peak Optimization Flags (Continued)

410.bwaves: basepeak = yes
416.games: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
           -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
           -inline-level=0 -scalar-rep-
434.zeusmp: basepeak = yes
437.leslie3d: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
459.GemsFDTD: basepeak = yes
465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
           -O3(pass 2) -no-prec-div(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(pass 1) -ipo(pass 2)
             -O3(pass 2) -no-prec-div(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 -auto-ilp32

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.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/Intel-ic15.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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For other inquiries, please contact webmaster@spec.org.

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