SPEC® CINT2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

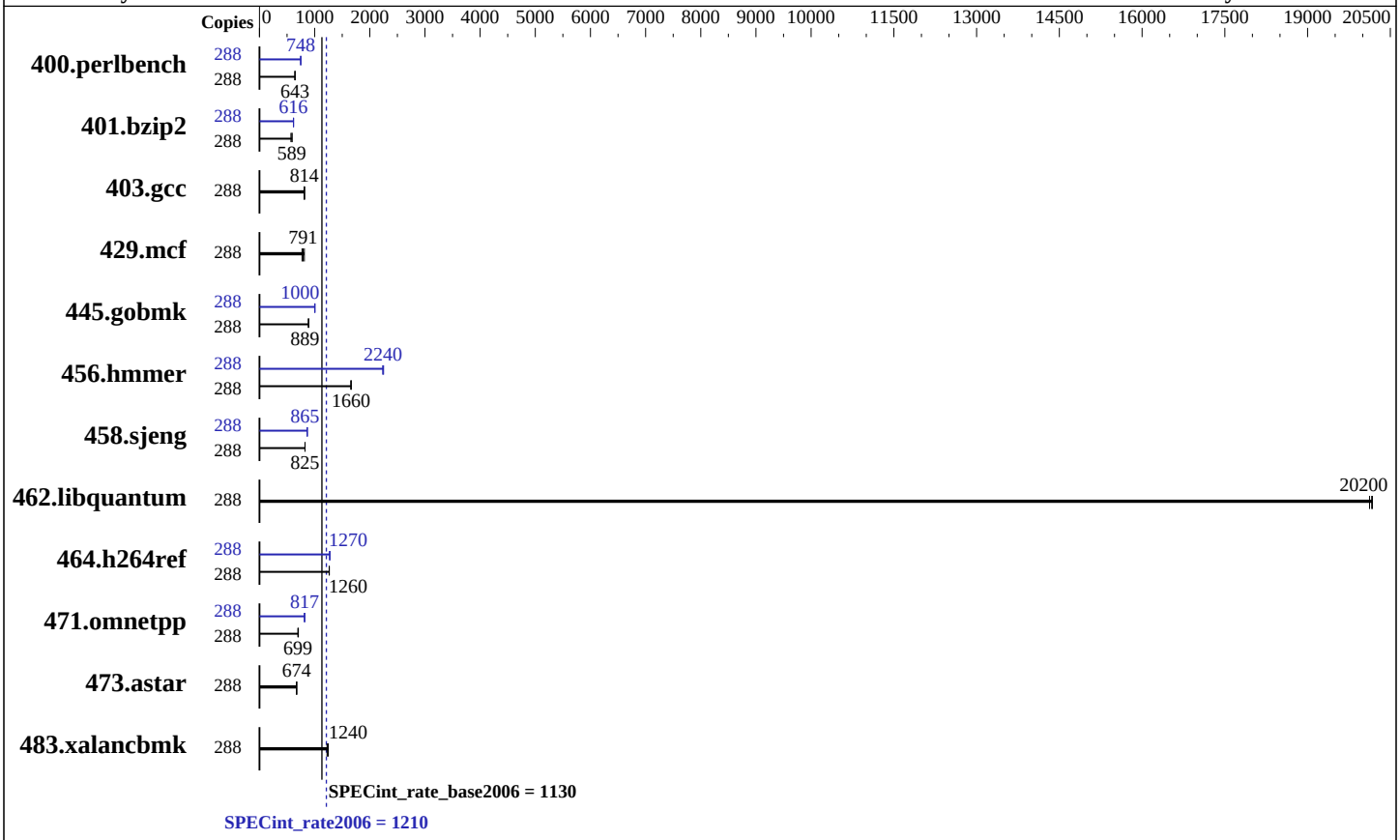
ProLiant XL260a Gen9
(1.50 GHz, Intel Xeon Phi 7290)

SPECint®_rate2006 = 1210

SPECint_rate_base2006 = 1130

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Test date: Oct-2016
Hardware Availability: Oct-2016
Software Availability: Nov-2016



Hardware

CPU Name:	Intel Xeon Phi 7290
CPU Characteristics:	Intel Turbo Boost Technology up to 1.70 GHz
CPU MHz:	1500
FPU:	Integrated
CPU(s) enabled:	72 cores, 1 chip, 72 cores/chip, 4 threads/core
CPU(s) orderable:	1 chip
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	1 MB I+D on chip per two cores
L3 Cache:	None
Other Cache:	None
Memory:	384 GB (6 x 64 GB 4Rx4 PC4-2400T-L)
Disk Subsystem:	1 x 800 GB SATA SSD
Other Hardware:	None

Software

Operating System:	SUSE Linux Enterprise Server 12 (x86_64) SP2 Kernel 4.4.21-68-default
Compiler:	C/C++: Version 16.0.2.181 of Intel C++ Studio XE for Linux
Auto Parallel:	No
File System:	xfs
System State:	Run level 5 (multi-user w/GUI)
Base Pointers:	32-bit
Peak Pointers:	32/64-bit
Other Software:	Microquill SmartHeap V10.2

