



SPEC[®] CINT2006 Result

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IBM Corporation

SPECint[®]_rate2006 = 14400

IBM Power E880 (4.0 GHz, 192 core, RHEL)

SPECint_rate_base2006 = 11100

CPU2006 license: 11

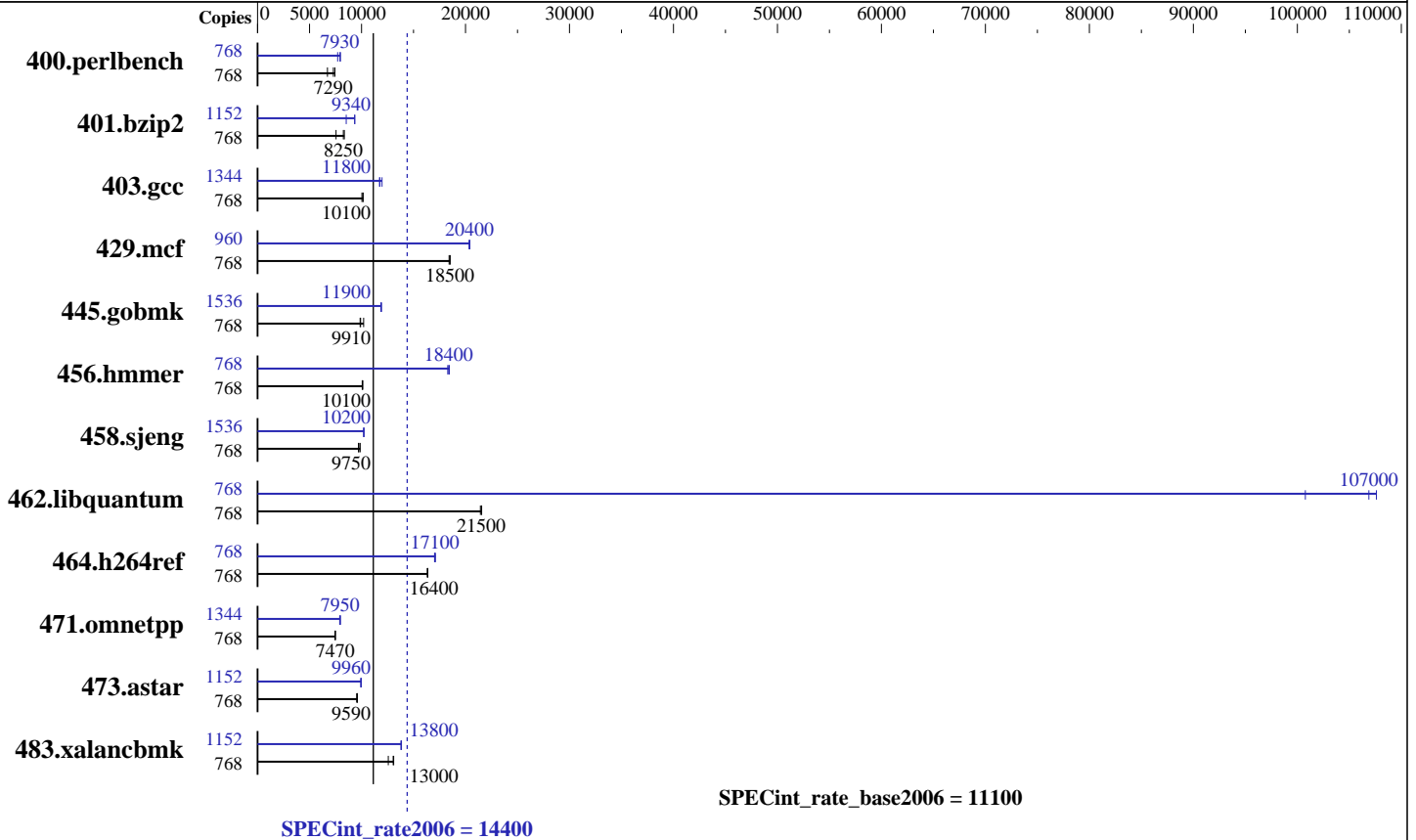
Test sponsor: IBM Corporation

Tested by: IBM Corporation

Test date: Apr-2015

Hardware Availability: Jun-2015

Software Availability: Mar-2015



Hardware

CPU Name: POWER8
 CPU Characteristics: Intelligent Energy Optimization enabled, up to 4.256 GHz
 CPU MHz: 4000
 FPU: Integrated
 CPU(s) enabled: 192 cores, 16 chips, 12 cores/chip, 8 threads/core
 CPU(s) orderable: 4,8,12,16 Modules
 Primary Cache: 32 KB I + 64 KB D on chip per core
 Secondary Cache: 512 KB I+D on chip per core
 L3 Cache: 8 MB I+D on chip per core
 Other Cache: 16 MB I+D off chip per CDIMM
 Memory: 4 TB (128 x 32 GB CDIMMs) DDR3 1600 MHz
 Disk Subsystem: 16 x 300 GB 15K RPM SAS SFF-2 Raid5
 Other Hardware: None

Software

Operating System: Red Hat Enterprise Linux Server release 7.1 (ppc64) kernel <3.10.0-229.1.2.el7.ppc64>
 Compiler: C/C++: Version 13.1 of IBM XL C/C++ for Linux
 Auto Parallel: No
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 32-bit
 Peak Pointers: 32/64-bit
 Other Software: Post-Link Optimization for Linux on POWER, version 5.6.2
 IBM Advance Toolchain 7.0-3



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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	768	1116	6720	1009	7440	1029	7290	768	974	7700	941	7970	947	7930
401.bzip2	768	982	7550	898	8250	888	8350	1152	1304	8530	1189	9350	1190	9340
403.gcc	768	616	10000	610	10100	609	10100	1344	922	11700	920	11800	904	12000
429.mcf	768	379	18500	378	18500	380	18400	960	430	20300	429	20400	429	20400
445.gobmk	768	817	9860	813	9910	790	10200	1536	1358	11900	1355	11900	1353	11900
456.hmmmer	768	712	10100	710	10100	708	10100	768	390	18400	392	18300	389	18400
458.sjeng	768	958	9700	941	9870	953	9750	1536	1820	10200	1819	10200	1817	10200
462.libquantum	768	742	21400	739	21500	738	21600	768	158	101000	149	107000	148	108000
