



MP1

C++ → C

# UTF-8

0 → 48

1 → 49

A → 65

☹ → 0x10F...

code point  
 0x10340  
~~00100000001101000000~~  
 17

0... 0x7F

0???????

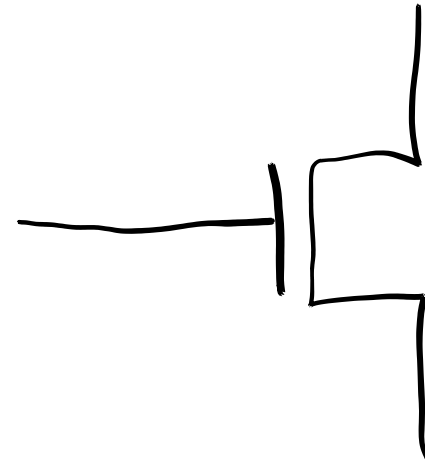
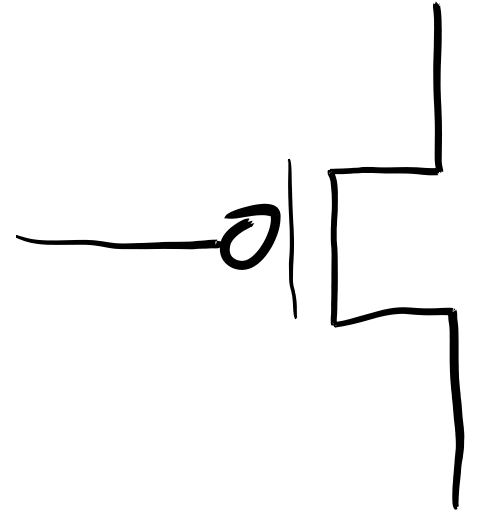
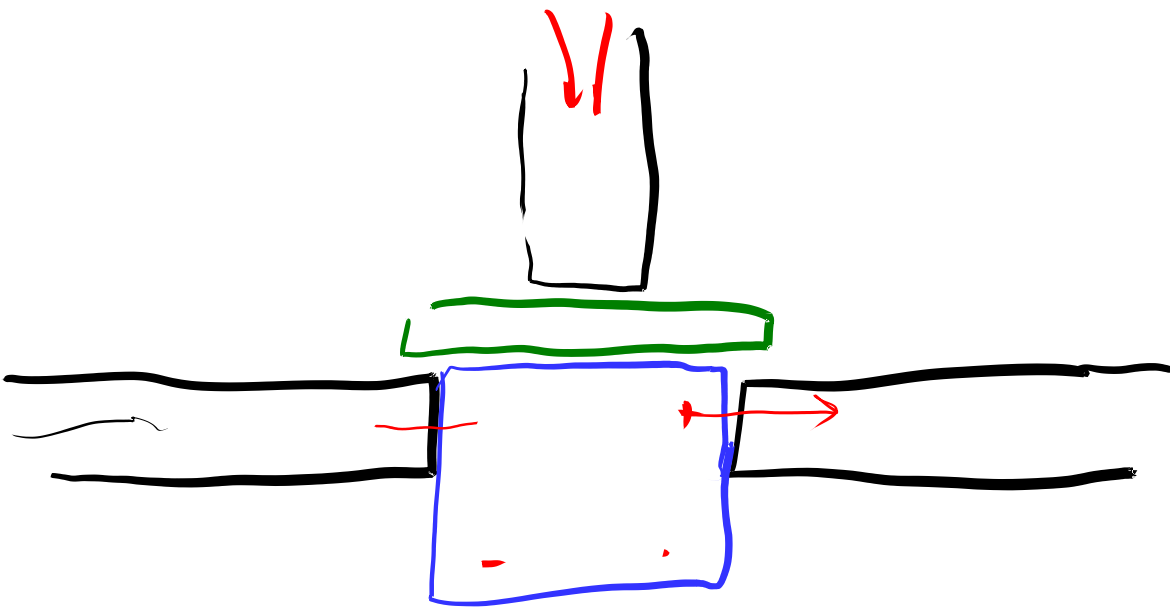
110----- 10----- = 11 bits  
 5 + 6

