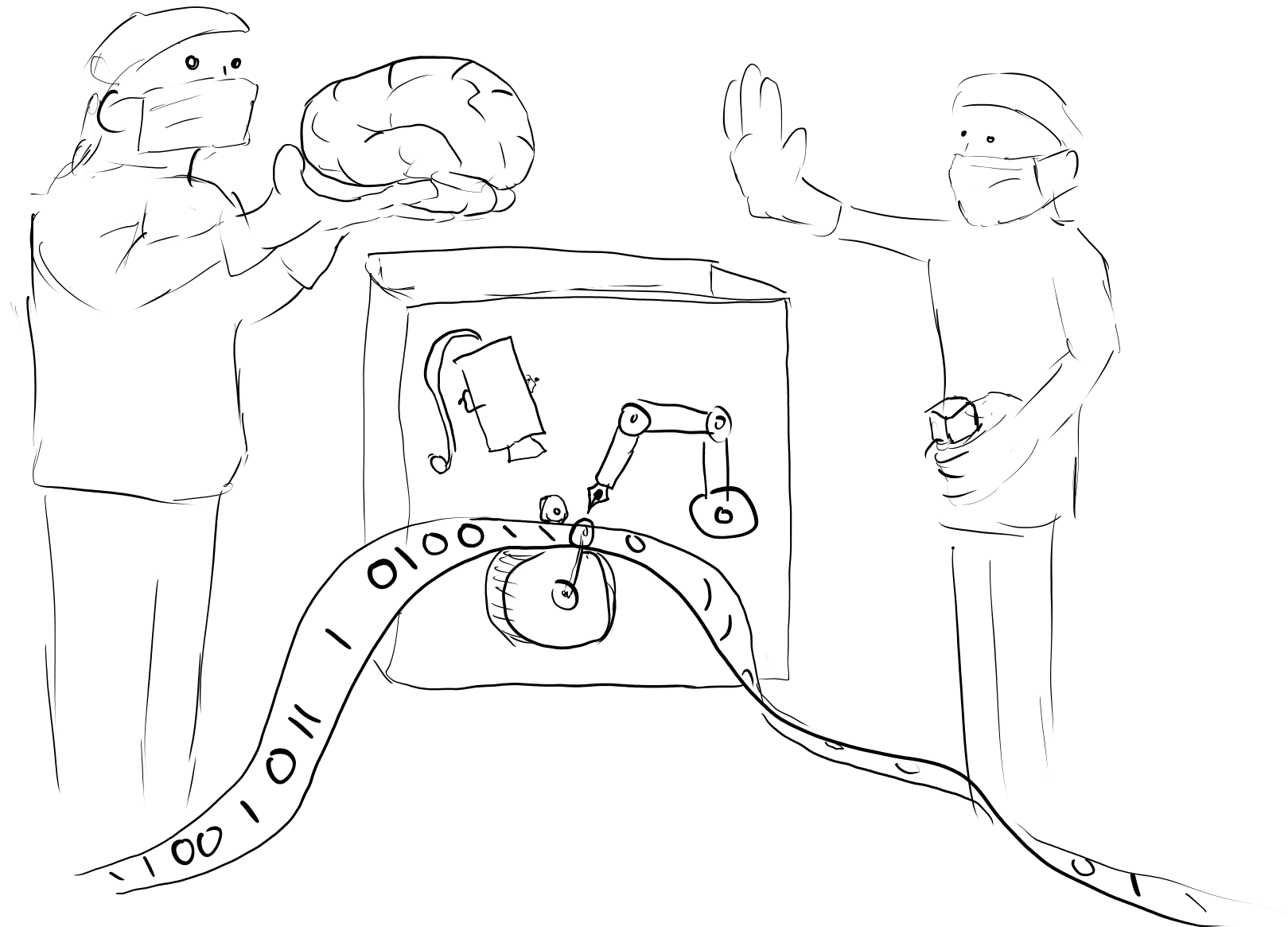
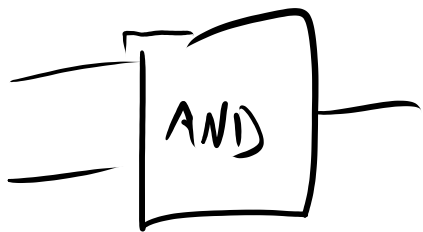






