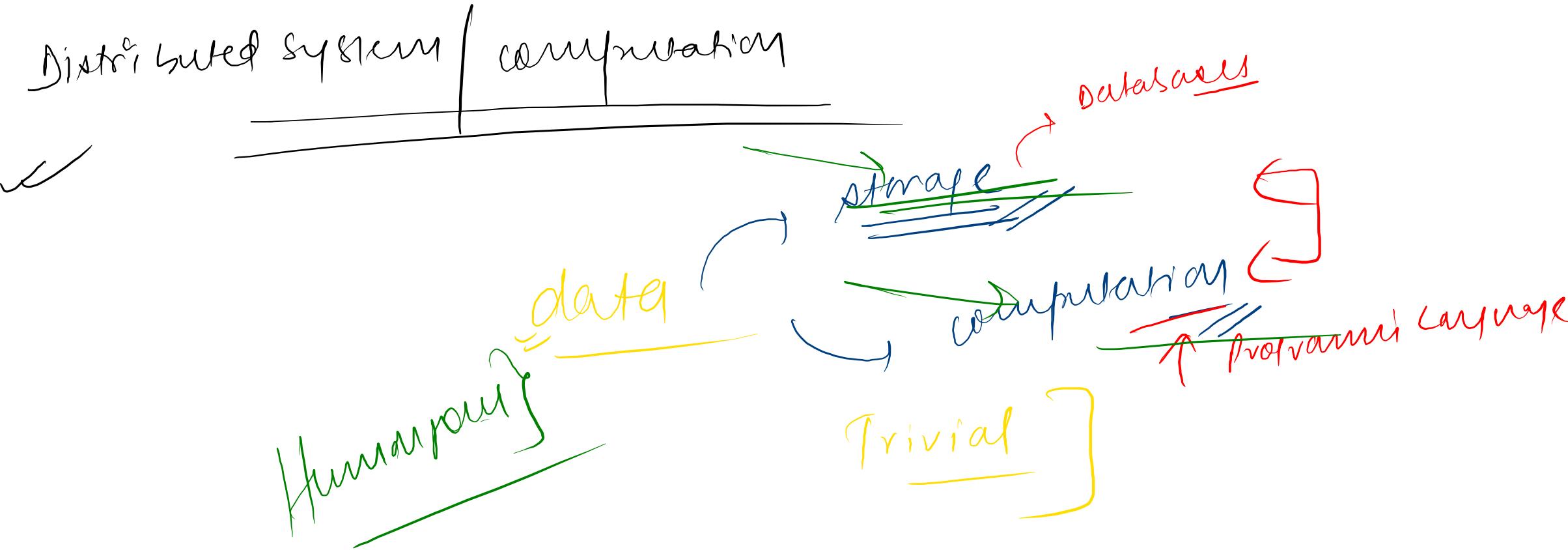
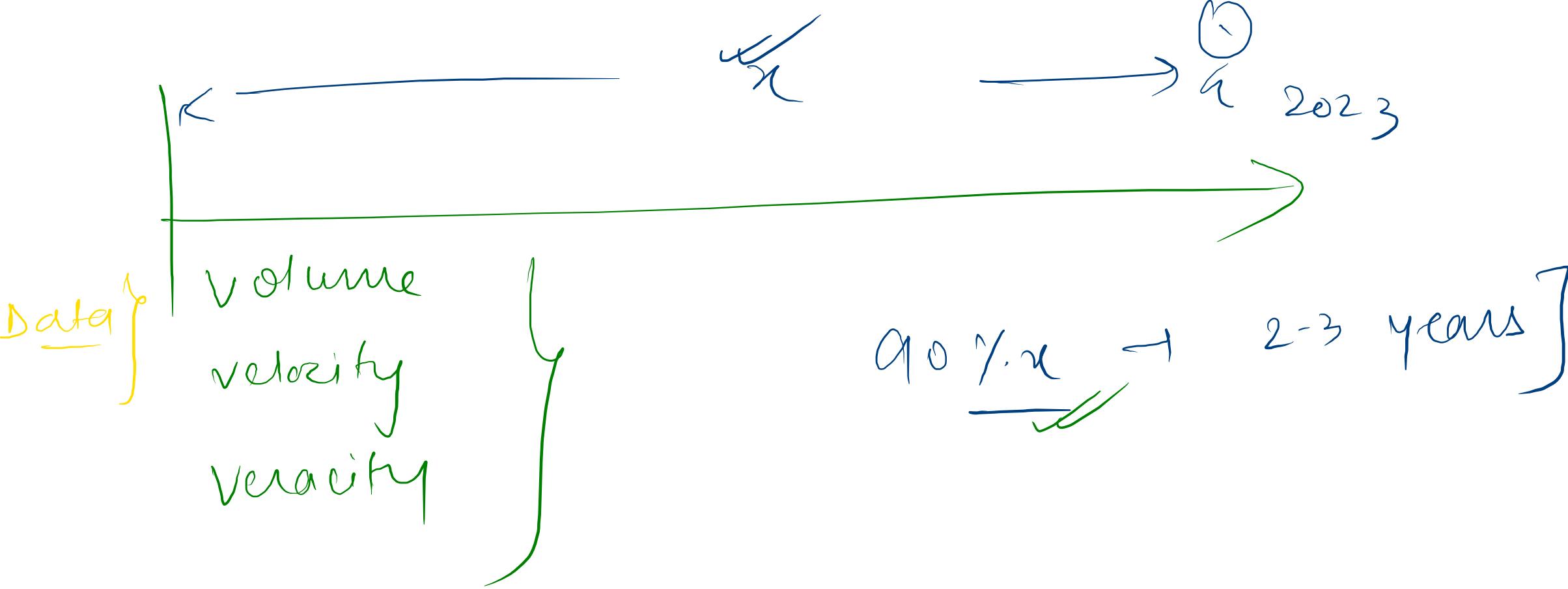
