# SPEC® CINT2006 Result

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## IBM Corporation

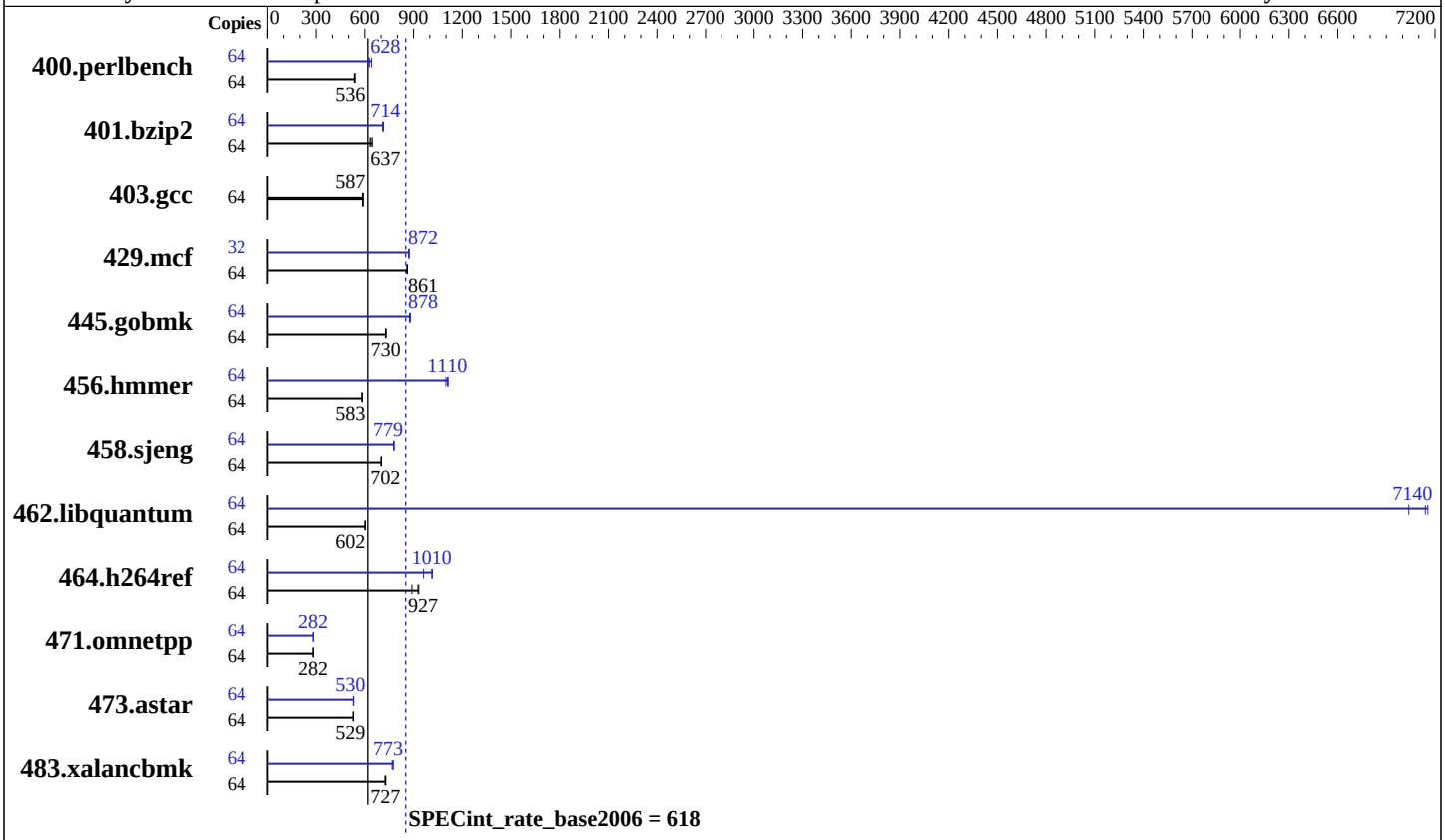
IBM Power 730 Express (4.2 GHz, 16 core, SLES)

SPECint®_rate2006 = 852

SPECint_rate_base2006 = 618

**CPU2006 license:** 11
**Test sponsor:** IBM Corporation
**Tested by:** IBM Corporation

**Test date:** Jan-2013
**Hardware Availability:** Feb-2013
**Software Availability:** Dec-2012




### Hardware

| | |
|---|---|
| CPU Name: | POWER7+ |
| CPU Characteristics: | Intelligent Energy Optimization enabled, up to 4.540 GHz |
| CPU MHz: | 4228 |
| FPU: | Integrated |
| CPU(s) enabled: | 16 cores, 2 chips, 8 cores/chip, 4 threads/core |
| CPU(s) orderable: | 8, 16 cores |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |
| L3 Cache: | 10 MB I+D on chip per core |
| Other Cache: | None |
| Memory: | 128 GB (16 x 8 GB) DDR3 1066 MHz |
| Disk Subsystem: | 1 x 146.8 GB SAS SFF 15K RPM |
| Other Hardware: | None |

### Software

| | |
|---|---|
| Operating System: | SUSE Linux Enterprise Server 11 SP2 (ppc64) kernel 3.0.42-0.7-ppc64 |
| Compiler: | C/C++: Version 12.1 of IBM XL C/C++ for Linux |
| Auto Parallel: | No |
| File System: | ext3 |
| 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 5.6.1-7<br>-MicroQuill SmartHeap 9 |

