

Experiment on Bit Operation

Code

```

#include <cstdlib>
#include <ctime>
#include <bitset>
using namespace std;
int main ()
{
    srand(112358);
    const unsigned long long N = 1e11;
    const unsigned long long pow2[] = {1, 2, 4, 8, 16, 32, 64, 128, 256, 512, 1024
, 2048, 4096};

    for ( unsigned long long i=0; i<N; ++i ) {
#ifdef BITSET_1
        bitset<64> bst(rand());
        unsigned long long fetch = 0;
        for ( int j=9; j>=3; j-- ) {
            fetch += bst[j]*pow2[j-3];
        }
#endif
#ifdef BITSET_2
        bitset<64> bst(rand());
        unsigned long long fetch = 0;
        for ( int j=3; j<10; ++j ) {
            fetch += bst[j]*pow2[j-3];
        }
#endif
#ifdef BITSET_3
        bitset<64> bst(rand());
        unsigned long long fetch = 0;
        for ( int j=9; j>=3; j-- ) {
            fetch = fetch<<1 + bst[j];
        }
#endif
#ifdef BIT_OP
        unsigned long long x = rand();
        unsigned long long fetch = (x>>53)&((1<<7)-1);
#endif
    }
    return (0);
}

```

Compilation

all:

```
g++ -std=c++11 -D BIT_OP -O2 test.cpp -o test_bitop
g++ -std=c++11 -D BITSET_3 -O2 test.cpp -o test_bitset3
g++ -std=c++11 -D BITSET_2 -O2 test.cpp -o test_bitset2
g++ -std=c++11 -D BITSET_1 -O2 test.cpp -o test_bitset1
```

Result

I run the run code 10 times each.

N=1e9	BIT_OP	BITSET_1	BITSET_2	BITSET_3
Rank	1	2	4	3
Average	6.7111	6.6941	6.6588	6.6603
Standard Deviation	0.079628931	0.034468826	0.084178118	0.06651157

N=1e10	BIT_OP	BITSET_1	BITSET_2	BITSET_3
Rank	3	2	1	4
Average	71.3118	71.498	71.8427	71.2525
Standard Deviation	0.480812923	1.209239614	2.904639624	1.088619028

N=1e11	BIT_OP	BITSET_1	BITSET_2	BITSET_3
Rank	4	1	2	3
Average	708.5203	713.3967	711.4905	709.8945
Standard Deviation	8.040931262	8.485305037	7.067016127	10.37166017

Conclusion

Bit operation performs the stable and fastest. The performance using bit-op on `std::bitset` or a full `uint64_t` shows not much difference.

More detail can be seen in the spreadsheet.

I will use `std::bitset` to interact with disk.