1110----- 10----- 10----- = 16 bits  
 4 6 6

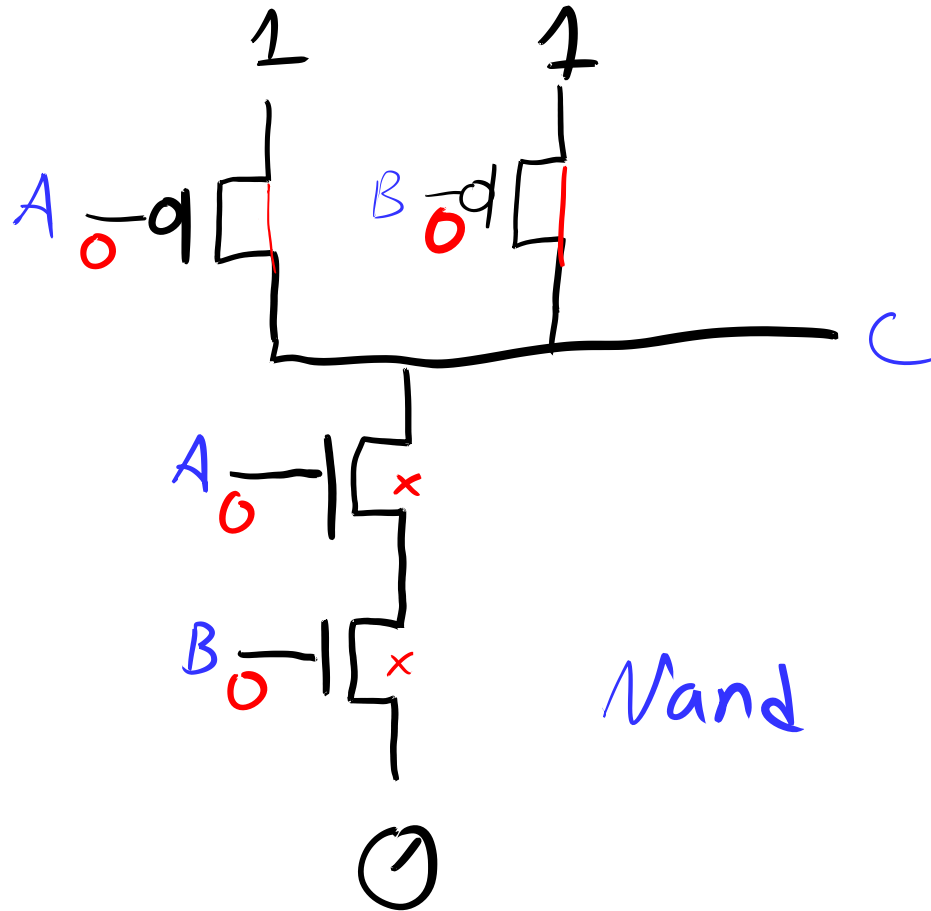
11110----- 10----- 10----- 10----- = 21 bits  
 3 6 6 6