Processor - math

Memory - store  
/  
data  
instructions



Ada  
Lovelace

math

Goal  
Prove everything  
impossible

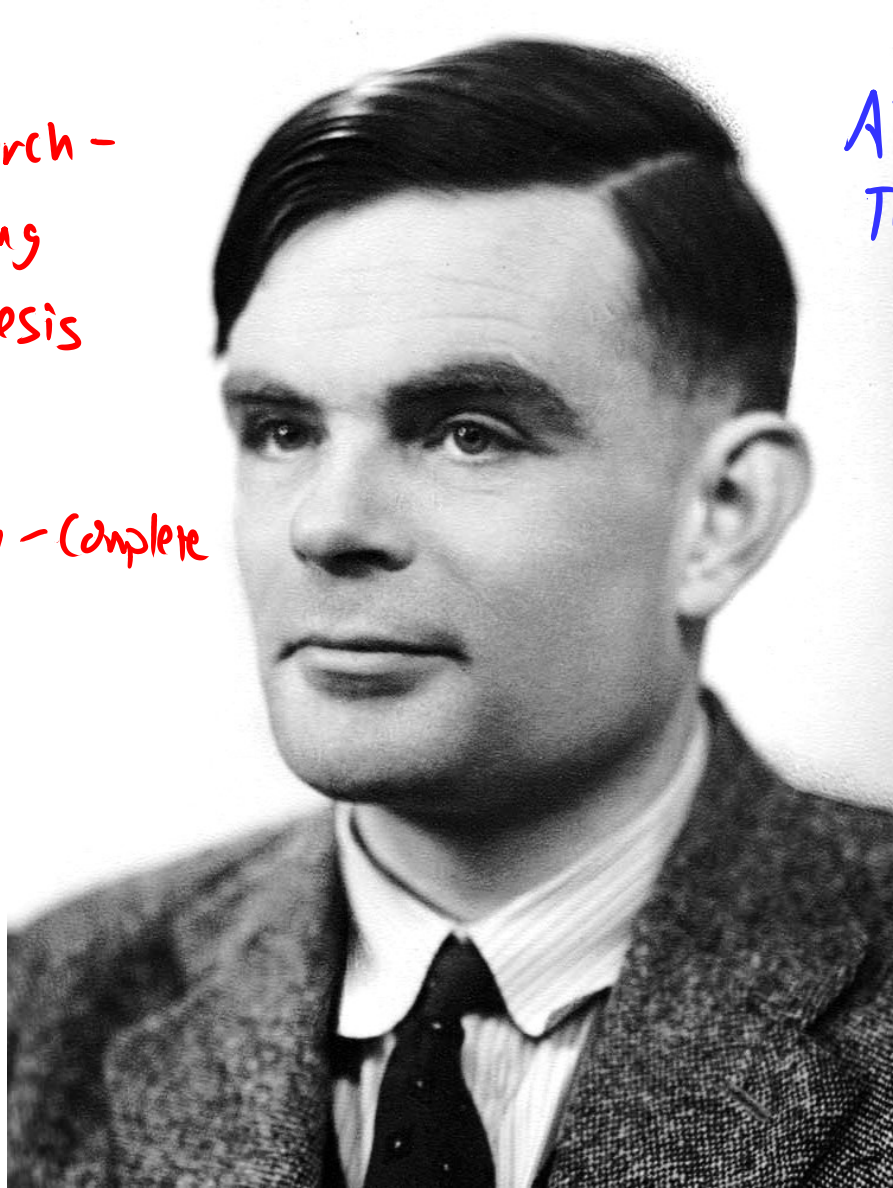
Kurt  
Gödel

X: X cannot be proven



Church -  
Turing  
Thesis

Turing - Complete



Alan  
Turing

Church-Turing thesis:

$\lambda$ -calculus & Turing machines are as powerful  
as any other math or machine