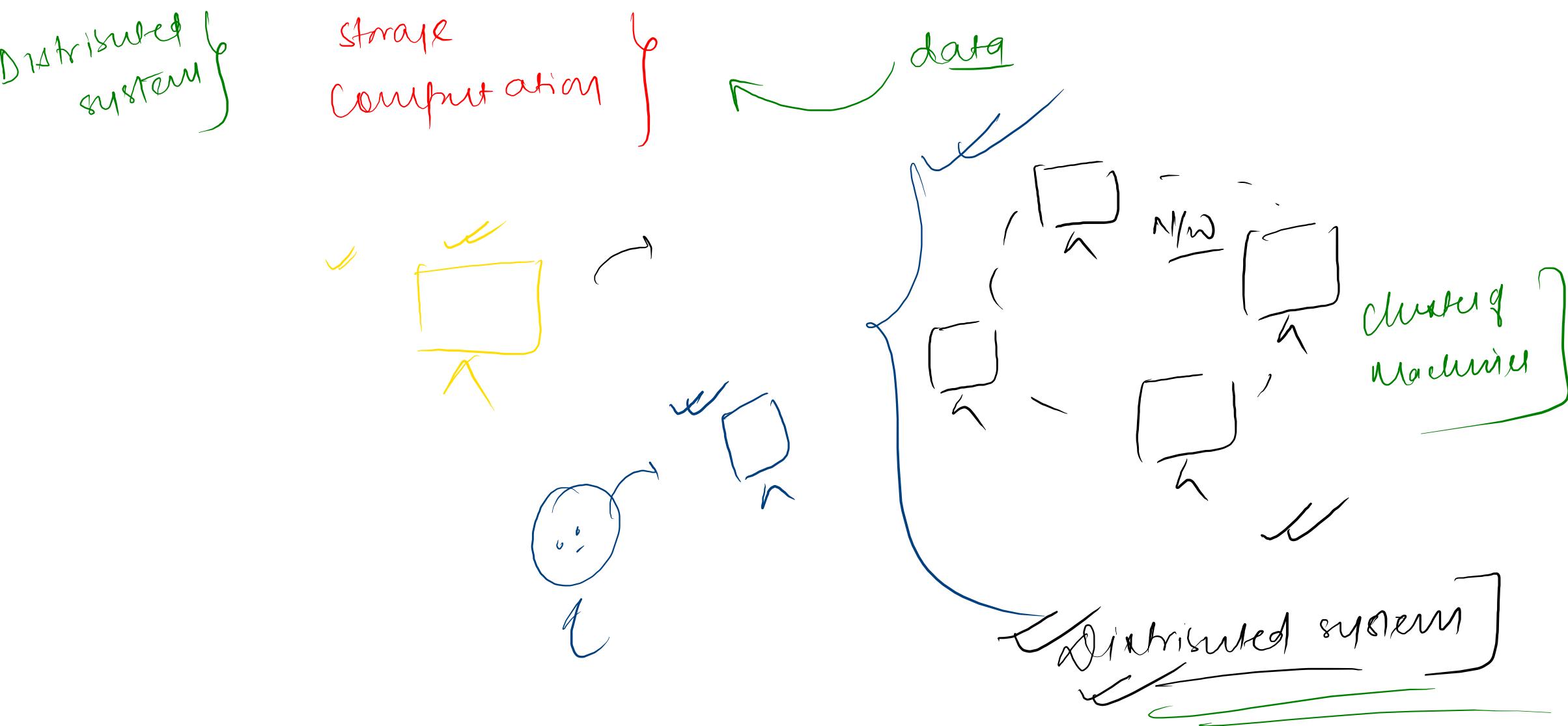
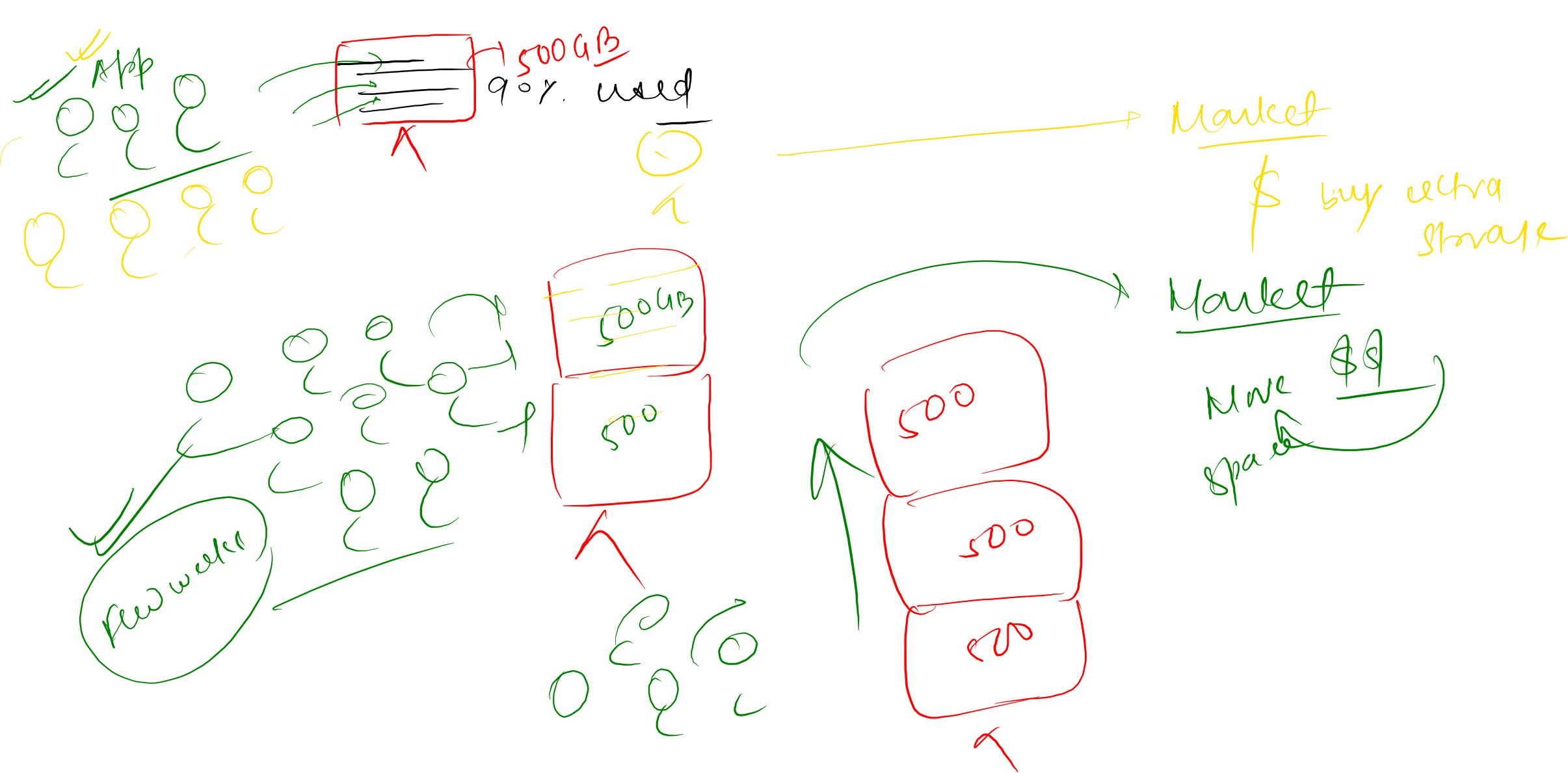


