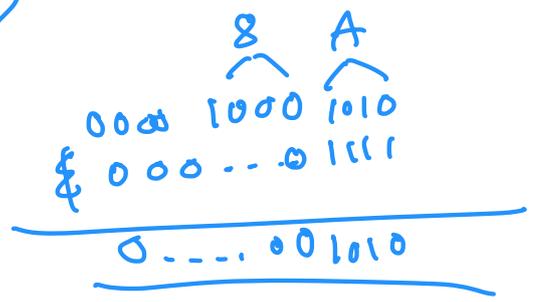


lowest\_n

①  $\text{int32}_t \text{ mask} = (1 \ll n) - 1;$

Ex:  $n = 4$       0x8A  
 $1 \ll 4$



$0 \dots 000 \underline{10000} = 16 \text{ (dec)}$

$0 \dots 000 \underline{01111} = 15 \text{ (dec)}$

$\Downarrow$   
 $x \& \text{ mask} = \text{extract lowest } 4$

②  $\text{int32}_t \text{ mask} = -1; // \text{all 1-bit}$

Ex:  $n = 4$       0x29

$i=0$   
 $11 \dots 11 \ll 1$   
 $= 11 \dots 10$

$i=1$   
 $11 \dots 10 \ll 1$   
 $11 \dots 100$

$i=2$   
 $11 \dots 1000$

$i=3$   
 $11 \dots \underline{10000}$

$\Rightarrow \sim \text{mask} = \underbrace{00 \dots 01111} \& \underbrace{0x29}_{0010 \ 1001}$   
 $= \underline{0x9}$

encode\_utf8 : Example input: 233

1-byte:  $0 \dots$   $\Rightarrow$  # you're encoding are just the . bits  
 $\uparrow$   
MSB

2-bytes:  $110 \dots$   $10 \dots$   $\Rightarrow$   $\dots = 233$  in binary

3-bytes:  $1110 \dots$   $10 \dots$   $10 \dots$

4-bytes:  $11110 \dots$   $10 \dots$   $10 \dots$   $10 \dots$

$\Rightarrow$  Need to figure out how many bytes I need to encode

Idea: compare input # to maximum value each pattern can encode

$\Rightarrow$  max val = all 1-bits for each dot -

$$\begin{aligned} 1\text{-byte} &= 0x\underbrace{0000}F = 0x7F \\ &= 0b1111111 \end{aligned}$$

$$\begin{aligned} 2\text{-byte} &: 0b1111111111 = 11 \text{ one-bits} \\ &= 0x7FF \end{aligned}$$

$$\begin{aligned} 3\text{-bytes} &: 0b1 \dots 1 = 16 \text{ one-bits} \\ &= 0xFFFF \end{aligned}$$

$$\begin{aligned} 4\text{-bytes} &: 0b1 \dots 1 = 21 \text{ one-bits} \\ &= 0x1FFFFFF \end{aligned}$$