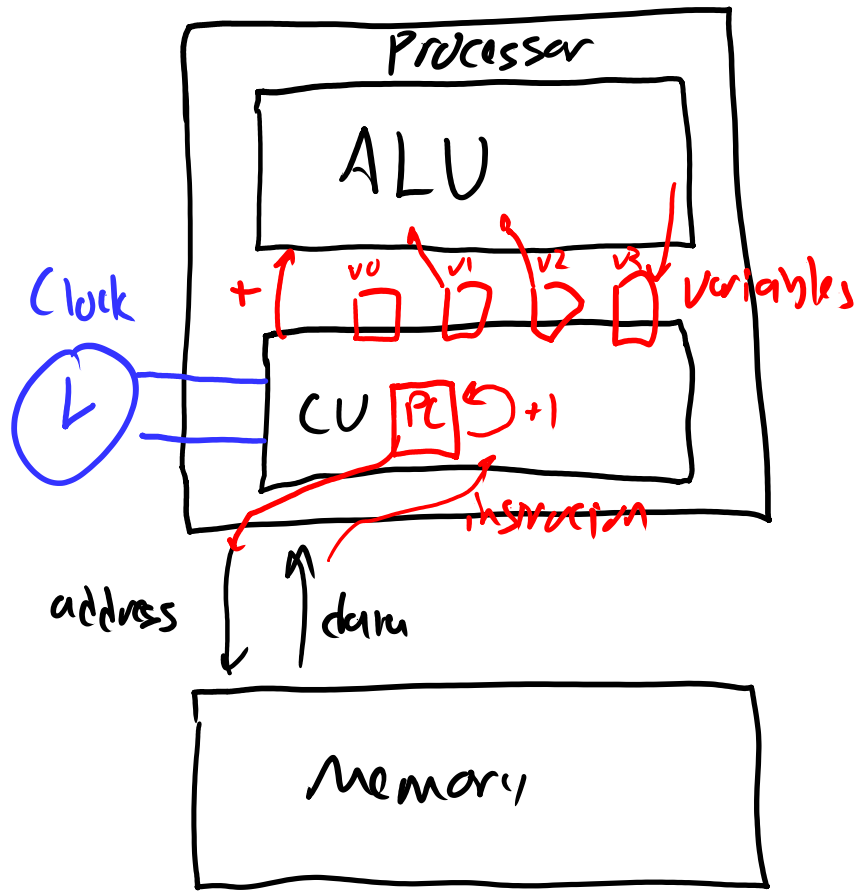
---

same  
not in speed

John  
von Neumann



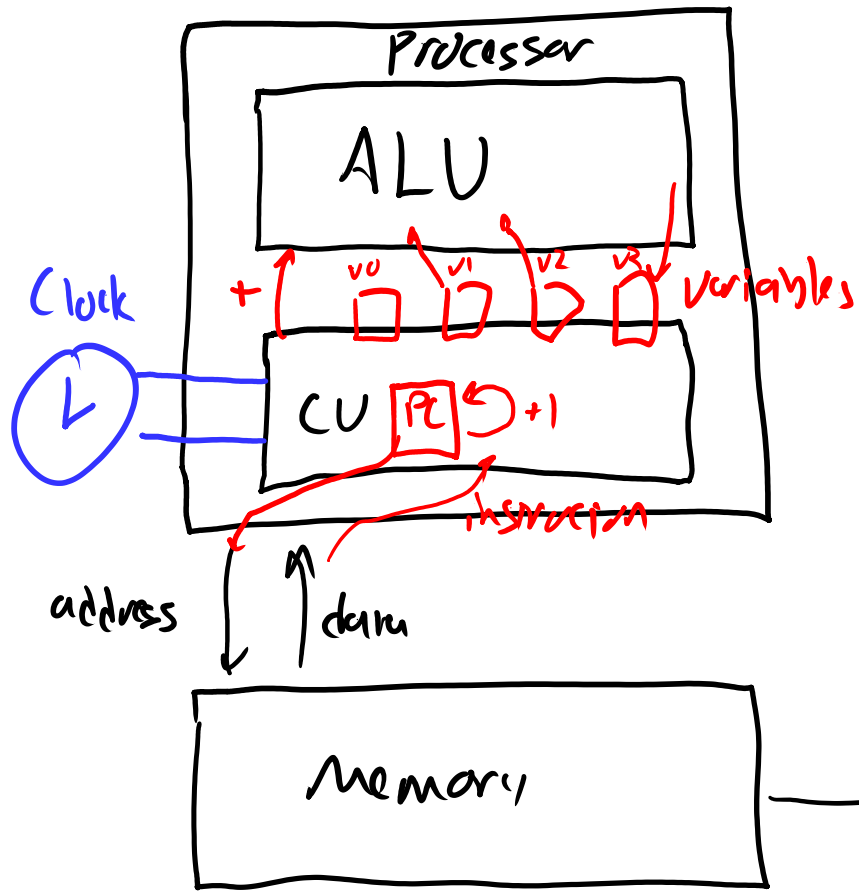
Von Neuman  
Architecture



Arithmetic-logic Unit  
↳ does math

Control Unit

Program Counter



Arithmetic-logic Unit  
↳ does math

Control Unit