Distributed systems / scaling | CAP } practically → Modern application]



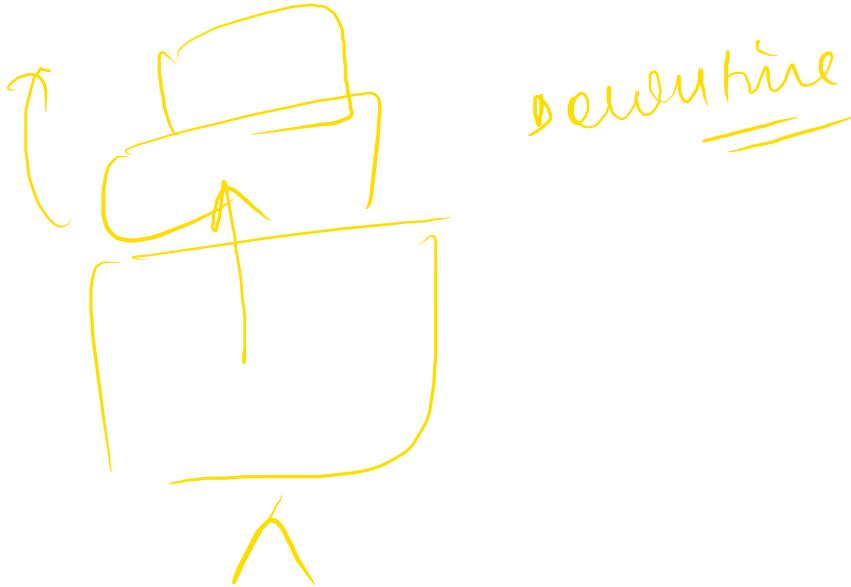






Vertical Scaling

↑
intuitive
visual

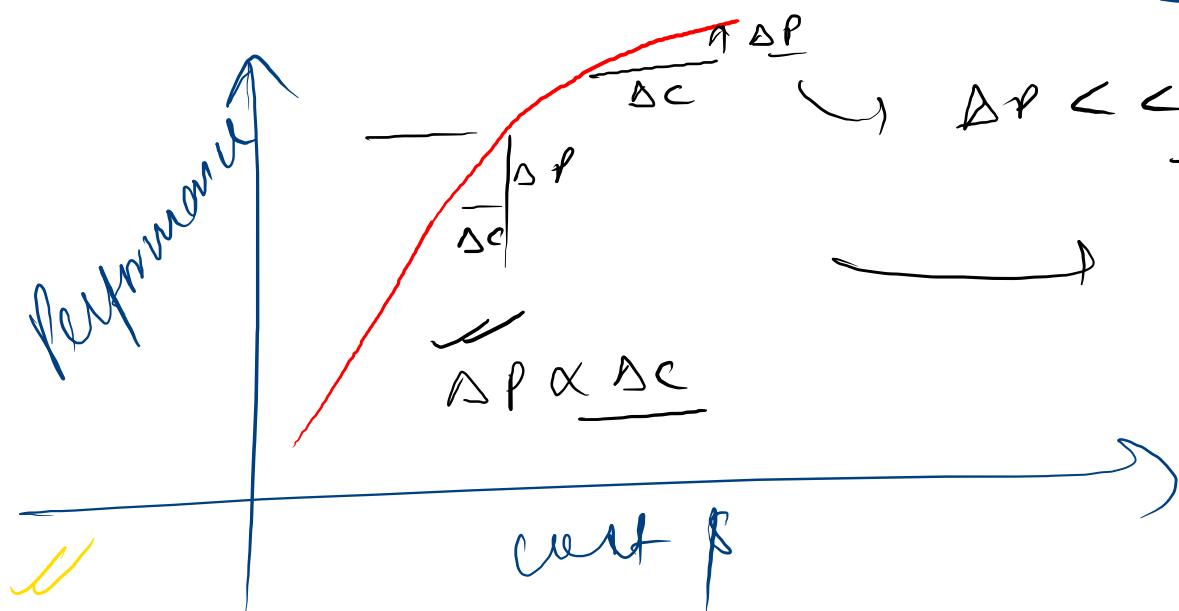


Devutine

~~Vertical scaling~~

Challenges

①



