Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Platinum 8160)

SPEC® CFP2006 Result

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SPECfp®_rate2006 = Not Run
SPECfp_rate_base2006 = 1470

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

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: Intel Xeon Platinum 8160</td>
<td>CPU Name: Intel Xeon Platinum 8160</td>
</tr>
<tr>
<td>CPU Characteristics:</td>
<td>CPU Characteristics: Intel Turbo Boost Technology up to 3.70 GHz</td>
</tr>
<tr>
<td>CPU MHZ: 2100</td>
<td>CPU MHZ: 2100</td>
</tr>
<tr>
<td>FPU: Integrated</td>
<td>FPU: Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled: 48 cores, 2 chips, 24 cores/chip, 2 threads/core</td>
<td>CPU(s) enabled: 48 cores, 2 chips, 24 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable: 1, 2 chip(s)</td>
<td>CPU(s) orderable: 1, 2 chip(s)</td>
</tr>
<tr>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
<td>Primary Cache: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache: 1 MB I+D on chip per core</td>
<td>Secondary Cache: 1 MB I+D on chip per core</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating System: SUSE Linux Enterprise Server 12 (x86_64) SP3</th>
<th>Operating System: SUSE Linux Enterprise Server 12 (x86_64) SP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>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</td>
<td>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</td>
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<tr>
<td>Auto Parallel: No</td>
<td>Auto Parallel: No</td>
</tr>
<tr>
<td>File System: xfs</td>
<td>File System: xfs</td>
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<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>System State: Run level 3 (multi-user)</td>
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</tbody>
</table>
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<th>Apr-2017</th>
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<tbody>
<tr>
<td>CPU2006 license:</td>
<td>3</td>
<td>Test date:</td>
<td>Dec-2017</td>
</tr>
<tr>
<td>Test sponsor:</td>
<td>HPE</td>
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<tr>
<td>Tested by:</td>
<td>HPE</td>
<td>Hardware Availability</td>
<td>Nov-2017</td>
</tr>
</tbody>
</table>

## L3 Cache
33 MB I+D on chip per chip  
## Other Cache
None  
## Memory
192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)  
## Disk Subsystem
1 x 480 GB SATA SSD, RAID 0  
## Other Hardware
None  
## L3 Cache
32/64-bit  
## Peak Pointers
Not Applicable  
## Other Software
None

## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>1313</td>
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</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 by default  
Filesystem page cache cleared with:  
  shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run runspec command invoked through numactl i.e.:  
  numactl --interleave=all runspec <etc>  
IRG balance 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_rate_base2006 = 1470**

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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 (b5e8d4b4b5ed28d7f98696cbe29c1)
runtime on bl460c16suse Sat Dec 9 22:58:28 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) Platinum 8160 CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 96 "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: 24
  - siblings: 48
  - physical 0: cores 0 1 2 3 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  - physical 1: cores 0 1 2 3 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
- cache size: 33792 KB

From /proc/meminfo
- MemTotal: 197739120 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
- SUSE-release:
  - SUSE Linux Enterprise Server 12 (x86_64)
  - VERSION = 12
  - PATCHLEVEL = 3
  - # 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-SP3"

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**Hardware Availability:** Nov-2017  
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### Platform Notes ( Continued )

```
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe://o:suse:sles:12:sp3"
```

```
uname -a:
    Linux bl460c16suse 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017
    (b7ce4e4) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 9 22:57
SPEC is set to: /home/cpu2006
```

### 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.

The system as described on this result page was formerly generally available. At the time of this publication, it may

Continued on next page
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General Notes (Continued)

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
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Software Availability:  Apr-2017

**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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