

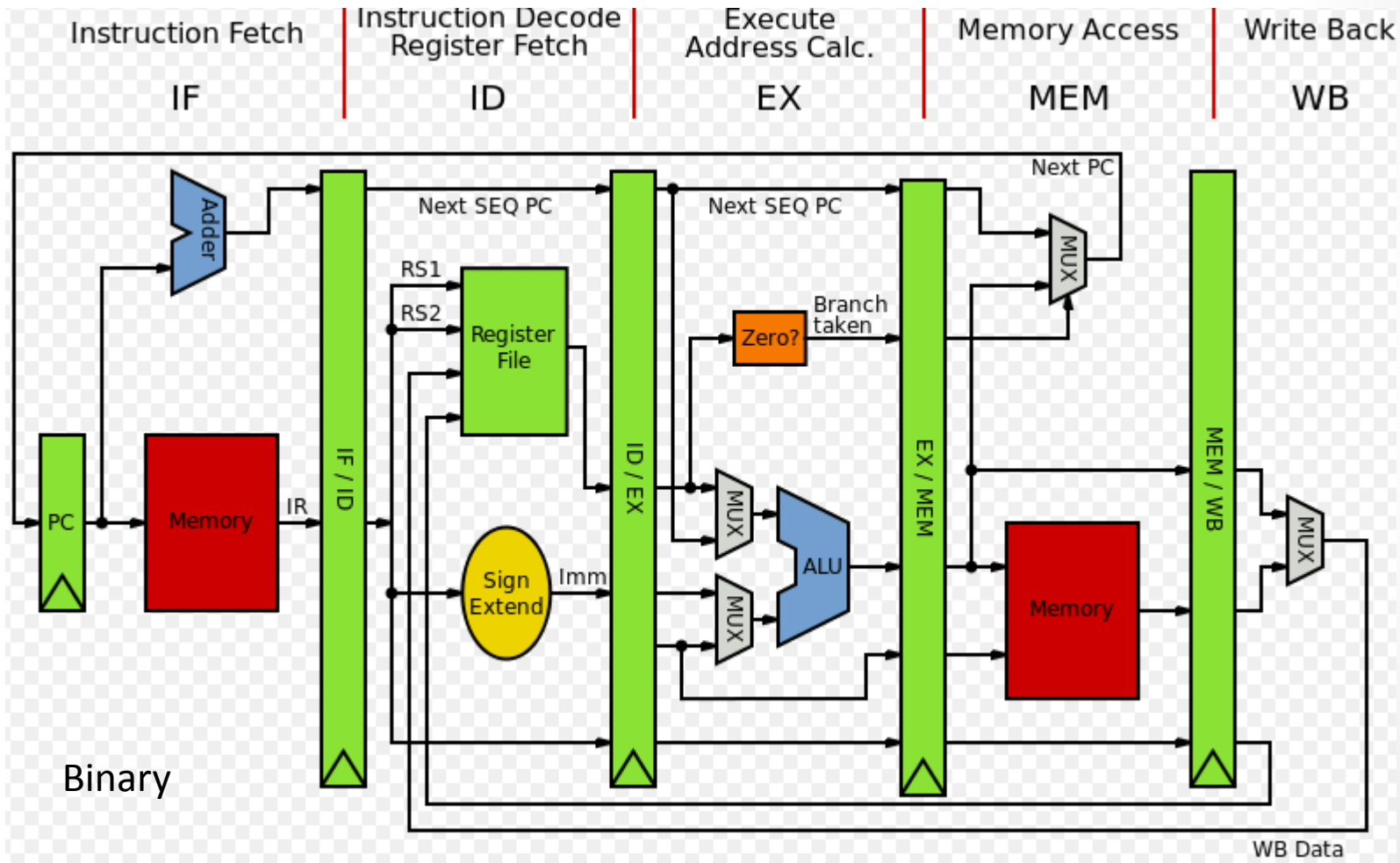
# Computer architecture

Machine code

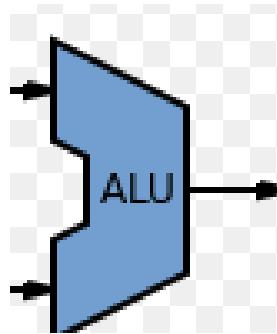
```
SUB AX, BX  
MOV CX, AX  
MOV DX, 0
```