company

\$ ↓

scale \rightarrow More profit

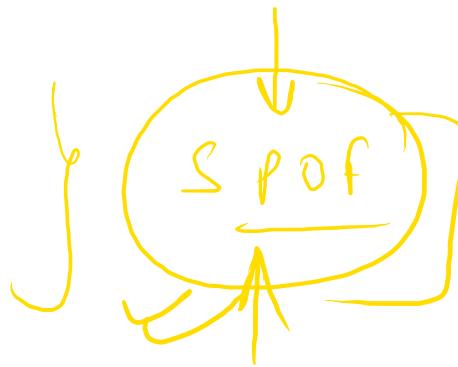
\$\$ Money

$$\Delta P \ll \Delta c \uparrow$$

Hardware limit fails

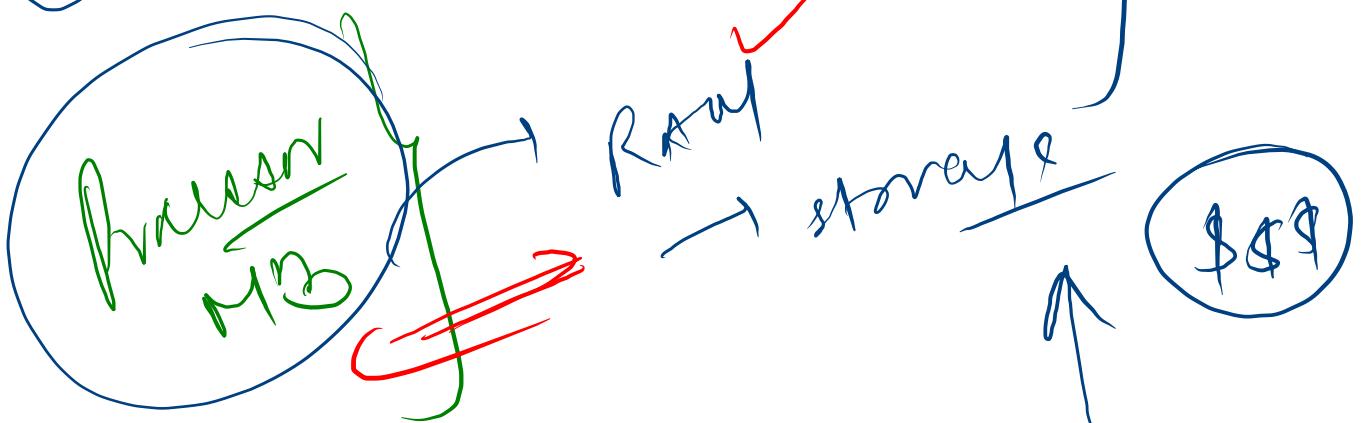
②

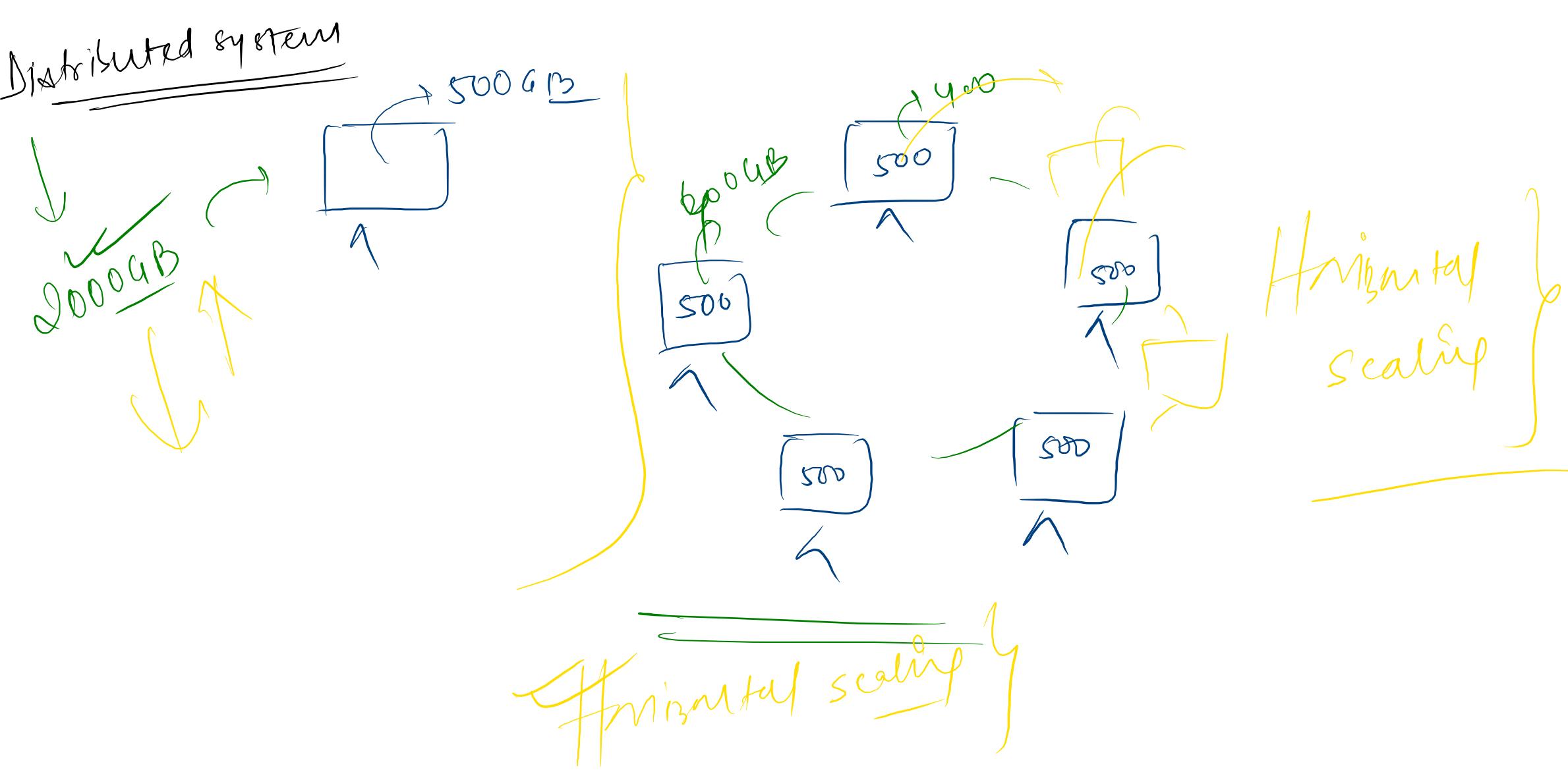
Single Machine } \$\$
