SPEC® CINT2006 Result

Dell Inc.

PowerEdge C6420 (Intel Xeon Platinum 8168, 2.70 GHz)

$SPECint^{®}\_rate2006 = 2460$

$SPECint\_rate\_base2006 = 2360$

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

Test date:	May-2017
Hardware Availability:	Jul-2017
Software Availability:	Nov-2016

Copies   0 1500 3500 5500 7500 9500 11500 13500 15500 17500 19500 21500 23500 25500 27500 29500 31500 33500 35500 37500 40500

Benchmark	Copies	Value
400.perlbench	96	2270
	96	1900
401.bzip2	96	1130
	96	1080
403.gcc	96	1650
	96	1640
429.mcf	96	2910
445.gobmk	96	1590
	96	1600
456.hmmer	96	3750
	96	3300
458.sjeng	96	1830
	96	1680
462.libquantum	96	40400
464.h264ref	96	2970
	96	2880
471.omnetpp	96	1070
	96	1020
473.astar	96	1240
483.xalancbmk	96	2330

SPECint_rate_base2006 = 2360

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Hardware

CPU Name:	Intel Xeon Platinum 8168
CPU Characteristics:	Intel Turbo Boost Technology up to 3.70 GHz
CPU MHz:	2700
FPU:	Integrated
CPU(s) enabled:	48 cores, 2 chips, 24 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 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:	33 MB I+D on chip per chip
Other Cache:	None
Memory:	384 GB (12 x 32 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 (x86_64) 4.4.21-69-default
Compiler:	C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux
Auto Parallel:	Yes
File System:	ext4
System State:	Run level 3 (multi-user)
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Microquill SmartHeap V10.2

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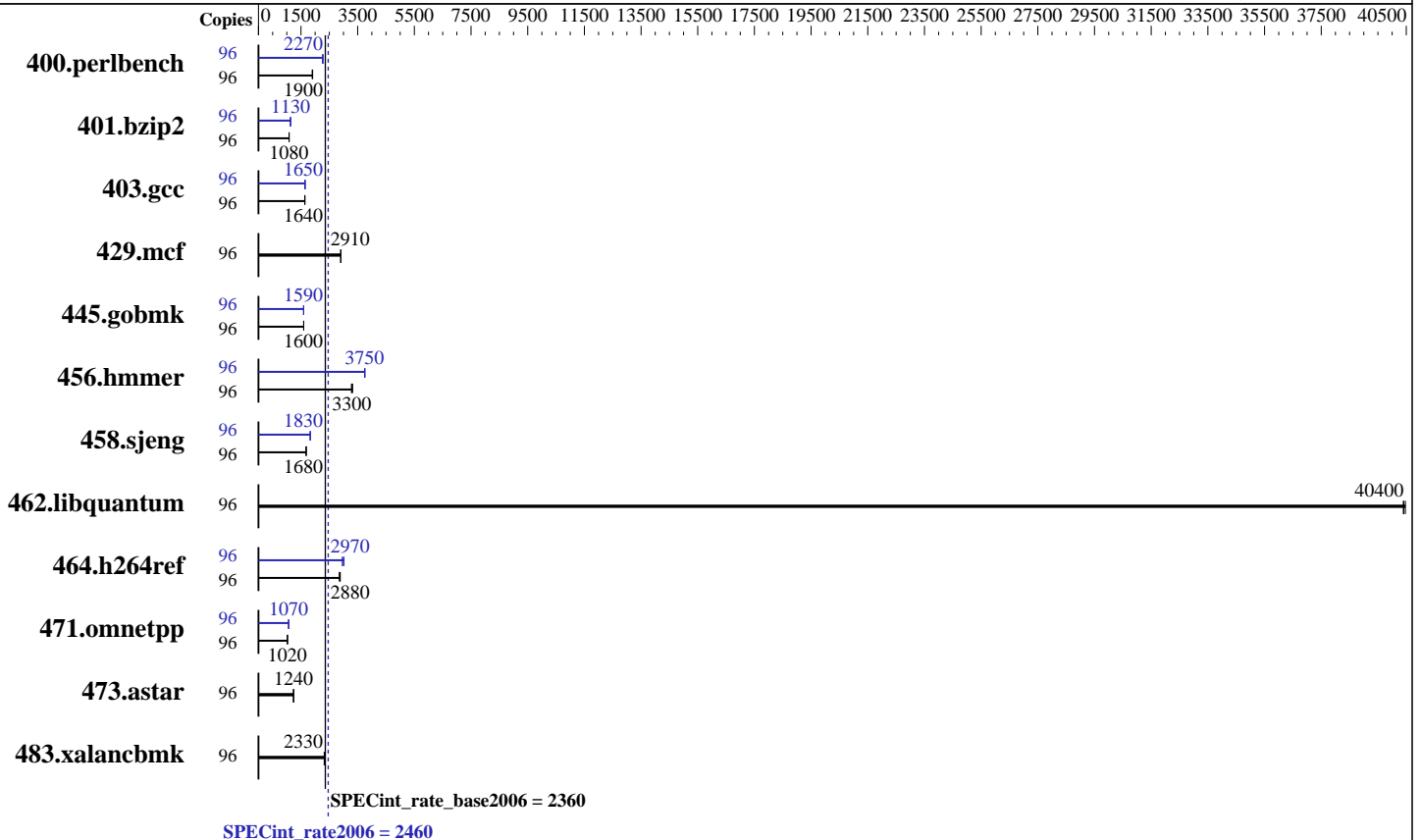
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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
400.perlbench	96	490	1910	494	1900	**493**	**1900**	96	414	2260	412	2280	**414**	**2270**
401.bzip2	96	**857**	**1080**	856	1080	859	1080	96	**820**	**1130**	820	1130	814	1140
403.gcc	96	472	1640	**472**	**1640**	473	1630	96	**470**	**1650**	469	1650	472	1640
429.mcf	96	301	2910	**301**	**2910**	302	2900	96	301	2910	**301**	**2910**	302	2900
445.gobmk	96	632	1590	**631**	**1600**	630	1600	96	**632**	**1590**	632	1590	631	1590
456.hmmer	96	**272**	**3300**	270	3320	273	3280	96	238	3760	239	3750	**239**	**3750**
458.sjeng	96	691	1680	**690**	**1680**	690	1680	96	636	1830	635	1830	**636**	**1830**
462.libquantum	96	**49.2**	**40400**	49.2	40500	49.2	40400	96	**49.2**	**40400**	49.2	40500	49.2	40400
464.h264ref	96	**737**	**2880**	737	2880	746	2850	96	717	2960	**716**	**2970**	704	3020
471.omnetpp	96	587	1020	**587**	**1020**	587	1020	96	564	1060	**563**	**1070**	563	1070
473.astar	96	**544**	**1240**	545	1240	544	1240	96	**544**	**1240**	545	1240	544	1240
483.xalancbmk	96	**285**	**2330**	286	2320	285	2330	96	**285**	**2330**	286	2320	285	2330

