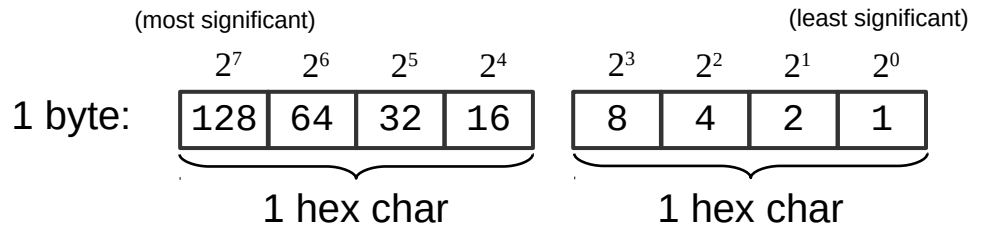


CS 261

Binary Information Cheat Sheet



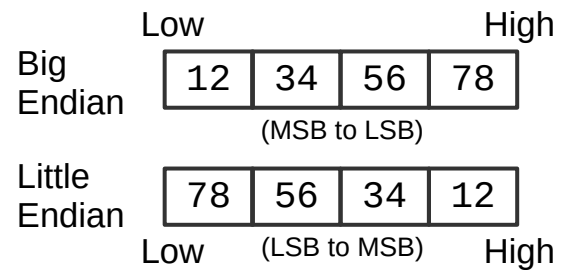
2^0	2^1	2^2	2^3	2^4	2^5	2^6	2^7	2^8	2^9	2^{10}	2^{11}
1	2	4	8	16	32	64	128	256	512	1024	2048

$1 = 1 = 0 \cdot 2^3 + 0 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0 = [0001]$
 $5 = 4 + 1 = 0 \cdot 2^3 + 1 \cdot 2^2 + 0 \cdot 2^1 + 1 \cdot 2^0 = [0101]$ $5-4=1$ $1-1=0$
 $11 = 8 + 2 + 1 = 1 \cdot 2^3 + 0 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0 = [1011]$ $11-8=3$ $3-2=1$ $1-1=0$
 $15 = 8 + 4 + 2 + 1 = 1 \cdot 2^3 + 1 \cdot 2^2 + 1 \cdot 2^1 + 1 \cdot 2^0 = [1111]$ $15-8=7$ $7-4=3$ $3-2=1$ $1-1=0$

Binary to decimal:

Add up all the powers of two

32-bit Value: 0x12345678



Decimal to binary:

Find highest power of two and subtract
Repeat above until the remainder is zero
Powers of two become 1; all other bits are 0

Dec	Bin	Hex	Dec	Bin	Hex
0	0000	0x0	8	1000	0x8
1	0001	0x1	9	1001	0x9
2	0010	0x2	10	1010	0xA
3	0011	0x3	11	1011	0xB
4	0100	0x4	12	1100	0xC
5	0101	0x5	13	1101	0xD
6	0110	0x6	14	1110	0xE
7	0111	0x7	15	1111	0xF

Arithmetic shift:

$0a00 \gg 8 = 000a$
 $8a00 \gg 8 = ff8a$

Logical shift:

$0a00 \gg 8 = 008a$
 $8a00 \gg 8 = 008a$

$x \& 0 = 0$
 $x \& 1 = x$
 $x | 0 = x$
 $x | 1 = 1$
 $x \wedge 0 = x$
 $x \wedge x = 0$

$x \& y = y \& x$
 $x | y = y | x$
 $x \wedge y = y \wedge x$

&	0	1
0	0	0
1	0	1

AND

	0	1
0	0	1
1	1	1

OR

^	0	1
0	0	1
1	1	0

XOR