expertise

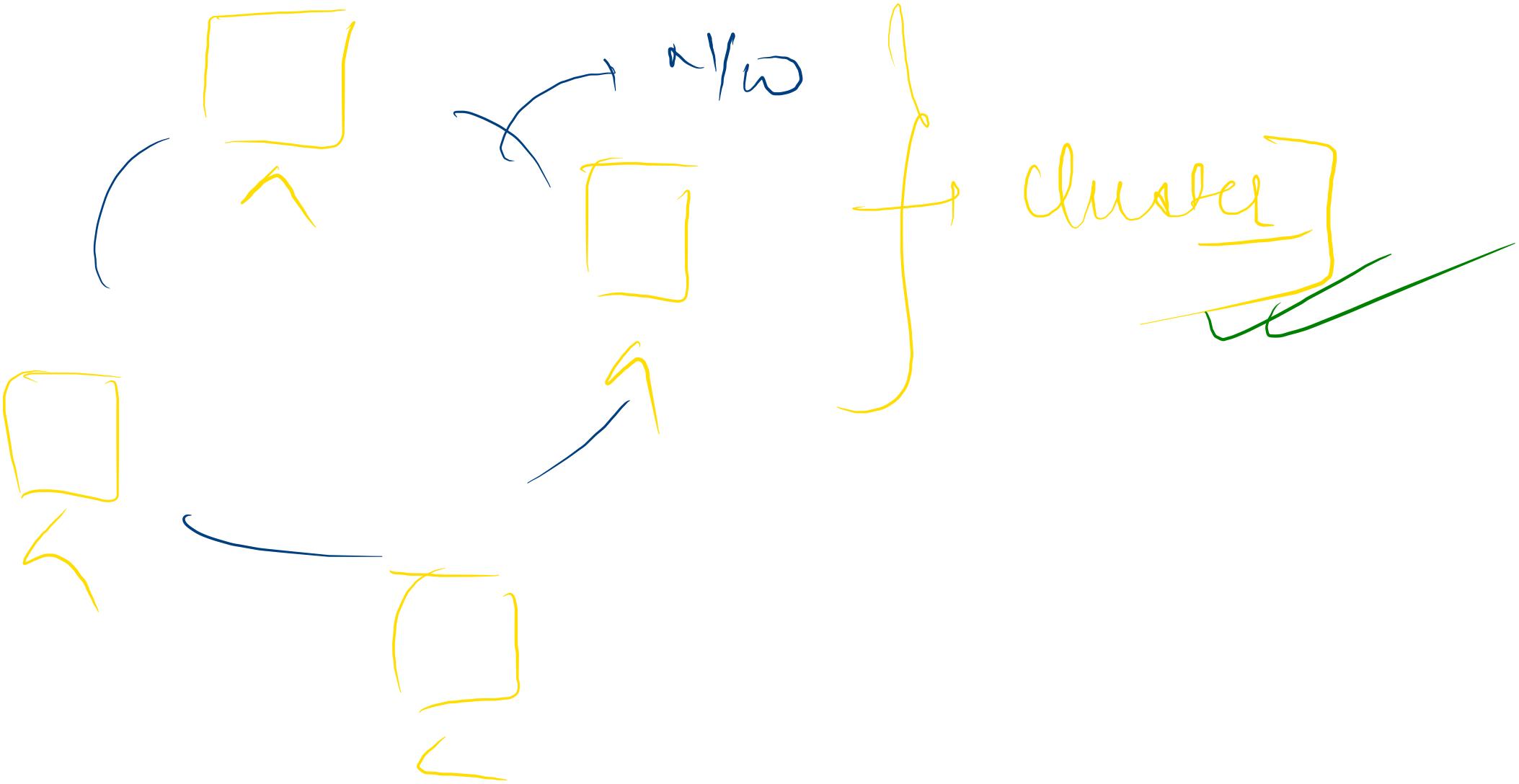


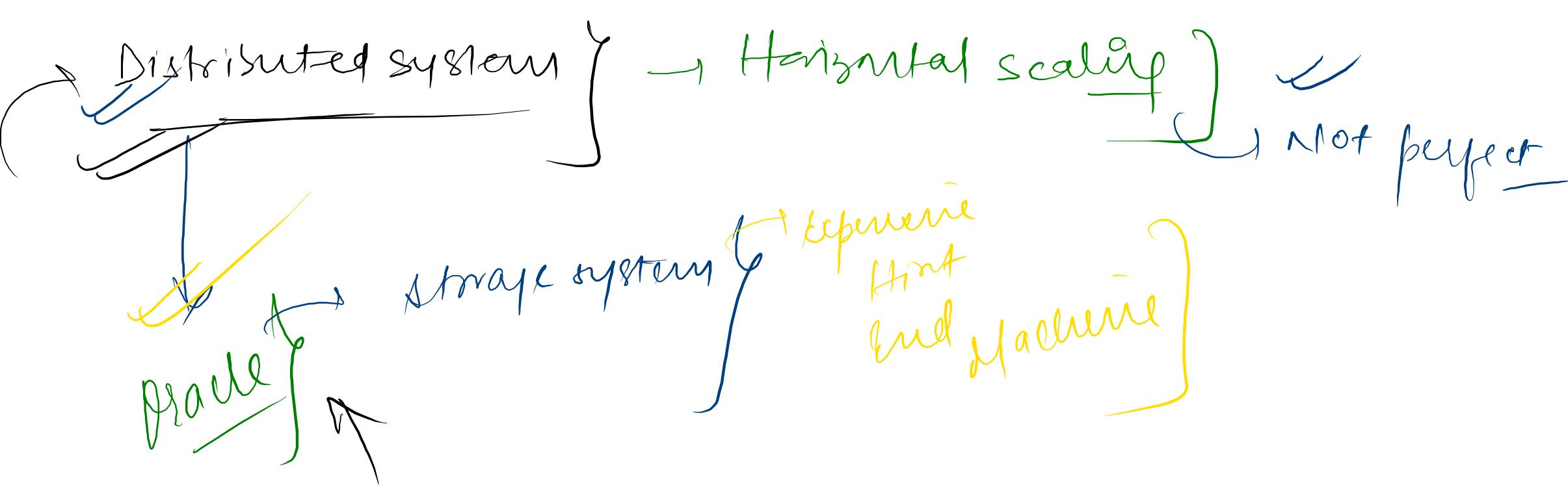
③

Hardware mini factory }

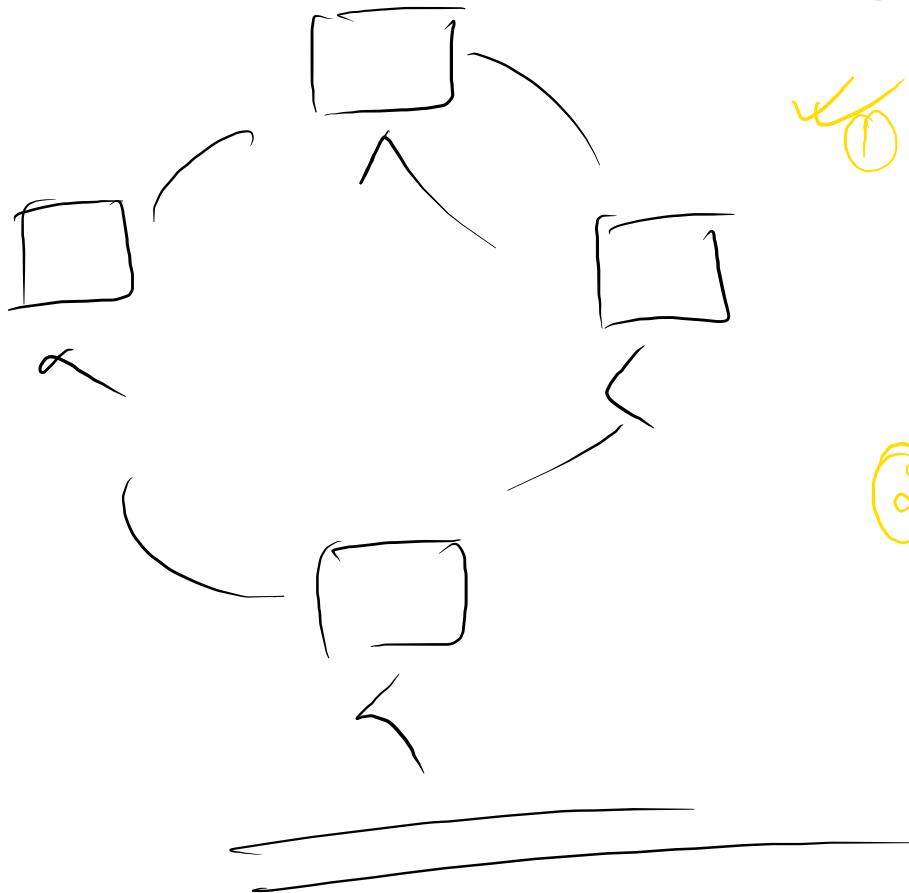








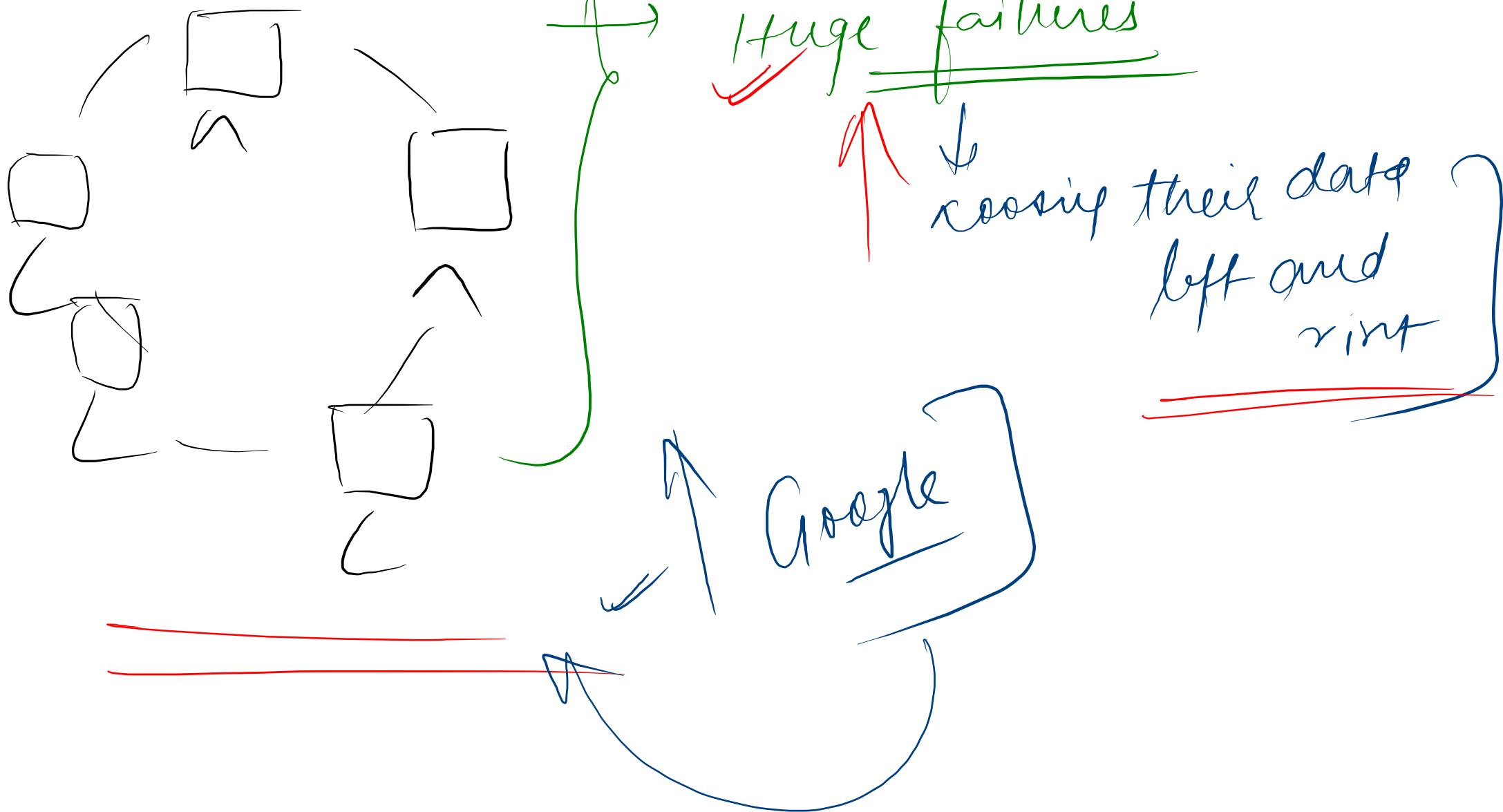
✓ Google Taxonomy

