**Dell Inc.**

**PowerEdge R440 (Intel Xeon Gold 5122, 3.60 GHz)**

**SPECint®2006 = 73.2**

**SPECint_base2006 = 69.9**

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

### Hardware

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 5122</td>
</tr>
<tr>
<td>CPU Characteristics</td>
<td>Intel Turbo Boost Technology up to 3.70 GHz</td>
</tr>
<tr>
<td>CPU MHz</td>
<td>3600</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>8 cores, 2 chips, 4 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>1.2 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>
<tr>
<td>L3 Cache</td>
<td>16.5 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Disk Subsystem</td>
<td>1 x 1 TB SATA 7200 RPM</td>
</tr>
<tr>
<td>Other Hardware</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>SUSE Linux Enterprise Server 12 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</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>
<tr>
<td>Base Pointers</td>
<td>32/64-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>
Dell Inc.  
PowerEdge R440 (Intel Xeon Gold 5122, 3.60 GHz)

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---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>209</td>
<td>46.6</td>
<td>209</td>
<td>46.7</td>
<td>209</td>
<td>46.8</td>
<td>184</td>
<td>53.2</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>342</td>
<td>28.2</td>
<td>342</td>
<td>28.2</td>
<td>342</td>
<td>28.2</td>
<td>339</td>
<td>28.5</td>
</tr>
<tr>
<td>403.gcc</td>
<td>189</td>
<td>42.5</td>
<td>189</td>
<td>42.5</td>
<td>191</td>
<td>42.2</td>
<td>190</td>
<td>42.3</td>
</tr>
<tr>
<td>429.mcf</td>
<td>317</td>
<td>33.1</td>
<td>317</td>
<td>33.1</td>
<td>317</td>
<td>33.1</td>
<td>311</td>
<td>33.1</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>95.7</td>
<td>97.5</td>
<td>95.5</td>
<td>97.7</td>
<td>95.4</td>
<td>97.8</td>
<td>95.7</td>
<td>97.5</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>331</td>
<td>36.6</td>
<td>331</td>
<td>36.5</td>
<td>331</td>
<td>36.6</td>
<td>324</td>
<td>37.3</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>5.07</td>
<td>4090</td>
<td>5.04</td>
<td>4110</td>
<td>5.43</td>
<td>3820</td>
<td>5.07</td>
<td>4090</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>306</td>
<td>72.4</td>
<td>305</td>
<td>72.3</td>
<td>306</td>
<td>72.3</td>
<td>306</td>
<td>72.3</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>214</td>
<td>29.2</td>
<td>216</td>
<td>28.9</td>
<td>215</td>
<td>29.1</td>
<td>161</td>
<td>38.8</td>
</tr>
<tr>
<td>473.astar</td>
<td>183</td>
<td>38.4</td>
<td>184</td>
<td>38.2</td>
<td>183</td>
<td>38.3</td>
<td>183</td>
<td>38.4</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>85.3</td>
<td>80.9</td>
<td>86.6</td>
<td>79.7</td>
<td>85.6</td>
<td>80.6</td>
<td>77.7</td>
<td>88.8</td>
</tr>
</tbody>
</table>

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

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**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 L1 Link Power Management disabled
- Sysinfo program /root/cpu2006-1.2_ic17u3/config/sysinfo.rev6993
- Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
- Running on linux-vw3y Mon Aug  7 21:02:06 2017

Continued on next page
Dell Inc.

PowerEdge R440 (Intel Xeon Gold 5122, 3.60 GHz)

**SPECint2006 =** 73.2

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---

**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 5122 CPU @ 3.60GHz
- 2 "physical id"s (chips)
- 16 "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: 4
  - siblings: 8
  - physical 0: cores 1 5 9 13
  - physical 1: cores 1 5 9 13
- cache size: 16896 KB

From `/proc/meminfo`
- MemTotal: 197458256 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

From `/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.

From `/etc/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"

From `uname -a`
- (9464f67) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 7 20:59

SPEC is set to: `/root/cpu2006-1.2_ic17u3`

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 923G 9.2G 913G 1% /
Dell Inc.

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Platform Notes (Continued)

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. 0.4.2 07/21/2017
Memory:
12x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666 MHz
4x Not Specified Not Specified

(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 = "/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"
OMP_NUM_THREADS = "8"

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
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64

Continued on next page
# Dell Inc. PowerEdge R440 (Intel Xeon Gold 5122, 3.60 GHz)

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<thead>
<tr>
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<tr>
<td>SPECint_base2006</td>
<td>69.9</td>
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**CPU2006 license:** 55  
**Test sponsor:** Dell Inc.  
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## Base Portability Flags (Continued)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>471.omnetpp</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>473.astar</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>-DSPEC_CPU_LP64 -DSPEC_CPU_LINUX</td>
</tr>
</tbody>
</table>

## Base Optimization Flags

**C benchmarks:**

- -xCORE-AVX2  
- -ipo  
- -O3  
- -no-prec-div  
- -parallel  
- -qopt-prefetch  
- -auto-p32

**C++ benchmarks:**

- -xCORE-AVX2  
- -ipo  
- -O3  
- -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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>403.gcc</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>429.mcf</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
</tbody>
</table>

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Dell Inc. PowerEdge R440 (Intel Xeon Gold 5122, 3.60 GHz)  

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Software Availability: Apr-2017

**Peak Portability Flags (Continued)**

- 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

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## Dell Inc. PowerEdge R440 (Intel Xeon Gold 5122, 3.60 GHz)

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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:


You can also download the XML flags sources by saving the following links:


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