**Dell Inc.**  
PowerEdge R940 (Intel Xeon Gold 6146, 3.20 GHz)  

<table>
<thead>
<tr>
<th>SPECint®2006</th>
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<tbody>
<tr>
<td>SPECint_base2006</td>
<td>79.6</td>
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</table>

**CPU2006 license:** 55  
**Test date:** Jul-2017  
**Test sponsor:** Dell Inc.  
**Hardware Availability:** Sep-2017  
**Tested by:** Dell Inc.  
**Software Availability:** Apr-2017

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**400.perlbench**  
**401.bzip2**  
**403.gcc**  
**429.mcf**  
**445.gobmk**  
**456.hmmer**  
**458.sjeng**  
**462.libquantum**  
**464.h264ref**  
**471.omnetpp**  
**473.astar**  
**483.xalancbmk**  

**Hardware**  
**CPU Name:** Intel Xeon Gold 6146  
**CPU Characteristics:** Intel Turbo Boost Technology up to 4.20 GHz  
**CPU MHz:** 3200  
**FPU:** Integrated  
**CPU(s) enabled:** 48 cores, 4 chips, 12 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:** 1 MB I+D on chip per core  
**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 960 GB SATA SSD  
**Other Hardware:** None  

**Software**  
**Operating System:** SUSE Linux Enterprise Server 12 SP2  
**Compiler:** C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux  
**Auto Parallel:** Yes  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 32/64-bit  
**Peak Pointers:** 32/64-bit  
**Other Software:** Microquill SmartHeap V10.2
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>400.perlbench</td>
<td>190</td>
<td>51.3</td>
<td>186</td>
<td>52.4</td>
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<td>59.4</td>
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<tr>
<td>401.bzip2</td>
<td>306</td>
<td>31.6</td>
<td>308</td>
<td>31.4</td>
<td>306</td>
<td>31.5</td>
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<td>31.4</td>
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<tr>
<td>403.gcc</td>
<td>193</td>
<td>41.8</td>
<td>192</td>
<td>41.8</td>
<td>193</td>
<td>41.6</td>
<td>197</td>
<td>40.9</td>
<td>188</td>
<td>42.8</td>
<td>196</td>
<td>41.0</td>
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<tr>
<td>429.mcf</td>
<td>281</td>
<td>37.3</td>
<td>283</td>
<td>37.1</td>
<td>282</td>
<td>37.1</td>
<td>278</td>
<td>37.7</td>
<td>279</td>
<td>37.6</td>
<td>279</td>
<td>37.6</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>84.3</td>
<td>111</td>
<td>84.1</td>
<td>111</td>
<td>84.8</td>
<td>110</td>
<td>84.3</td>
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<td>291</td>
<td>41.5</td>
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<td>41.3</td>
<td>292</td>
<td>41.4</td>
<td>287</td>
<td>42.1</td>
<td>290</td>
<td>41.7</td>
<td>289</td>
<td>41.9</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>2.99</td>
<td>6920</td>
<td>3.06</td>
<td>6780</td>
<td>3.06</td>
<td>6770</td>
<td>2.99</td>
<td>6920</td>
<td>3.06</td>
<td>6780</td>
<td>3.06</td>
<td>6770</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>281</td>
<td>78.7</td>
<td>281</td>
<td>78.8</td>
<td>282</td>
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<tr>
<td>471.omnetpp</td>
<td>171</td>
<td>36.6</td>
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<td>35.4</td>
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<td>36.0</td>
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<td>48.0</td>
<td>125</td>
<td>50.2</td>
<td>126</td>
<td>49.5</td>
</tr>
<tr>
<td>473.astar</td>
<td>162</td>
<td>43.2</td>
<td>163</td>
<td>43.1</td>
<td>163</td>
<td>43.2</td>
<td>164</td>
<td>42.9</td>
<td>164</td>
<td>42.8</td>
<td>163</td>
<td>43.0</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>81.7</td>
<td>84.5</td>
<td>84.4</td>
<td>81.7</td>
<td>84.2</td>
<td>82.0</td>
<td>70.6</td>
<td>97.7</td>
<td>71.7</td>
<td>96.2</td>
<td>71.5</td>
<td>96.5</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"

