Cheatography

Bit Hacks Cheat Sheet

by JSondhof via cheatography.com/30576/cs/9135/

C/C++ bitwise operations

&	AND
|	OR
^	XOR
~	NOT
<<	SHIFT (left)
>>	SHIFT (right)

Useful snippets

Counting (c) bits set in x

```
for (c = 0; x; c++) {  x &= vx- 1; }
```

Computing parity in parallel (32 Bit)

```
x ^= x >> 16; x ^= x >> 8; x ^= x >> 4; x &= 0xf; return (0x6996 >> x) & 1;
```

Integer arithmetics

`x = y << n`	Multiply by n times 2
`x = y >> n`	Divide by n times 2
`return (x & 1) == 0`	Is x even?
`return (x && !(x & (x - 1)))`	Is x power of 2?
`return (x ^ y) < 0`	Has x opposite sign than y?
`y ^ ((x ^ y) & -(x < y))`	min(x,y)
`x ^ ((x ^ y) & -(x < y))`	max(x,y)

Single bit operations

`y = x | (1< <n)`	Set the n^{th} bit
`y = x & ~(1<<n)`	Unset the n^{th} bit
`y = x ^ (1< <n)`	Toggle the n^{th} bit
`return x & (1< <n )`	Test if the n^{th} bit is set
`y = x & (x-1)`	Turn off rightmost 1bit
`y = x & (-x)`	Isolate rightmost 1bit
`y = x | (x-1)`	Right propagate rightmost 1bit (fill in ones)
`y = x | (x+1)`	Turn on rightmost 0bit
`y = ~x & (x+1)`	Isolate rightmost 0bit