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 enabled
    Virtualization Technology disabled
    System Profile set to Custom
    CPU Performance set to Maximum Performance
    C States set to autonomous
    C1E 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-fx60 Mon May 22 08:54:51 2017

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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) Platinum 8168 CPU @ 2.70GHz
      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 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
   cache size : 33792 KB

From /proc/meminfo
   MemTotal:       394867844 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

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-fx60 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 May 21 14:04

SPEC is set to: /root/cpu2006-1.2_ic17u3
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      ext4  909G  8.4G  900G   1% /
Additional information from dmidecode:
```

Continued on next page

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Platform Notes (Continued)

```
   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. 1.0.0 05/17/2017
  Memory:
   2x 002C00B3002C 36ASF4G72PZ-2G6D1 32 GB 2 rank 2666 MHz
   10x 002C0632002C 36ASF4G72PZ-2G6D1 32 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:
LD_LIBRARY_PATH = "/root/cpu2006-1.2_ic17u3/lib/ia32:/root/cpu2006-1.2_ic17u3/lib/intel64:/root/cpu2006-1.2_ic17u3/sh10.2"


 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
 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_2017/linux/lib/ia32
```

C++ benchmarks:
```
     icpc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32
```

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
```

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Base Portability Flags (Continued)

```
    473.astar: -D_FILE_OFFSET_BITS=64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
```

Base Optimization Flags

C benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-qopt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh10.2 -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_libraries_2017/linux/lib/ia32
```

```
    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_libraries_2017/linux/lib/ia32
```

Peak Portability Flags

```
400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
    401.bzip2: -DSPEC_CPU_LP64
     403.gcc: -D_FILE_OFFSET_BITS=64
     429.mcf: -D_FILE_OFFSET_BITS=64
```

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Tested by: Dell Inc.		**Software Availability:**	Nov-2016

Peak Portability Flags (Continued)

```
       445.gobmk: -D_FILE_OFFSET_BITS=64
      456.hmmer: -DSPEC_CPU_LP64
       458.sjeng: -DSPEC_CPU_LP64
   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
```

Peak Optimization Flags

C benchmarks:

```
    400.perlbench: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                   -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                   -no-prec-div(pass 2) -auto-ilp32 -qopt-mem-layout-trans=3

       401.bzip2: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                   -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                   -no-prec-div(pass 2) -qopt-prefetch -auto-ilp32
                   -qopt-mem-layout-trans=3

         403.gcc: -xCORE-AVX512 -ipo -O3 -no-prec-div
                   -qopt-mem-layout-trans=3

         429.mcf: basepeak = yes

       445.gobmk: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                   -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                   -no-prec-div(pass 2) -qopt-mem-layout-trans=3

      456.hmmer: -xCORE-AVX512 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
                   -qopt-mem-layout-trans=3

       458.sjeng: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                   -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                   -no-prec-div(pass 2) -unroll4 -auto-ilp32
                   -qopt-mem-layout-trans=3

   462.libquantum: basepeak = yes

      464.h264ref: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
                   -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
                   -no-prec-div(pass 2) -unroll2 -qopt-mem-layout-trans=3
```

C++ benchmarks:

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Peak Optimization Flags (Continued)

```
471.omnetpp: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)
             -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)
             -no-prec-div(pass 2)
             -qopt-ra-region-strategy=block
             -qopt-mem-layout-trans=3 -Wl,-z,muldefs
             -L/sh10.2 -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-ic17.0-official-linux64-revF.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Flags-PowerEdge14G-revC.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/Dell-Platform-Flags-PowerEdge14G-revC.xml

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