## Platform Notes

- BIOS settings:
  - Sub NUMA Cluster disabled
  - Virtualization Technology disabled
  - System Profile set to Custom
  - CPU Performance set to Maximum Performance
  - C States set to Autonomous
  - C1E disabled
  - Energy Efficient Turbo disabled
  - Uncore Frequency set to Dynamic
  - Energy Efficiency Policy set to Performance
  - Memory Patrol Scrub disabled
  - Logical Processor enabled
  - CPU Interconnect Bus Link Power Management disabled
  - PCI ASPM LI Link Power Management disabled
  - Sysinfo program /home/_cpu2006/config/sysinfo.rev6993
  - Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
  - running on linux-r2ls Wed Jul 12 10:07:32 2017
Dell Inc.
PowerEdge R940 (Intel Xeon Gold 6146, 3.20 GHz)

SPECint2006 = 83.8
SPECint_base2006 = 79.6

CPU2006 license: 55  Test date:  Jul-2017
Test sponsor:  Dell Inc.  Hardware Availability:  Sep-2017
Tested by:  Dell Inc.  Software Availability:  Apr-2017

Platform Notes (Continued)

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 6146 CPU @ 3.20GHz
4 "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 : 12
siblings : 24
physical 0: cores 0 1 2 3 4 9 10 16 18 19 25 26
physical 1: cores 0 1 2 3 8 9 10 11 18 19 24 27
physical 2: cores 0 1 2 3 4 8 9 11 17 18 19 20
physical 3: cores 0 1 2 3 4 8 10 11 18 24 25 27
cache size : 25344 KB

From /proc/meminfo
MemTotal:       791225340 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:
Linux linux-r2ls 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
(9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jul 12 09:59
SPEC is set to: /home/_cpu2006

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Dell Inc. 
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Platform Notes (Continued)

Filesystem Type Size Used Avail Use% Mounted on  
/dev/sda4 xfs 796G 11G 785G 2% /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. 1.0.3 05/30/2017  
Memory:  
13x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666 MHz  
35x 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,scatter"  
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 enabled by default.  
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

Base Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64  
401.bzip2: -DSPEC_CPU_LP64  
403.gcc: -DSPEC_CPU_LP64  
429.mcf: -DSPEC_CPU_LP64  
445.gobmk: -DSPEC_CPU_LP64  
456.hmmer: -DSPEC_CPU_LP64  
458.sjeng: -DSPEC_CPU_LP64

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**Base Portability Flags (Continued)**

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<tr>
<td>483.xalancbmk</td>
<td>-DSPEC_CPU_LP64 -DSPEC_CPU_LINUX</td>
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</table>

**Base Optimization Flags**

C benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -parallel -qopt-prefetch -auto-p32

C++ benchmarks:
-xCORE-AVX2 -ipo -03 -no-prec-div -qopt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh10.2 -lsmartheap64

**Base Other Flags**

C benchmarks:
403.gcc: -Dalloca=_alloca

**Peak Compiler Invocation**

C benchmarks (except as noted below):
icc -m64

400.perlbench: icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
445.gobmk: icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32

C++ benchmarks (except as noted below):
icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
473.astar: icpc -m64

**Peak Portability Flags**

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
Dell Inc. PowerEdge R940 (Intel Xeon Gold 6146, 3.20 GHz)

SPECint2006 = 83.8
SPECint_base2006 = 79.6

Peak Portability Flags (Continued)

429.mcf: -DSPEC_CPU_LP64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

400.perlbench: -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) -qopt-prefetch

401.bzip2: -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 -auto-ilp32 -qopt-prefetch

403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
-qopt-malloc-options=3 -auto-ilp32

429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
-qopt-prefetch -auto-p32

445.gobmk: -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)

456.hmmer: basepeak = yes

458.sjeng: -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) -unroll4

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: -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) -qopt-ra-region-strategy=block
-Wl,-z,muldefs -L/sh10.2 -lsmartheap

Continued on next page
SPEC CINT2006 Result

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CPU2006 license: 55
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Peak Optimization Flags (Continued)

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-auto-p32 -Wl,-z,muldefs -L/sh10.2 -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
- Wl,-z,muldefs -L/sh10.2 -lsmartheap

Peak Other Flags

C benchmarks:

403.gcc: -Dalloca=_alloca

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 questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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