464.h264ref	768	1041	16300	1038	16400	1040	16400	768	998	17000	993	17100	997	17100
471.omnetpp	768	644	7450	641	7490	642	7470	1344	1063	7900	1056	7950	1055	7960
473.astar	768	561	9600	562	9590	566	9530	1152	815	9920	812	9960	812	9960
483.xalanbmk	768	421	12600	405	13100	406	13000	1152	576	13800	576	13800	574	13800

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

Peak Tuning Notes

400.perlbench fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
401.bzip2 fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
403.gcc fdpr options: -O4 -m power8 -A 2 -sls -dir -vrox
429.mcf fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
456.hmmmer fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
458.sjeng fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
462.libquantum fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
464.h264ref fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
471.omnetpp fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
473.astar fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox
483.xalanbmk fdpr options: -O4 -m power8 -A 2 -rcl 2 -sls -dir -vrox

Submit Notes

The config file option 'submit' was used to assign benchmark copy to specific kernel thread using the "numactl" command (see flags file for details).

Operating System Notes

ulimit -s (stack) set to unlimited

59520 16M large pages defined with
echo 59520 > /proc/sys/vm/nr_hugepages
echo 115200 > /proc/sys/vm/nr_overcommit_hugepages
Transparent huge page enabled with
echo always > /sys/kernel/mm/transparent_hugepage/enabled



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General Notes

Environment variables set by runspec before the start of the run:

```
HUGETLB_MORECORE = "yes"
HUGETLB_VERBOSE = "0"
TCMALLOC_MEMFS_MALLOCS_PATH = "/dev/hugepages/"
XLFRTOPTIONS = "intrinths=1"
```

This result uses the `post_setup` and/or `bench_post_setup` to drop caches. SPEC has determined that although the effect may have been negligible for this run, future submissions will not be considered rule compliant if the `post_setup` actions drop caches (e.g. : `echo 3 > /proc/sys/vm/drop_caches`).