Assembly language

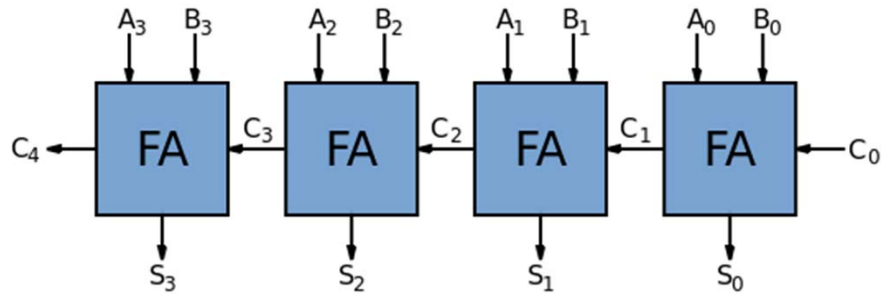
```
001010111000011  
100010111001000  
101110100000000000000000
```



Functional blocks

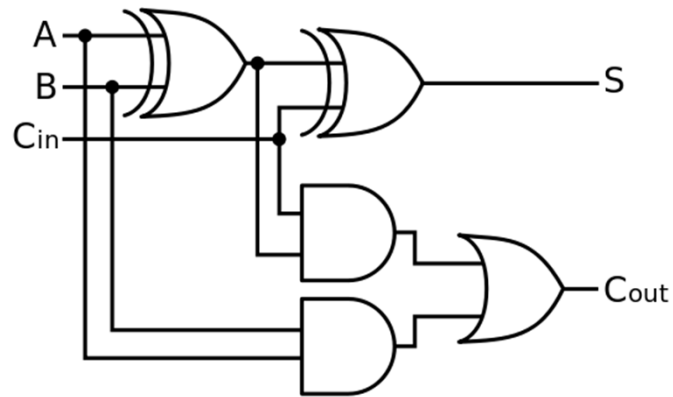


Adders

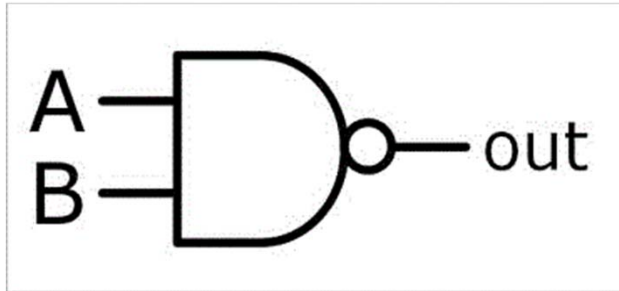


Digital logic design

Gates