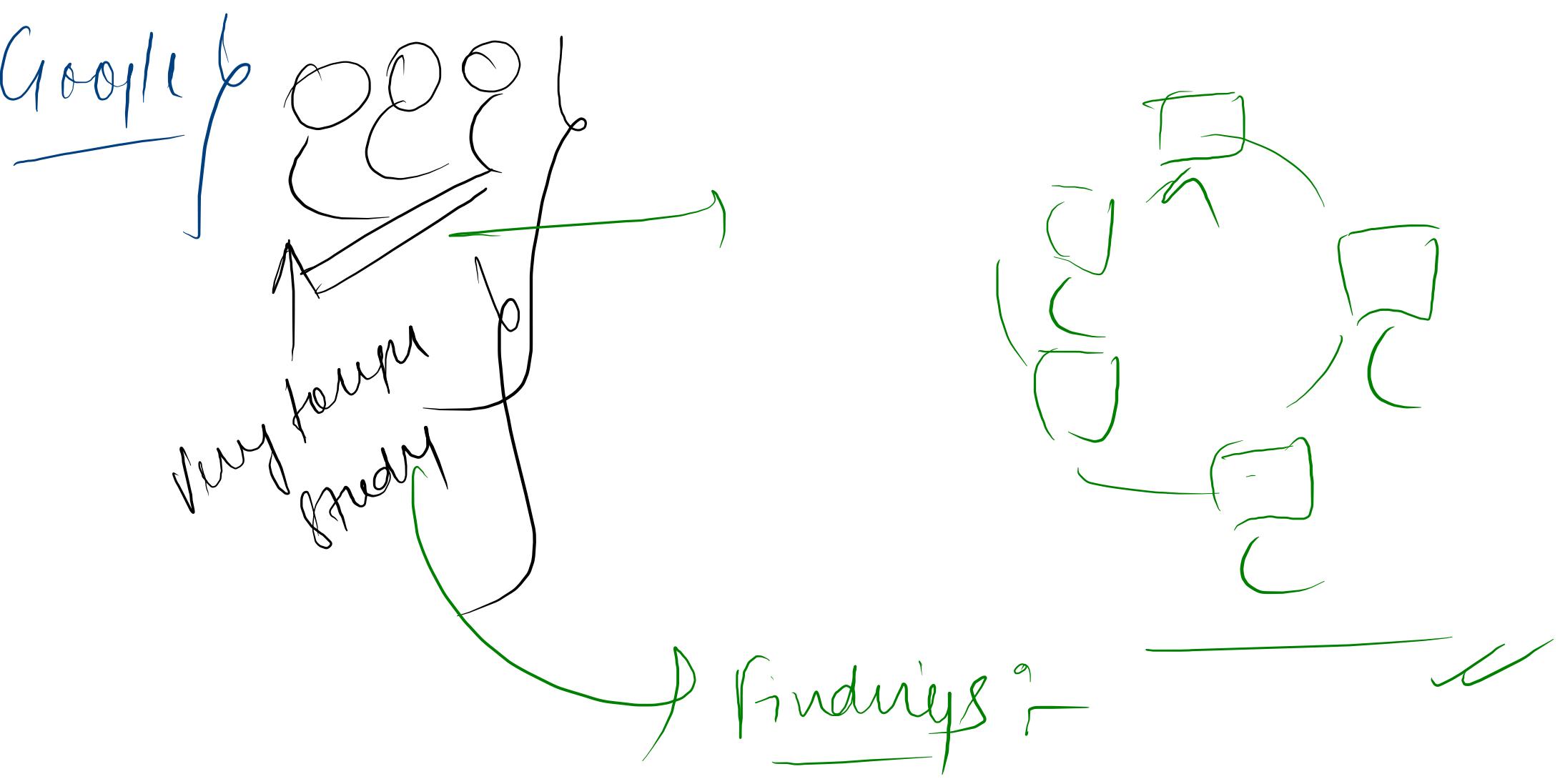


✓ Distributed

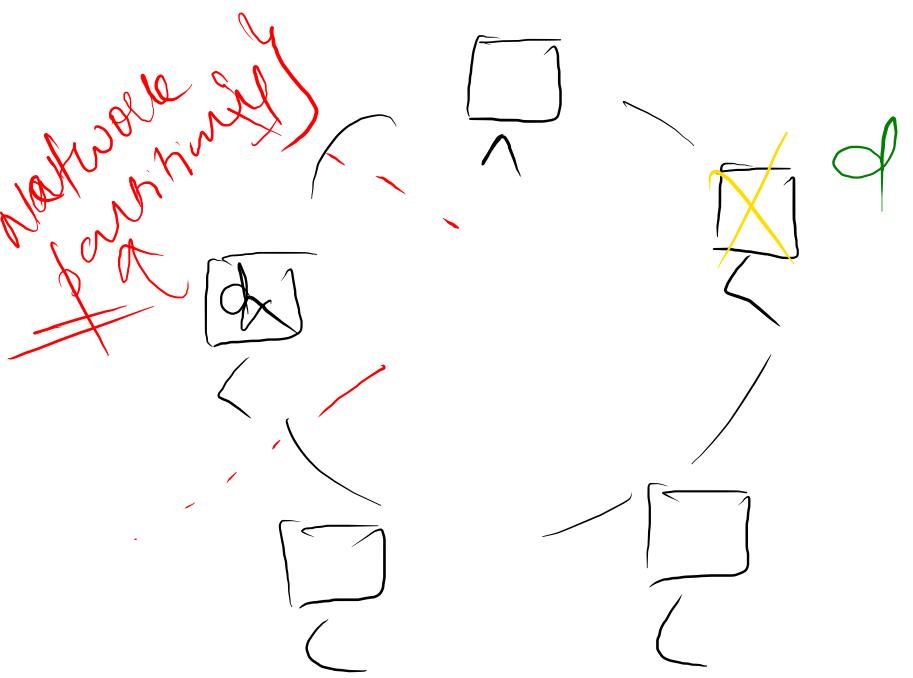
✗ ① multiple Machines
↑
commodity H/w

② connected over N/w





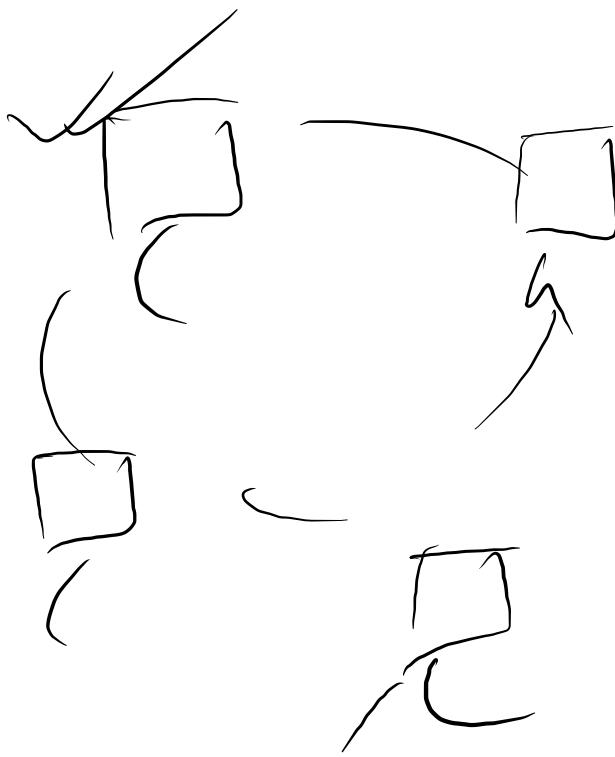
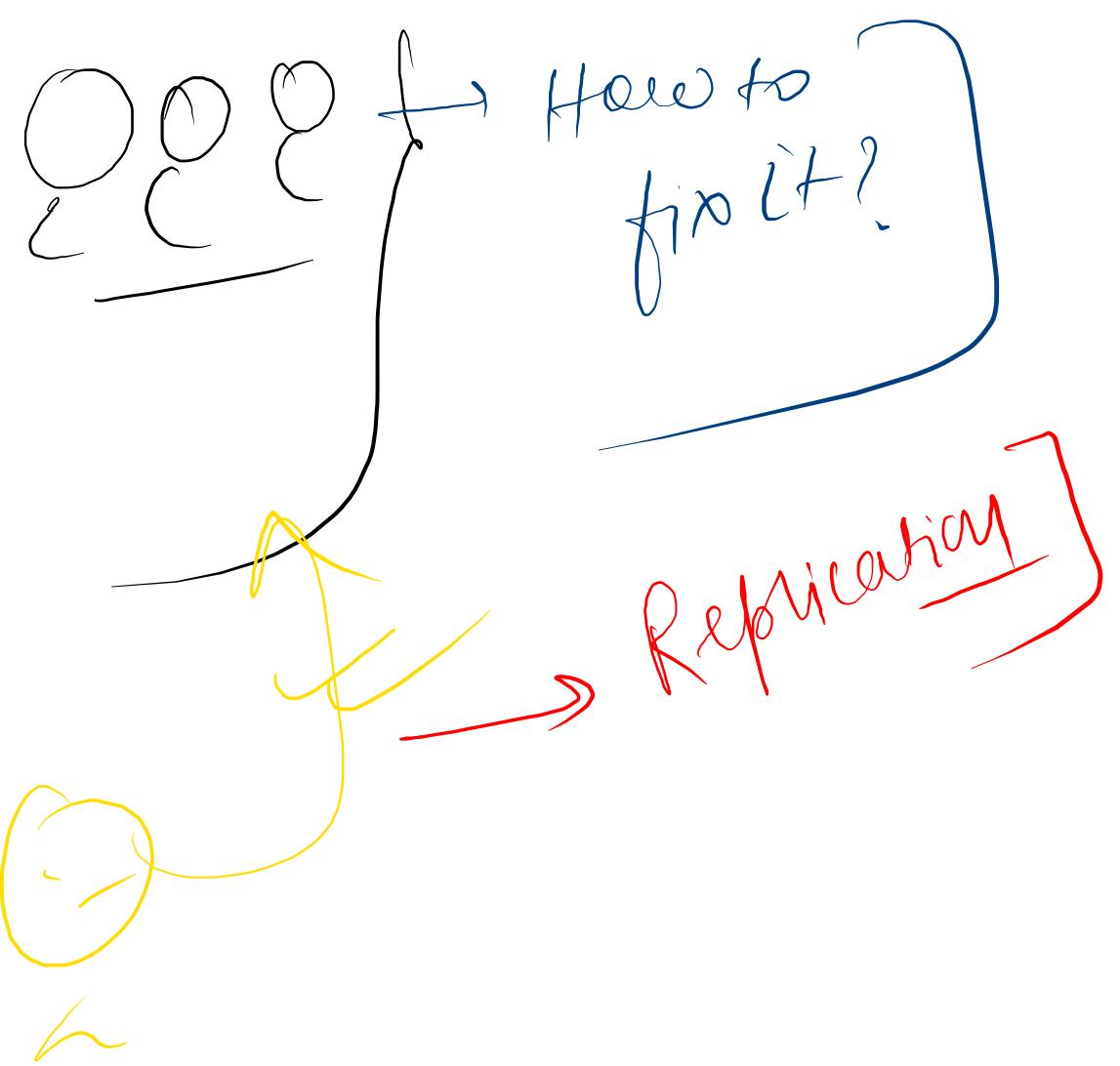
~~Network
of Sustainability~~

