Dell Inc.
PowerEdge R940
(Intel Xeon Platinum 8158, 3.00 GHz)

<table>
<thead>
<tr>
<th>SPECfp\textsuperscript{2006}</th>
<th>155</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp\textsubscript{base2006}</td>
<td>149</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 55  
**Test sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

**Hardware**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Platinum 8158</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 3.70 GHz</td>
</tr>
<tr>
<td>CPU Frequency</td>
<td>3000</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>48 cores, 4 chips, 12 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>2,4 chip</td>
</tr>
<tr>
<td>Primary Cache</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache</td>
<td>1 MB I+D on chip per core</td>
</tr>
</tbody>
</table>

**Software**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>SUSE Linux Enterprise Server 12 (x86_64) SP2 4.4.21-69-default</td>
</tr>
<tr>
<td>Compiler</td>
<td>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>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>
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SPECfp2006 = 155
SPECfp_base2006 = 149

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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: 1 x 900 GB 15K RPM SAS12
Other Hardware: None

Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

Operating System Notes
Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes
BIOS settings:
Logical Processor Disabled
Virtualization Technology Disabled
Sub NUMA Cluster Disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C1E Disabled
C States set to Autonomous
Uncore Frequency set to Dynamic
Memory Patrol Scrub Disabled

Test date: Oct-2017
Hardware Availability: Jul-2017
Software Availability: Apr-2017

Results Table

Benchmark | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio
-----------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------|---------|-------
410.bwaves | 8.78 | 1550 | 8.69 | 1560 | 8.70 | 1560 | 8.78 | 1550 | 8.69 | 1560 | 8.70 | 1560
416.gamess | 399 | 49.0 | 399 | 49.0 | 399 | 49.0 | 379 | 51.7 | 378 | 51.7 | 379 | 51.7
433.milc | 123 | 74.4 | 125 | 73.7 | 125 | 73.7 | 123 | 74.4 | 125 | 73.7 | 125 | 73.7
434.zeusmp | 41.7 | 218 | 43.0 | 211 | 42.9 | 212 | 41.7 | 218 | 43.0 | 211 | 42.9 | 212
435.gromacs | 116 | 61.4 | 116 | 61.5 | 117 | 61.1 | 116 | 61.4 | 116 | 61.5 | 117 | 61.1
436.cactusADM | 8.55 | 1400 | 8.33 | 1430 | 8.42 | 1420 | 8.55 | 1400 | 8.33 | 1430 | 8.42 | 1420
437.leslie3d | 22.8 | 412 | 22.7 | 414 | 23.6 | 399 | 22.8 | 412 | 22.7 | 414 | 23.6 | 399
444.namd | 225 | 35.6 | 225 | 35.6 | 225 | 35.6 | 220 | 36.5 | 220 | 36.5 | 220 | 36.5
447.dealII | 160 | 71.3 | 160 | 71.7 | 159 | 71.9 | 160 | 71.3 | 160 | 71.7 | 159 | 71.9
450.soplex | 163 | 51.1 | 164 | 50.8 | 167 | 50.0 | 163 | 51.1 | 164 | 50.8 | 167 | 50.0
453.povray | 76.6 | 69.5 | 76.5 | 69.6 | 76.4 | 69.6 | 67.7 | 78.6 | 67.5 | 78.8 | 67.5 | 78.8
454.calculix | 110 | 75.0 | 110 | 75.0 | 110 | 74.7 | 107 | 76.8 | 107 | 77.0 | 107 | 76.8
459.GemsFDTD | 55.3 | 192 | 56.2 | 189 | 56.4 | 188 | 45.3 | 234 | 45.9 | 231 | 45.9 | 231
465.tonto | 181 | 54.4 | 182 | 53.9 | 183 | 53.7 | 144 | 68.3 | 144 | 68.4 | 144 | 68.3
470.lbm | 5.09 | 2700 | 5.07 | 2710 | 5.07 | 2710 | 5.09 | 2700 | 5.07 | 2710 | 5.07 | 2710
481.wrf | 83.5 | 134 | 82.9 | 135 | 83.5 | 134 | 83.5 | 134 | 82.9 | 135 | 83.5 | 134
482.sphinx3 | 241 | 80.8 | 241 | 80.9 | 241 | 81.0 | 241 | 80.8 | 241 | 80.9 | 241 | 81.0

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.
SPEC CFP2006 Result

Dell Inc.

**PowerEdge R940**
**(Intel Xeon Platinum 8158, 3.00 GHz)**

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| Hardware Availability: | Jul-2017 |
| Software Availability: | Apr-2017 |

**Platform Notes (Continued)**

Energy Efficiency Policy set to Performance
CPU Interconnect Bus Link Power Management Disabled
PCI ASPM L1 Link Power Management Disabled
Sysinfo program /home/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on linux-apb2 Fri Oct 13 13:31:48 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 8158 CPU @ 3.00GHz
4 "physical id"s (chips)
48 "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 : 12
siblings : 12
physical 0: cores 0 1 2 3 4 9 10 16 18 19 25 26
physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26
physical 2: cores 0 1 2 3 4 9 10 16 18 19 25 26
physical 3: cores 0 1 2 3 4 8 10 11 18 24 25 27
cache size : 25344 KB

From /proc/meminfo
MemTotal: 791225344 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.
  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:
SPEC CFP2006 Result

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Platform Notes (Continued)

(9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Oct 13 09:09

SPEC is set to: /home/cpu2006
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 796G 17G 779G 3% /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 Dell Inc. 1.1.7 08/10/2017
Memory:
17x 002C00B3002C 18ASF2G72PD2-2G6D1 16 GB 2 rank 2666 MHz
7x 00AD00B300AD HMA82GR7AF8N-VK 16 GB 2 rank 2666 MHz
24x 00CE063200CE M393A2K43BB1-CTD 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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/sh10.2"
OMP_NUM_THREADS = "48"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.2
Transparent Huge Pages disabled with:
echo never > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run

Base Compiler Invocation

C benchmarks:
icc -m64
C++ benchmarks:
icpc -m64
Fortran benchmarks:
ifort -m64

Continued on next page
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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 -parallel -qopt-prefetch

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

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

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Continued on next page
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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: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
    -par-num-threads=1(pass 1) -ipo(pass 2) -03(pass 2)  
    -no-prec-div(pass 2) -fno-alias -auto-ilp32

  447.dealII: basepeak = yes
  450.soplex: basepeak = yes

  453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
    -par-num-threads=1(pass 1) -ipo(pass 2) -03(pass 2)  
    -no-prec-div(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:
  410.bwaves: basepeak = yes

  416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)  
    -par-num-threads=1(pass 1) -ipo(pass 2) -03(pass 2)  
    -no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-

  434.zeusmp: basepeak = yes
  437.leslie3d: basepeak = yes

Continued on next page
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Peak Optimization Flags (Continued)

459.GemsFDTD: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -unroll2 -inline-level=0
-qopt-prefetch -parallel

465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
-no-prec-div(pass 2) -inline-calloc -qopt-malloc-options=3
-auto -unroll14

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32
481.wrf: basepeak = yes

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

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

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

Tested with SPEC CPU2006 v1.2.