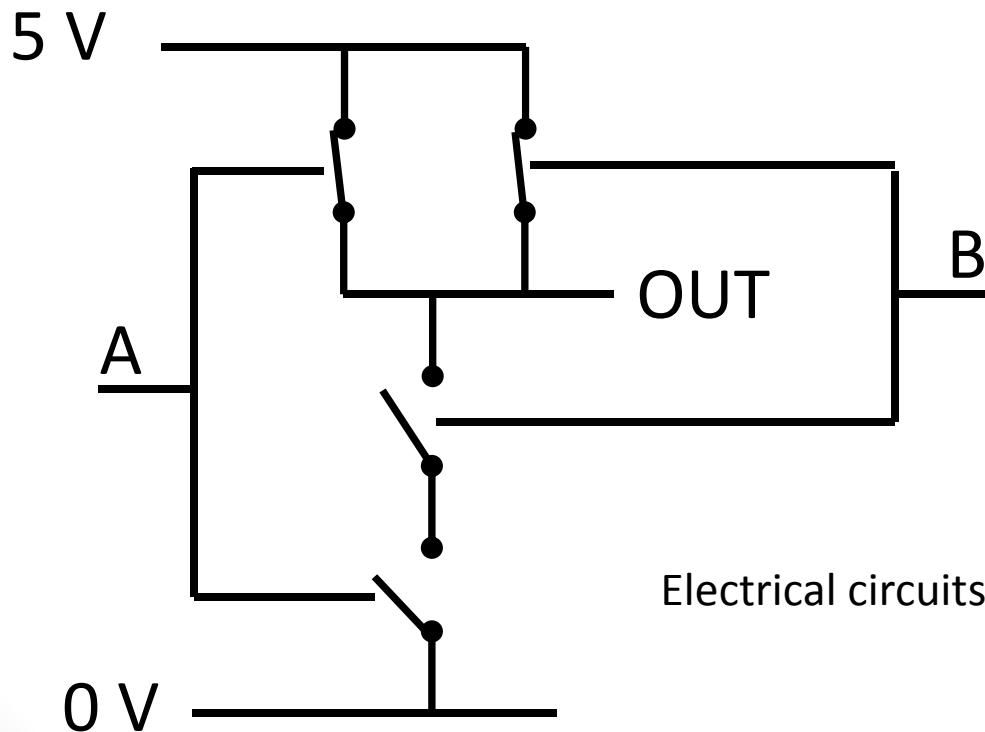


### Gates



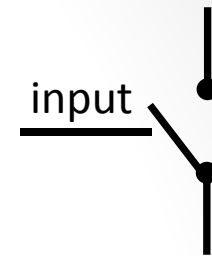
'1' 5V  
'0' 0V

### Digital circuit design

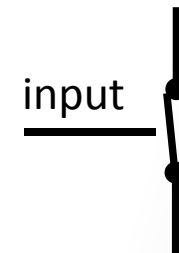


Electrical circuits

Open when input = 0  
Closed when input = 1



Closed when input = 0  