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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 | 64 | 1157 | 541 | 1168 | 535 | **1166** | **536** | 64 | 1007 | 621 | **996** | **628** | 976 | 641 |
| 401.bzip2 | 64 | 957 | 645 | 978 | 632 | **969** | **637** | 64 | 864 | 715 | 872 | 709 | **866** | **714** |
| 403.gcc | 64 | 873 | 590 | **878** | **587** | 879 | 586 | 64 | 873 | 590 | **878** | **587** | 879 | 586 |
| 429.mcf | 64 | **678** | **861** | 677 | 862 | 680 | 859 | 32 | **335** | **872** | 335 | 872 | 336 | 870 |
| 445.gobmk | 64 | **920** | **730** | 920 | 730 | 923 | 728 | 64 | **765** | **878** | 763 | 880 | 768 | 874 |
| 456.hmmer | 64 | 1023 | 584 | **1024** | **583** | 1025 | 583 | 64 | 536 | 1110 | 543 | 1100 | **538** | **1110** |
| 458.sjeng | 64 | 1108 | 699 | **1103** | **702** | 1102 | 703 | 64 | 997 | 777 | 993 | 780 | **994** | **779** |
| 462.libquantum | 64 | 2203 | 602 | **2203** | **602** | 2202 | 602 | 64 | 188 | 7040 | **186** | **7140** | 185 | 7160 |
| 464.h264ref | 64 | 1519 | 932 | **1528** | **927** | 1592 | 890 | 64 | 1394 | 1020 | **1399** | **1010** | 1473 | 962 |
| 471.omnetpp | 64 | 1419 | 282 | 1420 | 282 | **1419** | **282** | 64 | **1417** | **282** | 1414 | 283 | 1418 | 282 |
| 473.astar | 64 | 847 | 531 | 852 | 527 | **849** | **529** | 64 | 845 | 532 | **848** | **530** | 849 | 529 |
| 483.xalancbmk | 64 | 606 | 729 | **608** | **727** | 610 | 724 | 64 | **571** | **773** | 575 | 768 | 571 | 774 |

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

## Compiler Invocation Notes

```
C/C++ compiler updated to December 2012 PTF
Version: 12.01.0000.0002
```

## Peak Tuning Notes

```
Post-Link optimization tool used for:
400.perlbench
     with options -O4 -omullX for optimization phase,
     and -imullX for instrumentation phase
401.bzip2
     with options -O4 -vrox
403.gcc
    with options -O4 -nodp -rtb
429.mcf 445.gobmk 458.sjeng 473.astar
    with options -O3
462.libquantum
    with options -O4 -vrox -nodp
464.h264ref
    with options -O4 -vrox -nodp -rtb
471.omnetpp
    with options -O3 -lu -1 -nodp -sdp 9
483.xalancbmk
    with options -O3 -m power7
```

## 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 1048576.

Large pages reserved as follows by root user:
echo 4224 > /proc/sys/vm/nr_hugepages

The following environment varibles were set before the runspec command:
  export HUGETLB_VERBOSE=0
  export HUGETLB_MORECORE=yes
```

## Base Compiler Invocation

C benchmarks:
```
xlc -qlanglvl=extc99
```

C++ benchmarks:
```
xlC
```

## 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:
```
-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads -qalias=noansi
-qalloca -lhugetlbfs
```

C++ benchmarks:
```
-O5 -qarch=pwr7 -qtune=pwr7 -q32 -qipa=threads -qrtti -lsmartheap
```

## Base Other Flags

C benchmarks:

Continued on next page

## Base Other Flags (Continued)

C++ benchmarks:

## Peak Compiler Invocation

C benchmarks:
```
xlc -qlanglvl=extc99
```

C++ benchmarks:
```
xlC
```

## Peak Portability Flags

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

## Peak Optimization Flags

C benchmarks:

400.perlbench: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qalias=noansi -qipa=level=2 -lsmartheap

401.bzip2: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O3 -qarch=pwr7 -qtune=pwr7 -lhugetlbfs

403.gcc: basepeak = yes

429.mcf: -Wl,-q -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -lhugetlbfs

445.gobmk: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -lhugetlbfs

456.hmmer: -Wl,-q -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qsimd -qassert=refalign -qipa=inline=threshold=2888 -qipa=inline=limit=11880 -lhugetlbfs

458.sjeng: -Wl,-q -qpdf1(pass 1) -qpdf2(pass 2) -O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -lhugetlbfs

Continued on next page

## Peak Optimization Flags (Continued)

462.libquantum: `-Wl,-q -qpdf1`(pass 1) `-qpdf2`(pass 2) `-O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -q64 -lhugetlbfs`

464.h264ref: `Same as 458.sjeng`

C++ benchmarks:

471.omnetpp: `-Wl,-q -qpdf1`(pass 1) `-qpdf2`(pass 2) `-O5 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qrtti -lsmartheap`

473.astar: `-Wl,-q -qpdf1`(pass 1) `-qpdf2`(pass 2) `-O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -lhugetlbfs -lsmartheap`

483.xalancbmk: `-Wl,-q -O4 -qarch=pwr7 -qtune=pwr7 -qipa=threads -qipa=partition=large -lsmartheap`

## Peak Other Flags

C benchmarks:

C++ benchmarks:

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2006/flags/IBM-Power.html`
`http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2006/flags/IBM-Power.xml`
`http://www.spec.org/cpu2006/flags/IBM-Linux-XL.20121024.xml`


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