Base Compiler Invocation

C benchmarks:

```
/opt/ibm/xlC/13.1.0/bin/xlC_at -qlanglvl=extc99
```

C++ benchmarks:

```
/opt/ibm/xlC/13.1.0/bin/xlC_at
```

Base Portability Flags

```
400.perlbench: -DSPEC_CPU_LINUX_PPC
462.libquantum: -DSPEC_CPU_LINUX
464.h264ref: -qchars=signed
483.xalancbmk: -DSPEC_CPU_LINUX
```

Base Optimization Flags

C benchmarks:

```
-qinline=40 -qipa=threads -qlargepage -O5 -qalias=noansi -qalloca
-lhugetlbfs
```

C++ benchmarks:

```
-qinline=40 -qipa=threads -qlargepage -O5 -qrtti -ltcmalloc
```

Base Other Flags

C benchmarks:

```
-qipa=noobject -qsuppress=1500-036
```

C++ benchmarks:

```
-qipa=noobject -qsuppress=1500-036
```



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Peak Compiler Invocation

C benchmarks:

/opt/ibm/xlC/13.1.0/bin/xlC_at -qlanglvl=extc99

C++ benchmarks:

/opt/ibm/xlC/13.1.0/bin/xlC_at

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LINUX_PPC
403.gcc: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LINUX
464.h264ref: -qchars=signed
483.xalancbmk: -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:

400.perlbench: -qinline=40 -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=auto
-qtune=auto -qfdpr -qalias=noansi -lhugetlbfs -Wl,-q
401.bzip2: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O4 -qsimd=noauto -qlargepage -qfdpr -lhugetlbfs -Wl,-q
403.gcc: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O4 -q64 -qlargepage -qfdpr -qalloca -lhugetlbfs -Wl,-q
429.mcf: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O5 -qlargepage -qnoprefetch -qfdpr -lhugetlbfs -Wl,-q
445.gobmk: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O5 -qlargepage -lhugetlbfs
456.hmmer: -qinline=40 -qipa=threads -O5 -qlargepage
-qassert=refalign -qfdpr -lhugetlbfs -Wl,-q
458.sjeng: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O3 -qarch=auto -qtune=auto -qprefetch=dscr=0x54 -qfdpr
-lhugetlbfs -Wl,-q
462.libquantum: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O5 -qsimd=noauto -qinline=400 -q64 -qlargepage -qfdpr
-lhugetlbfs -Wl,-q
464.h264ref: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O5 -qfdpr -lhugetlbfs -Wl,-q

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Peak Optimization Flags (Continued)

C++ benchmarks:

471.omnetpp: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O5 -qsimd=noauto -qarch=pwr7 -qtune=pwr7
-qprefetch=dscr=0x54 -qfdpr -qrtti -lhugetlbfs -Wl,-q
-ltcmalloc

473.astar: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O5 -qlargepage -qprefetch=dscr=0x93 -qfdpr -lhugetlbfs
-Wl,-q -ltcmalloc

483.xalancbmk: -qinline=40 -qipa=threads -qpdf1(pass 1) -qpdf2(pass 2)
-O3 -qarch=auto -qtune=auto -qsimd -qlargepage
-qprefetch=dscr=0x93 -qipa=partition=large -qfdpr
-lhugetlbfs -Wl,-q -ltcmalloc

Peak Other Flags

C benchmarks (except as noted below):

-qsuppress=1586-476(pass 2) -qipa=noobject -qsuppress=1500-036

400.perlbench: -qsuppress=1586-476(pass 2) -qsuppress=1500-036

456.hmmer: -qipa=noobject -qsuppress=1500-036

C++ benchmarks:

-qsuppress=1586-476(pass 2) -qipa=noobject -qsuppress=1500-036

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2006/flags/IBM-XL.V13La.html>

<http://www.spec.org/cpu2006/flags/IBM-Linux-V7.html>

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

<http://www.spec.org/cpu2006/flags/IBM-XL.V13La.xml>

<http://www.spec.org/cpu2006/flags/IBM-Linux-V7.xml>

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