Open when input = 1

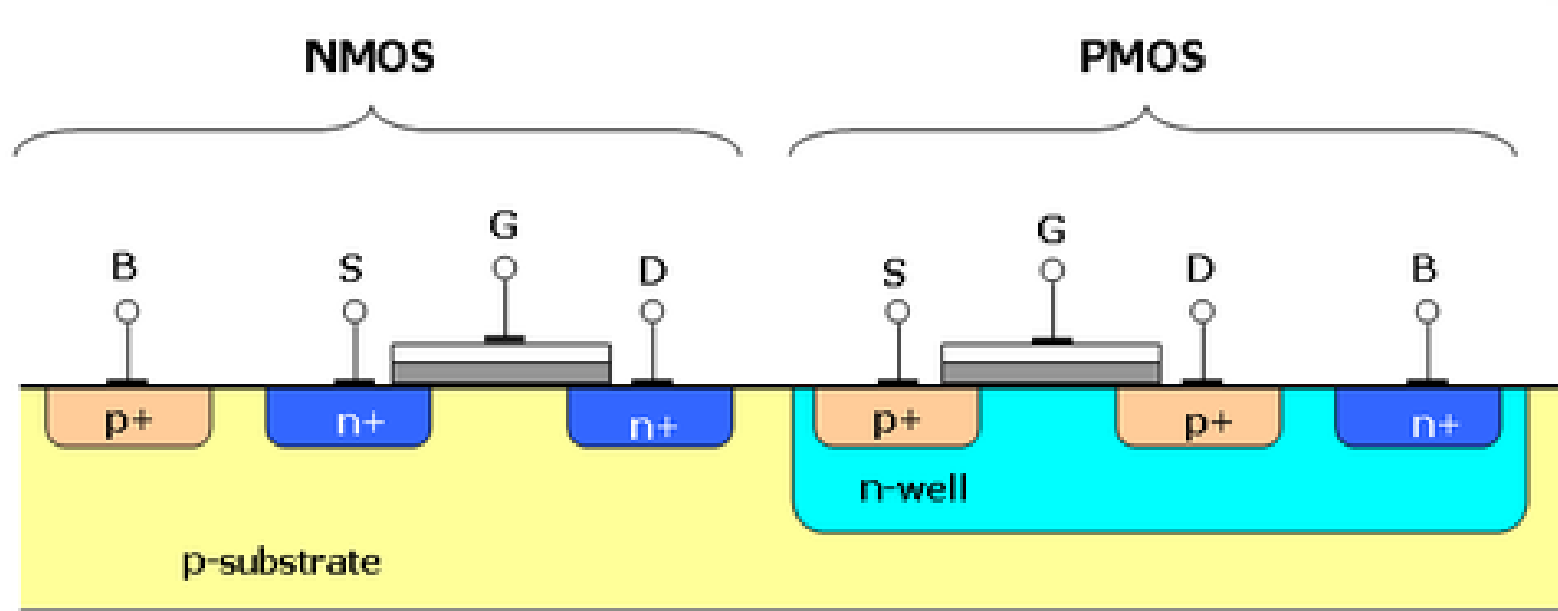


Transistors

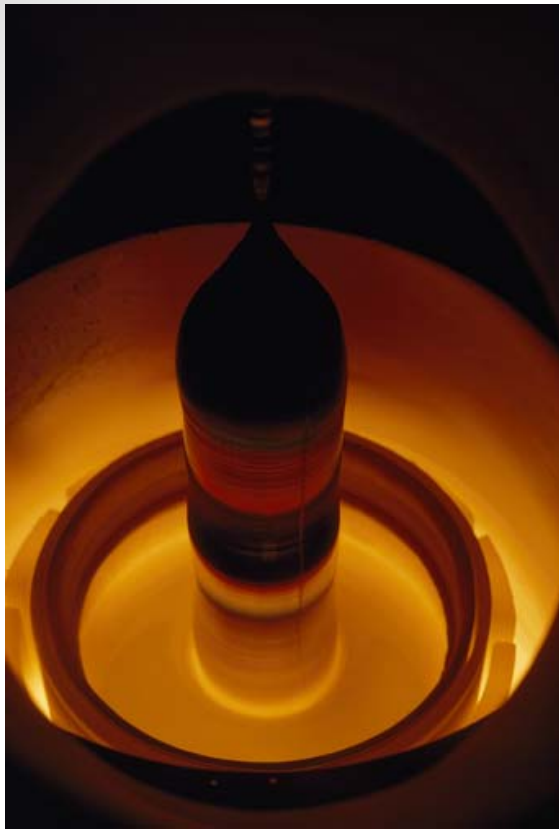


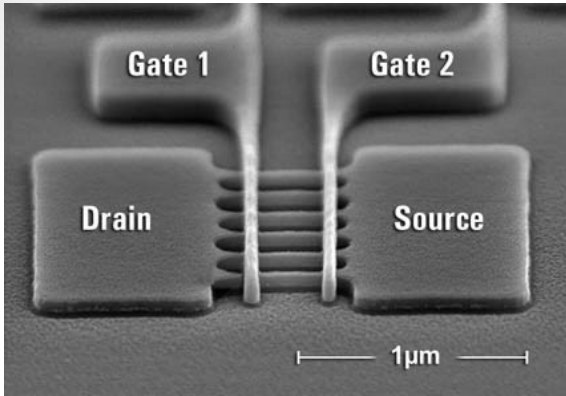
Transistors (symbols)

**Semiconductor physics**

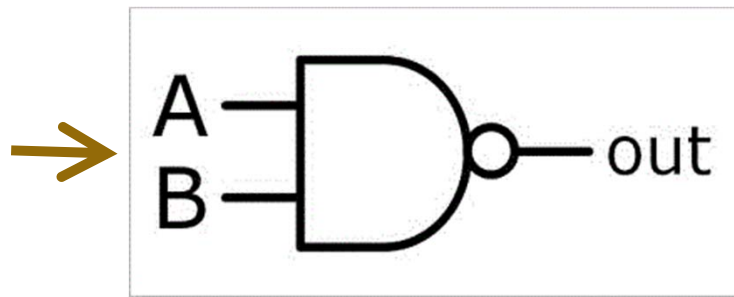


Transistors (physical device)