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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	288	4374	643	4360	645	**4373**	**643**	288	**3763**	**748**	3765	747	3760	748
401.bzip2	288	4877	570	4706	591	**4720**	**589**	288	4516	615	**4515**	**616**	4484	620
403.gcc	288	**2847**	**814**	2830	819	2870	808	288	**2847**	**814**	2830	819	2870	808
429.mcf	288	**3322**	**791**	3227	814	3408	771	288	**3322**	**791**	3227	814	3408	771
445.gobmk	288	3400	888	**3398**	**889**	3397	889	288	3003	1010	**3008**	**1000**	3021	1000
456.hmmer	288	1616	1660	1623	1660	**1616**	**1660**	288	1202	2230	1194	2250	**1199**	**2240**
458.sjeng	288	4225	825	**4224**	**825**	4216	826	288	**4028**	**865**	4019	867	4028	865
462.libquantum	288	297	20100	**296**	**20200**	296	20200	288	297	20100	**296**	**20200**	296	20200
464.h264ref	288	5034	1270	5046	1260	**5039**	**1260**	288	**5002**	**1270**	5016	1270	4993	1280
471.omnetpp	288	2553	705	**2575**	**699**	2577	698	288	2192	821	2214	813	**2202**	**817**
473.astar	288	**2999**	**674**	3008	672	2997	675	288	**2999**	**674**	3008	672	2997	675
483.xalancbmk	288	**1609**	**1240**	1594	1250	1623	1220	288	**1609**	**1240**	1594	1250	1623	1220

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"
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>
```

Platform Notes

```
BIOS Configuration:
   Power Profile set to Maximum Performance
   Thermal Configuration set to Maximum Cooling
   Processor Power and Utilization Monitoring set to Disabled
   Memory Patrol Scrubbing set to Disabled
   Cluster Model set to SNC-4

Sysinfo program /home/intel/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on xl260a-g9-kn Wed Oct 26 13:27:50 2016
```

Continued on next page

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 Phi(TM) CPU 7290 @ 1.50GHz
      1 "physical id"s (chips)
      288 "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 : 72
      siblings  : 288
      physical 0: cores 0 1 2 4 5 6 7 8 9 10 11 12 13 14 15 18 19 20 21 22 23 24
      25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49
      50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73
   cache size : 1024 KB

From /proc/meminfo
   MemTotal:       396103624 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 xl260a-g9-kn 4.4.21-68-default #1 SMP Tue Oct 18 18:19:37 UTC 2016
   (63cf368) x86_64 x86_64 x86_64 GNU/Linux

run-level 5 Oct 26 13:07

SPEC is set to: /home/intel
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda4      xfs   703G  4.4G  699G   1% /home
```

Continued on next page

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 HP U24 10/12/2016
   Memory:
    6x UNKNOWN NOT AVAILABLE 64 GB 4 rank 2400 MHz

 (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/intel/libs/32:/home/intel/libs/64:/home/intel/sh"

 Binaries compiled on a system with 1x Intel 2nd Generation Xeon Phi CPU
 + 96GB DDR4 memory using RedHat EL 7.2
```

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
```

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:
```
-xMIC-AVX512 -ipo -O3 -no-prec-div -opt-prefetch
```

C++ benchmarks:
```
-xMIC-AVX512 -ipo -O3 -no-prec-div -opt-prefetch -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_libraries_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_libraries_2016/linux/compiler/lib/ia32_lin
```

Peak Portability Flags

400.perlbench: `-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64`
401.bzip2: `-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64`
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 -DSPEC_CPU_LP64`
458.sjeng: `-D_FILE_OFFSET_BITS=64 -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: -xMIC-AVX512 -ipo -O3 -no-prec-div -prof-gen(pass 1) -prof-use(pass 2) -par-num-threads=1(pass 1) -auto-ilp32

401.bzip2: -xMIC-AVX512 -ipo -O3 -no-prec-div -prof-gen(pass 1) -prof-use(pass 2) -par-num-threads=1(pass 1) -opt-prefetch -auto-ilp32 -ansi-alias

403.gcc: basepeak = yes

429.mcf: basepeak = yes

445.gobmk: -xMIC-AVX512(pass 2) -prof-gen(pass 1) -par-num-threads=1(pass 1) -prof-use(pass 2) -ansi-alias

456.hmmer: -xMIC-AVX512 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32

458.sjeng: -xMIC-AVX512 -ipo -O3 -no-prec-div -prof-gen(pass 1) -prof-use(pass 2) -par-num-threads=1(pass 1) -unroll4 -auto-ilp32

462.libquantum: basepeak = yes

464.h264ref: -xMIC-AVX512 -ipo -O3 -no-prec-div -prof-gen(pass 1) -prof-use(pass 2) -par-num-threads=1(pass 1) -unroll2 -ansi-alias

C++ benchmarks:

471.omnetpp: -xMIC-AVX512 -ipo -O3 -no-prec-div -prof-gen(pass 1) -prof-use(pass 2) -par-num-threads=1(pass 1) -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-revB.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-Phi-revA.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-revB.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-Phi-revA.xml

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

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