11110 000 100|0000 1000110| 10000000  
 F0 90 8 D 80

Transistor  $\rightarrow$  electric valve



Logic gate



not and  
 $\neg(A \wedge B)$

A	B	C
0	0	1
0	1	1
1	0	1
1	1	0

$\sim(A \wedge B)$

# Arithmetic Logic

ALU

Arithmetic  
Logic  
Unit

$$\begin{array}{r} 0a \\ + 0b \\ \hline \boxed{0} \boxed{0} \end{array}$$

AND  
 $a \& b$

$$\begin{array}{r} 0a \\ + 1b \\ \hline \boxed{0} \boxed{1} \end{array}$$

XOR

$$\begin{array}{r} 1a \\ + 0b \\ \hline \boxed{0} \boxed{1} \end{array}$$

$$\begin{array}{r} 1a \\ + 1b \\ \hline \boxed{1} \boxed{0} \end{array}$$

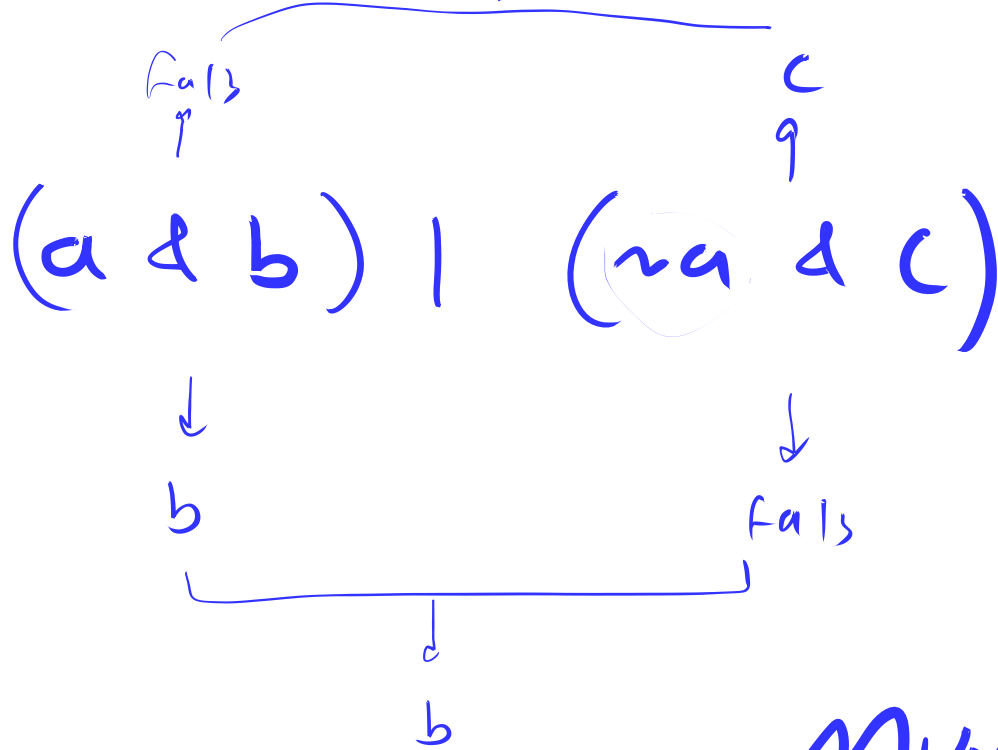
Choice (if)