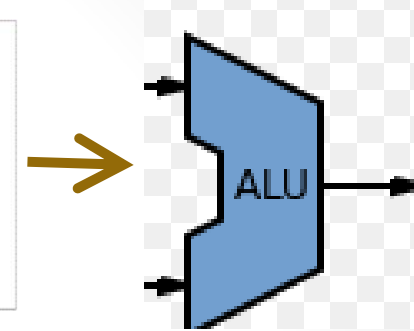




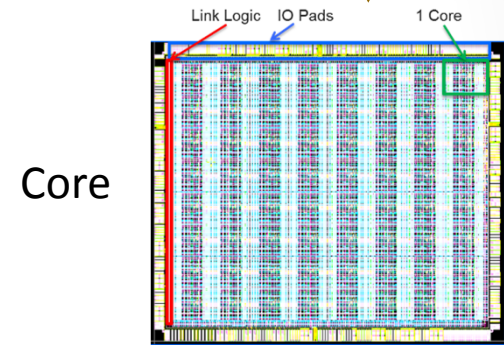
Transistor



Gate



Functional block



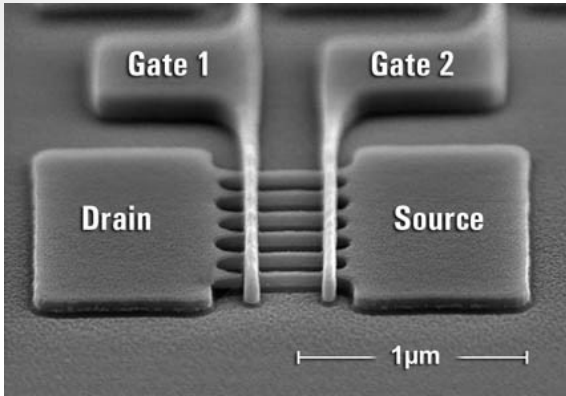
Core

System

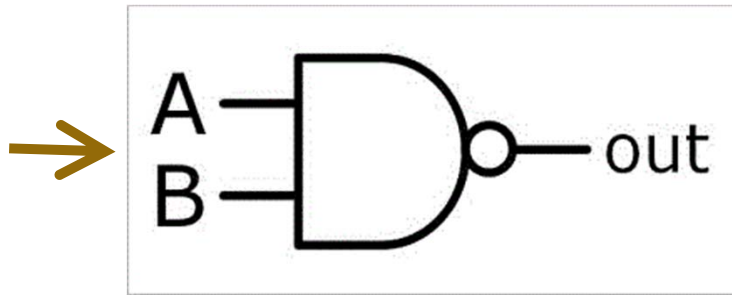


Chip

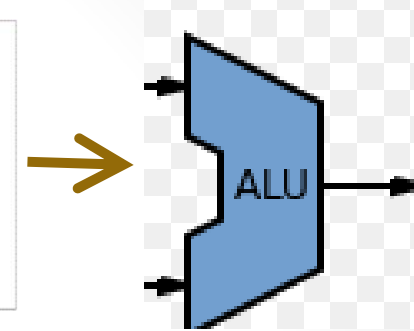




Electrical signals



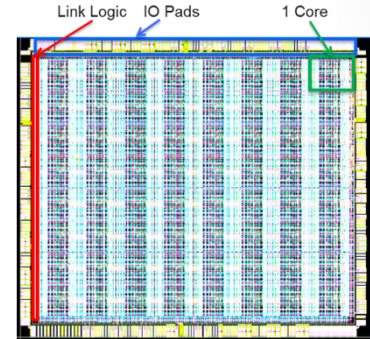
Bits



Binary

Machine code

Assembly



Programming languages

