

# CS 631-01 Conversions { Evaluation

Lab 01 ; Lab 02

Project 01 starter

321

Conversions

Binary - base 2

$$3 \times 10^2 + 2 \times 10^1 + 1 \times 10^0$$

060101

06 1101  
32 16 8 4 2 1

$$(1)2^3 + (1)2^2 + 0(2^1) + 1(2^0)$$
$$8 + 4 + 0 + 1 = 13$$

Hexadecimal (Hex) - base 16

0xF3B

0 - 9    A - F    a - f  
10    15

$$\underline{F} \times 16^2 + \underline{3} \times 16^1 + \underline{B} \times 16^0$$
$$15 \times 16^2 + 3 \times 16 + 11 \times 1$$
$$15 \times 256 + 48 + 11$$
$$3840 + 48 + 11 = 3899$$

# Converting HEX to BIN and BIN to HEX

HEX 0xF3B



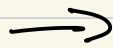
BIN 0x 1111 0011 1011

## Conversions

"214"

"0b1101"

"0xF3B"



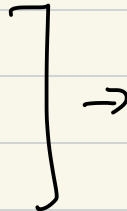
uint32\_t

parse\_operand()

TK\_INTLIT

TK\_BINLIT

TK\_HEXLIT



"1011"

char \*s = "1011"  
s[0] s[1] s[2]  
uint32\_t tmp = 0;  
uint32\_t value = 0;

char d;

'0' = 48

'1' = 49

d = s[0];

tmp = d - '0';  
value = tmp;

binary  
decimal

Hexadecimal

d = s[1];

tmp = d - '0';

value = (value << 1)

= value \* 2 + tmp

value = 2

$$d = s[2]$$

$$tmp = d - '0'$$

$$tmp = 1$$

$$\begin{aligned} \text{value} &= \text{value} * 2 + tmp \\ &= 4 + 1 \\ &= 5 \end{aligned}$$

$$d = s[3]$$

$$tmp = d - '0'$$

$$tmp = 1$$

$$\begin{aligned} \text{value} &= \text{value} * 2 + tmp \\ &= 10 + 1 \\ &= 11 \end{aligned}$$

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ntlang

nt -b 10 "241"

241

scan

parsed  $\rightarrow$  uint32\_t

$\downarrow$

str

uint32\_t to Str  
base 10

uint32\_t value;

char out[64];

out[0] = '2'

out[1] = '4'

out[2] = '1'

out[3] = '\0' 0

~~241~~

↑

~~uint32\_t tmp~~

$$241 / 10 = 24$$

$$241 \% 10 = 1$$

$$tmp = \underline{value \% 10}$$

$$out[0] = '0' + tmp \quad (1)$$

$$value = value / 10 \quad \text{base}$$

$$tmp = value \% 10$$

$$out[1] = '0' + tmp \quad (4)$$

•  
r  
»

width -w 4, 8, 16, 32  
only for -b 2 -b 16

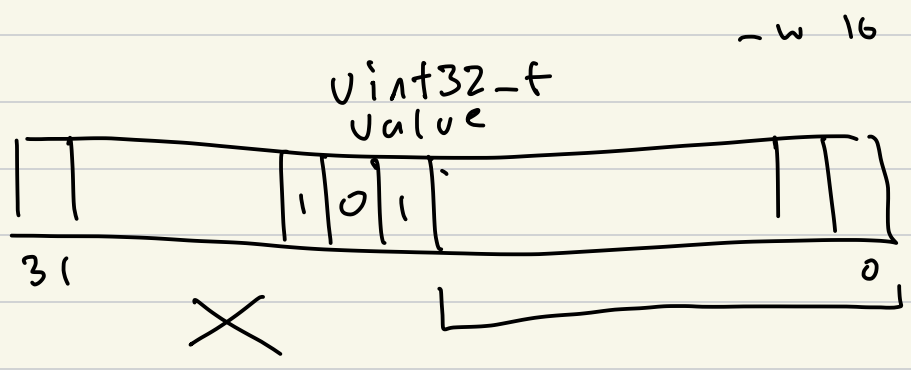
nt -b 16 -w 4 -e "0xAC"  
0xc

nt -b 16 -w 4 -e "0xAC >> 4"  
0xA

0x0A (8)

nt -b 2 -w 4 -e "0xAC >> 4"

0b1010



$$\text{value} = \text{value} \& \underbrace{0\text{x}\text{FFFF}}$$

masking

-w4 0xF      0b1111  
 -w8 0xFF      0b1111 1111  
 -w16 0xFFFF      0b1111 1111 1111 1111

Compute the mask

$$\text{width} = \underline{4}$$

mask =

width

$$\begin{array}{r} 0\text{x}10 \\ \underline{\quad \quad} \\ - \quad \quad 1 \\ \hline 0\text{x}0\text{F} \end{array} = \begin{array}{r} \text{dec} \\ 16 \\ - 1 \\ \hline 15 \end{array}$$

$$\begin{array}{r} \text{bin} \\ \underline{0\text{b}10000} \\ - 1 \\ \hline 0\text{b}01111 \end{array}$$

$$\text{mask} = (0\text{b}1 \ll \text{width}) - 1;$$

signed output

nt -e "-3"

-3

nt -b 2 -w 4 "=3"

0b1101

0b0011

inv 0b1100

+ 0b1101

nt -b 2 -w 8 "-3"

0b11111101

nt -b 10 -w 4 "0b1101"

-3

nt -b 10 -w 8 "0b1101"

13

nt -b 10 -e "0xFFFFFFFF"

-1



$n + -610 -c "0x\text{FFFF}\text{FFFF}" -0$

42 . . . . .

$$1 + 2 + 3$$