Program Counter



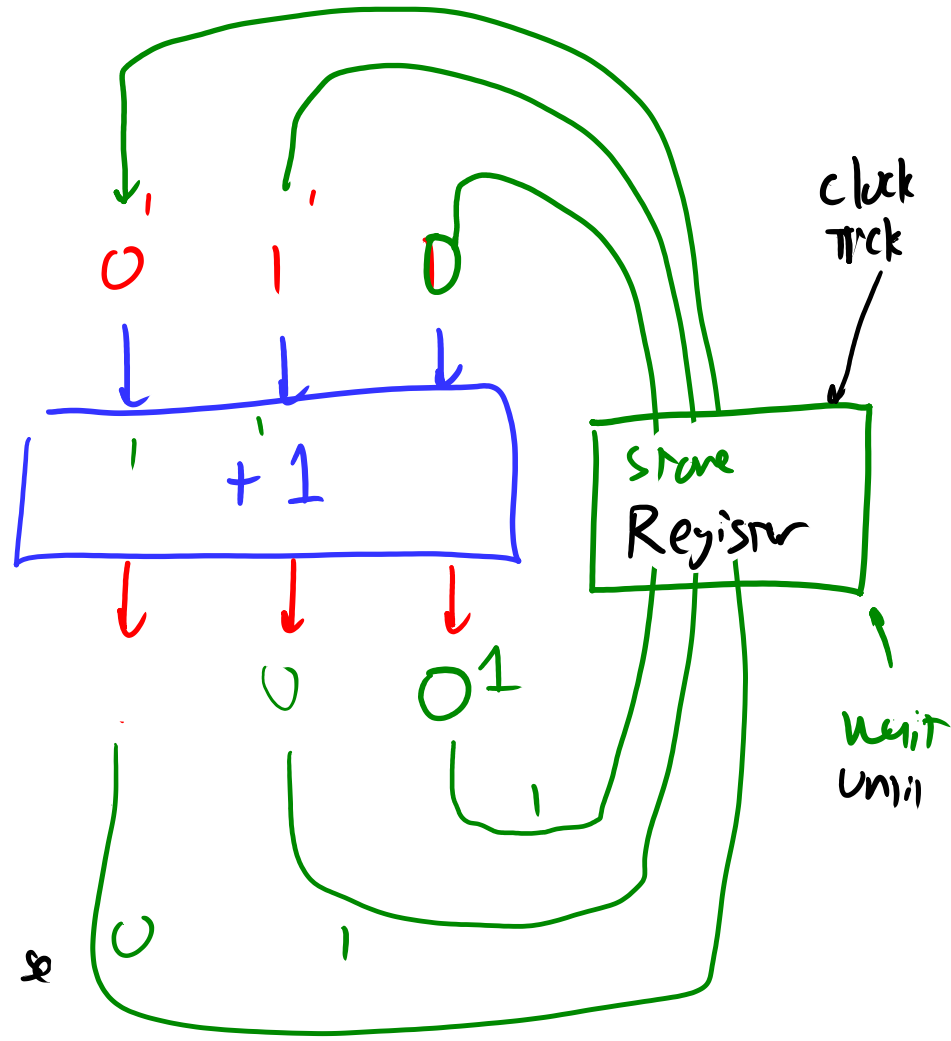
# Counter

000  
001  
010  
011  
100  
:  
:  
:

clock speed      Hz

4.7 GHz

speed of light = 1 foot / billionth of a s



Faster requires smaller

Moore's law

↳ # of components on a CPU  
doubles every 2 years

Processor  
↓

CPU