Dell Inc.

PowerEdge R930 (Intel Xeon E7-8890 v4, 2.20 GHz)

**SPECint\_rate2006 = 3680**

**SPECint\_rate\_base2006 = 3550**

**Dell Inc.**

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

**Test date:** May-2016
**Hardware Availability:** Jun-2016
**Software Availability:** Mar-2016

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**Hardware**

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E7-8890 v4</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 3.40 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>2200</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>96 cores, 4 chips, 24 cores/chip, 2 threads/core</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>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3 Cache</td>
<td>60 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)</td>
</tr>
<tr>
<td>Disk Subsystem</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other Hardware</td>
<td>None</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 SP1 3.12.49-11-default</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 16.0.2.181 of Intel C++ Studio XE for Linux</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>No</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>32-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software</td>
<td>Microquill SmartHeap V10.2</td>
</tr>
</tbody>
</table>
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SPECint_rate_base2006 = 3550

CPU2006 license: 55
Test sponsor: Dell Inc.
Test date: May-2016
Hardware Availability: Jun-2016
Tested by: Dell Inc.
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>192</td>
<td>650</td>
<td>2890</td>
<td>655</td>
<td>2870</td>
<td>651</td>
<td>2880</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>192</td>
<td>1058</td>
<td>1750</td>
<td>1055</td>
<td>1760</td>
<td>1057</td>
<td>1750</td>
</tr>
<tr>
<td>403.gcc</td>
<td>192</td>
<td>609</td>
<td>2540</td>
<td>607</td>
<td>2550</td>
<td>609</td>
<td>2540</td>
</tr>
<tr>
<td>429.mcf</td>
<td>192</td>
<td>406</td>
<td>4320</td>
<td>405</td>
<td>4330</td>
<td>406</td>
<td>4320</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>192</td>
<td>766</td>
<td>2630</td>
<td>765</td>
<td>2630</td>
<td>765</td>
<td>2630</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>192</td>
<td>356</td>
<td>5030</td>
<td>354</td>
<td>5060</td>
<td>355</td>
<td>5050</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>192</td>
<td>856</td>
<td>2710</td>
<td>857</td>
<td>2710</td>
<td>857</td>
<td>2710</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>192</td>
<td>103</td>
<td>38600</td>
<td>103</td>
<td>38600</td>
<td>103</td>
<td>38600</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>192</td>
<td>879</td>
<td>4830</td>
<td>876</td>
<td>4850</td>
<td>881</td>
<td>4820</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>192</td>
<td>803</td>
<td>1490</td>
<td>800</td>
<td>1500</td>
<td>800</td>
<td>1500</td>
</tr>
<tr>
<td>473.astar</td>
<td>192</td>
<td>690</td>
<td>1950</td>
<td>691</td>
<td>1950</td>
<td>691</td>
<td>1950</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>192</td>
<td>364</td>
<td>3640</td>
<td>365</td>
<td>3630</td>
<td>363</td>
<td>3650</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:
Snoop Mode set to Cluster on Die
Virtualization Technology disabled
System Profile set to custom
CPU Performance set to Hardware P States
C States set to Autonomous
C1E disabled
Energy Efficient Turbo disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Balanced Performance
Memory Patrol Scrub disabled
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 $e3fbb8667b5a285932ceab81e28219e1
running on linux-j6f8 Tue May 10 21:47:02 2016

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:
Continued on next page
Dell Inc.  
PowerEdge R930 (Intel Xeon E7-8890 v4, 2.20 GHz)  

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Test sponsor: Dell Inc.  
Tested by: Dell Inc.  

Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From /proc/cpuinfo
model name : Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
4 "physical id"s (chips)
192 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 24
siblings : 48
physical 0: cores 0 1 2 3 4 5 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 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
27 28 29
physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
27 28 29
physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
27 28 29
cache size : 30720 KB

From /proc/meminfo
MemTotal:       529059184 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 1
# 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-SP1"
VERSION_ID="12.1"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 10 21:01

Continued on next page
Platform Notes (Continued)

SPEC is set to: /root/cpu2006-1.2
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   439G  8.4G  431G   2% /

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. 2.0.1 04/20/2016
Memory:
1x 00AD063200AD HMA42GR7MFR4N-TF 16 GB 2 rank 2133 MHz, configured at 1600 MHz
1x 00AD063200AD HMA42GR7MFR4N-TFT1 16 GB 2 rank 2133 MHz, configured at 1600 MHz
30x 00CE00B300CE M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz, configured at 1600 MHz
64x Not Specified Not Specified

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"

Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB memory using RedHat EL 7.2 glibc 2.17
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>

Base Compiler Invocation

C benchmarks:
    icc -m32 -L/opt/intel-compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

C++ benchmarks:
    icpc -m32 -L/opt/intel-compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
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Hardware Availability: Jun-2016  
Software Availability: Mar-2016

Base Portability Flags

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -D_FILE_OFFSET_BITS=64
403.gcc: -D_FILE_OFFSET_BITS=64
429.mcf: -D_FILE_OFFSET_BITS=64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -D_FILE_OFFSET_BITS=64
458.sjeng: -D_FILE_OFFSET_BITS=64
462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
464.h264ref: -D_FILE_OFFSET_BITS=64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -D_FILE_OFFSET_BITS=64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX

Base Optimization Flags

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

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
-opt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh -lsmartheap

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m32 -L/opt/intel/compilers_and_librarys_2016/linux/compiler/lib/ia32_lin
400.perlbench: icc -m64
401.bzip2: icc -m64
456.hmmer: icc -m64
458.sjeng: icc -m64

C++ benchmarks:
icpc -m32 -L/opt/intel/compilers_and_librarys_2016/linux/compiler/lib/ia32_lin
## Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64</td>
</tr>
<tr>
<td>bzip2</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>gcc</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>hmerm</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>libquantum</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>libquantum</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>h264ref</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>omnetpp</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>astar</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>xalancbmk</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX</td>
</tr>
</tbody>
</table>

## Peak Optimization Flags

### C benchmarks:

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -auto-ilp32</td>
</tr>
<tr>
<td>bzip2</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -opt-prefetch -auto-ilp32 -ansi-alias</td>
</tr>
<tr>
<td>gcc</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div</td>
</tr>
<tr>
<td>mcf</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>gobmk</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -prof-use(pass 2) -par-num-threads=1(pass 1) -ansi-alias -opt-mem-layout-trans=3</td>
</tr>
<tr>
<td>hmerm</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32</td>
</tr>
<tr>
<td>sjeng</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4 -auto-ilp32</td>
</tr>
<tr>
<td>libquantum</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>h264ref</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2 -ansi-alias</td>
</tr>
</tbody>
</table>

Continued on next page
SPEC CINT2006 Result

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Peak Optimization Flags (Continued)

C++ benchmarks:

471.omnetpp: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
           -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
           -par-num-threads=1(pass 1) -prof-use(pass 2) -ansi-alias
           -opt-ra-region-strategy=block -Wl,-z,muldefs
           -L/sh -lsmartheap

473.astar: basepeak = yes
483.xalancbmk: basepeak = yes

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-ic16.0-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.xml

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

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