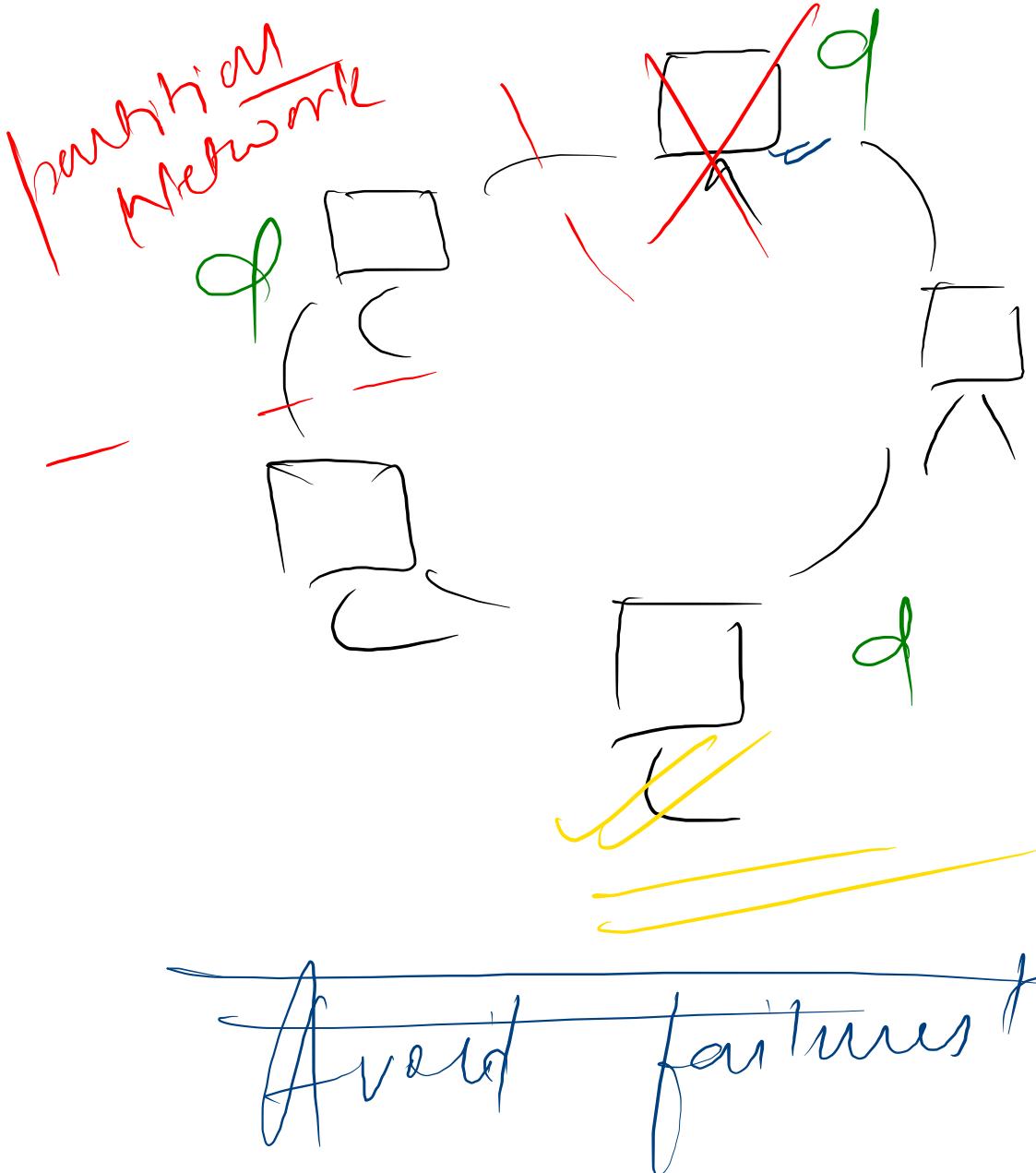


- ① commodity $\frac{H}{W}$

② connected over $\frac{N}{W}$

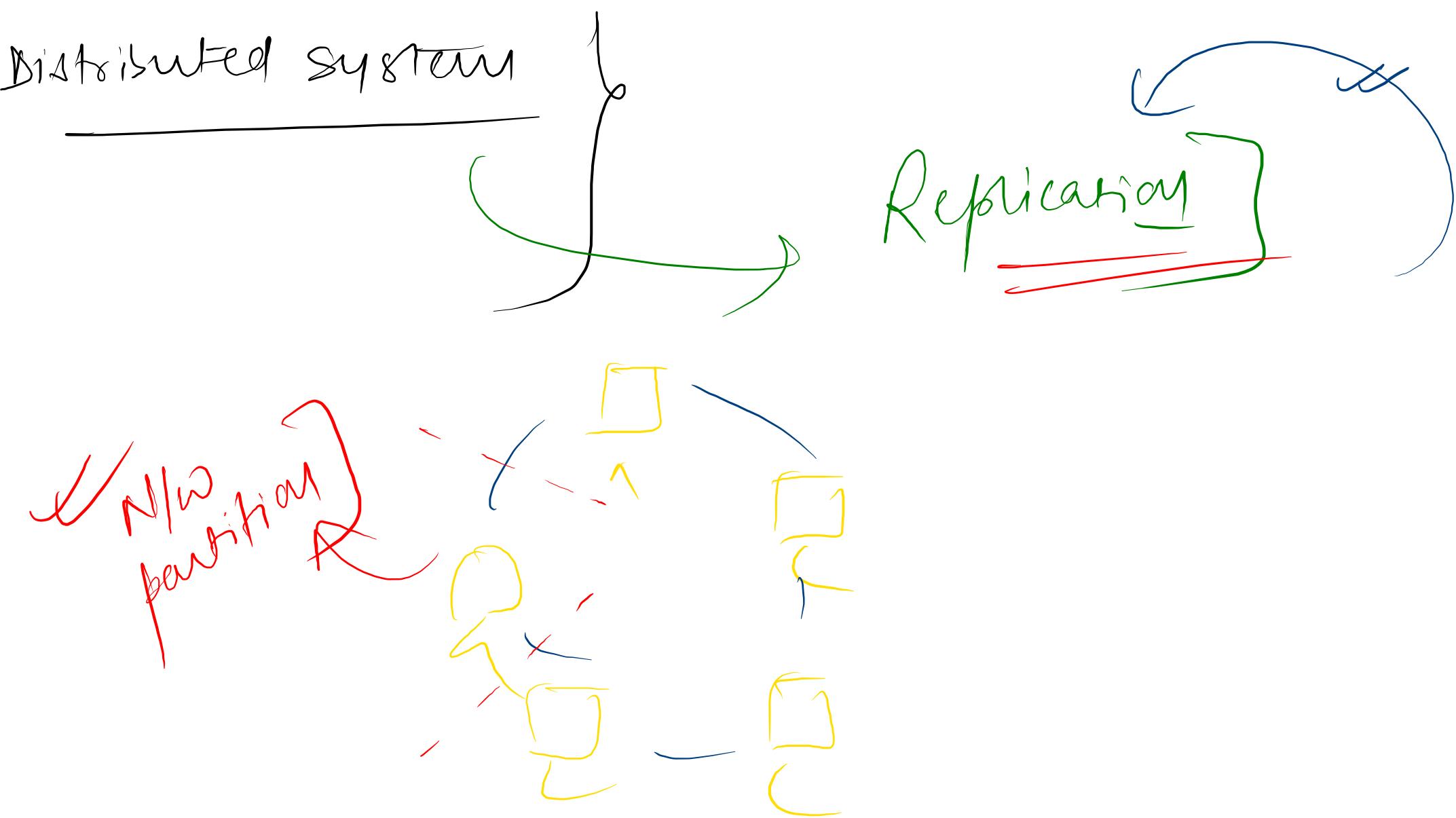
