Hewlett Packard Enterprise

ProLiant DL560 Gen10
(3.50 GHz, Intel Xeon Gold 6144)

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)

CPU Name: Intel Xeon Gold 6144
CPU Characteristics: Intel Turbo Boost Technology up to 4.20 GHz
CPU MHz: 3500
FPU: Integrated
CPU(s) enabled: 32 cores, 4 chips, 8 cores/chip, 2 threads/core
CPU(s) orderable: 1, 2, 4 chip(s)
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 1 MB I+D on chip per core

Operating System: SUSE Linux Enterprise Server 12 (x86_64) SP2
Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux;
          Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux
Auto Parallel: No
File System: xfs
System State: Run level 3 (multi-user)

Hardware

Software

SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 1960

Test date: Dec-2017
Hardware Availability: Oct-2017
Software Availability: Sep-2017

410.bwaves 64
416.gamess 64
433.milc 64
434.zeusmp 64
435.gromacs 64
436.cactusADM 64
437.leslie3d 64
444.namd 64
447.dealII 64
450.soplex 64
453.povray 64
454.calculix 64
459.GemsFDTD 64
465.tonto 64
470.lbm 64
481.wrf 64
482.sphinx3 64

2920
2760
2560
2490
2440
2280
2200
2060
2030
2110
1500
1240
1840
2070

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Hewlett Packard Enterprise
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SPEC CFP2006 Result

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L3 Cache: 24.75 MB I+D on chip per chip
Other Cache: None
Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Disk Subsystem: 2 x 480 GB SATA SSD, RAID 0
Other Hardware: None

Base Pointers: 32/64-bit
Peak Pointers: Not Applicable
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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</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 by default
Filesystem page cache cleared with:
- shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
- runcspec command invoked through numactl i.e.:
  numactl --interleave=all runcspec <etc>
irqbalance disabled with "systemctl stop irqbalance"
tuned profile set with "tuned-adm profile throughput-performance"
Continued on next page
SPEC CFP2006 Result

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SPECfp_rate2006 = Not Run
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Operating System Notes (Continued)

VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"

Platform Notes

BIOS Configuration:
- Thermal Configuration set to Maximum Cooling
- Memory Patrol Scrubbing set to Disabled
- LLC Prefetch set to Enabled
- LLC Dead Line Allocation set to Disabled
- Workload Profile set to General Throughput Compute
- Minimum Processor Idle Power Core C-State set to C1E State

Sysinfo program /home/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-e6az Thu Dec 7 15:14:31 2017

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) Gold 6144 CPU @ 3.50GHz
- 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 2 3 9 16 19 26 27
  - physical 1: cores 0 2 3 9 16 19 26 27
  - physical 2: cores 0 2 3 9 16 19 26 27
  - physical 3: cores 0 2 3 9 16 19 26 27
- cache size : 25344 KB

From /proc/meminfo
- MemTotal: 792283168 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
- SUSE Linux Enterprise Server 12 SP2

From /etc/*release* /etc/*version*
- SuSE-release:
  - SUSE Linux Enterprise Server 12 (x86_64)
  - VERSION = 12
  - PATCHLEVEL = 2
- # 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.

Continued on next page
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Hardware Availability: Oct-2017
Software Availability: Sep-2017

Platform Notes (Continued)

os-release:
NAME="SLES"
VERSION="12-SP2"
VERSION_ID="12.2"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
(9464f67) x86_64 x86_64 x86_64 GNU/Linux

runtime 3 Dec 6 16:09

SPEC is set to: /home/cpu2006
Files system Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 852G 116G 736G 14% /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 HPE U34 09/29/2017
Memory:
48x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666 MHz

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/sh10.2"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.2

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
No: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
No: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

This benchmark result is intended to provide perspective on
past performance using the historical hardware and/or
software described on this result page.

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Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
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General Notes (Continued)

The system as described on this result page was formerly generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.htm.

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

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
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
SPEC CFP2006 Result

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SPECfp_rate2006 =  Not Run
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</tr>
</tbody>
</table>

**Base Optimization Flags**

C benchmarks:
- -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
- -qopt-mem-layout-trans=3

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

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.html
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.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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