Store

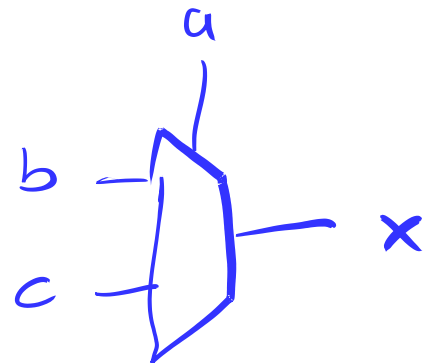
$c[b[a]]$

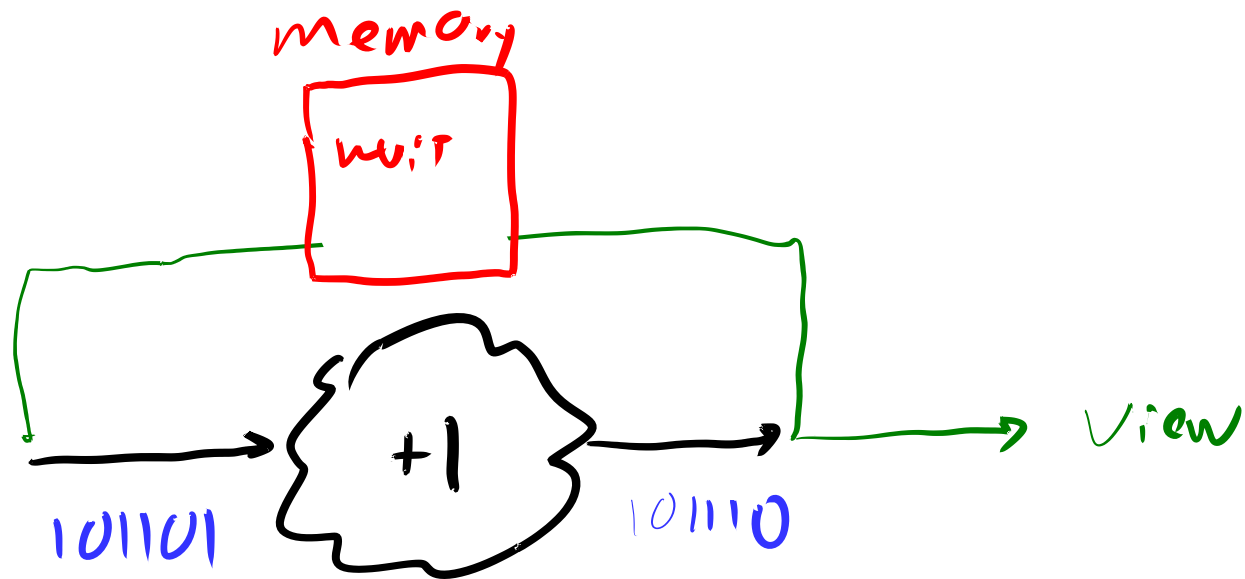
$x = a ? b : c$        $x = \text{if}(a) \text{ b else } c$

~~$b$~~  if  $a$  else  $c$

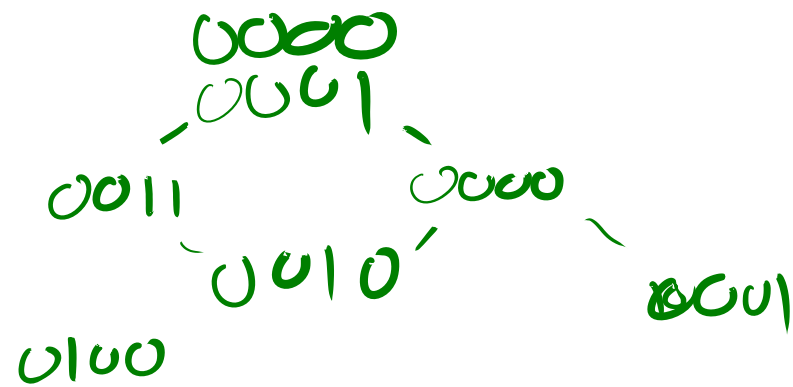
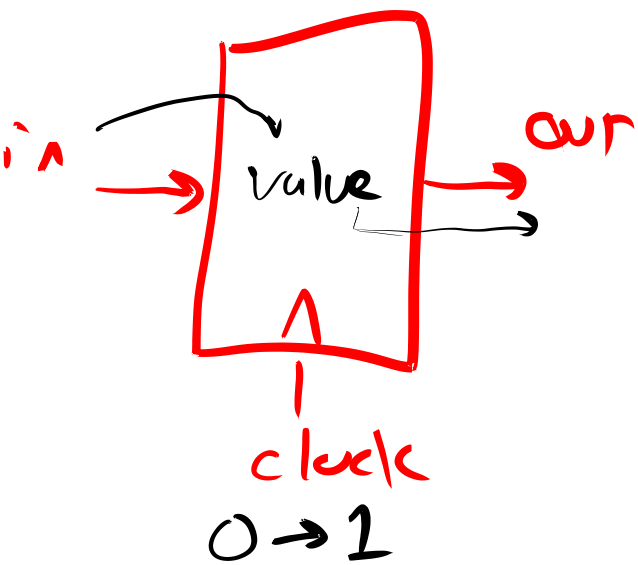


Mux  
Multiplexer





key is tv





Cluck speed

GHz