↳ persuasibility of failure \uparrow

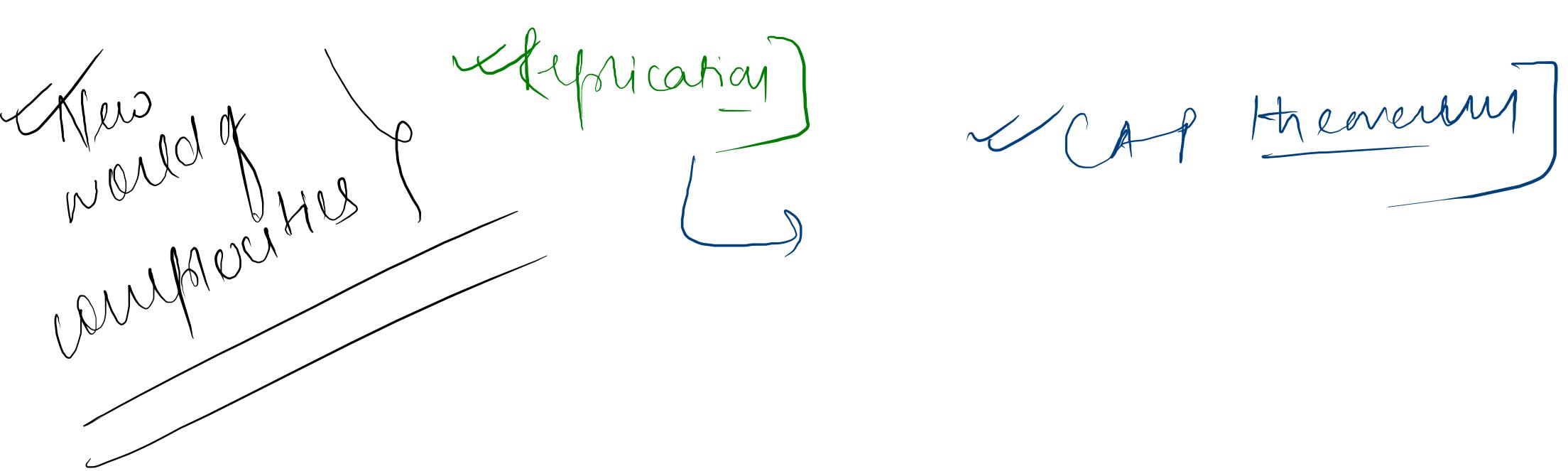




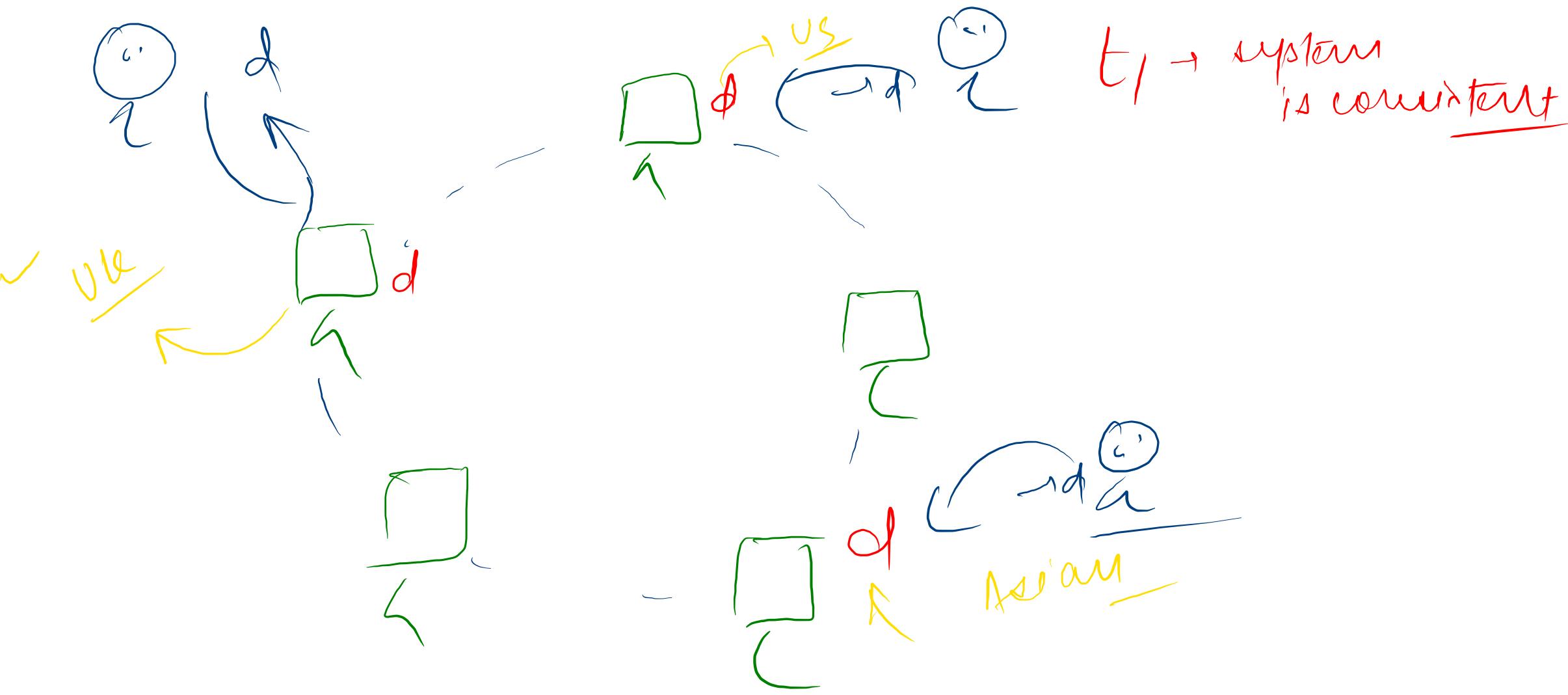
~~Avoid~~

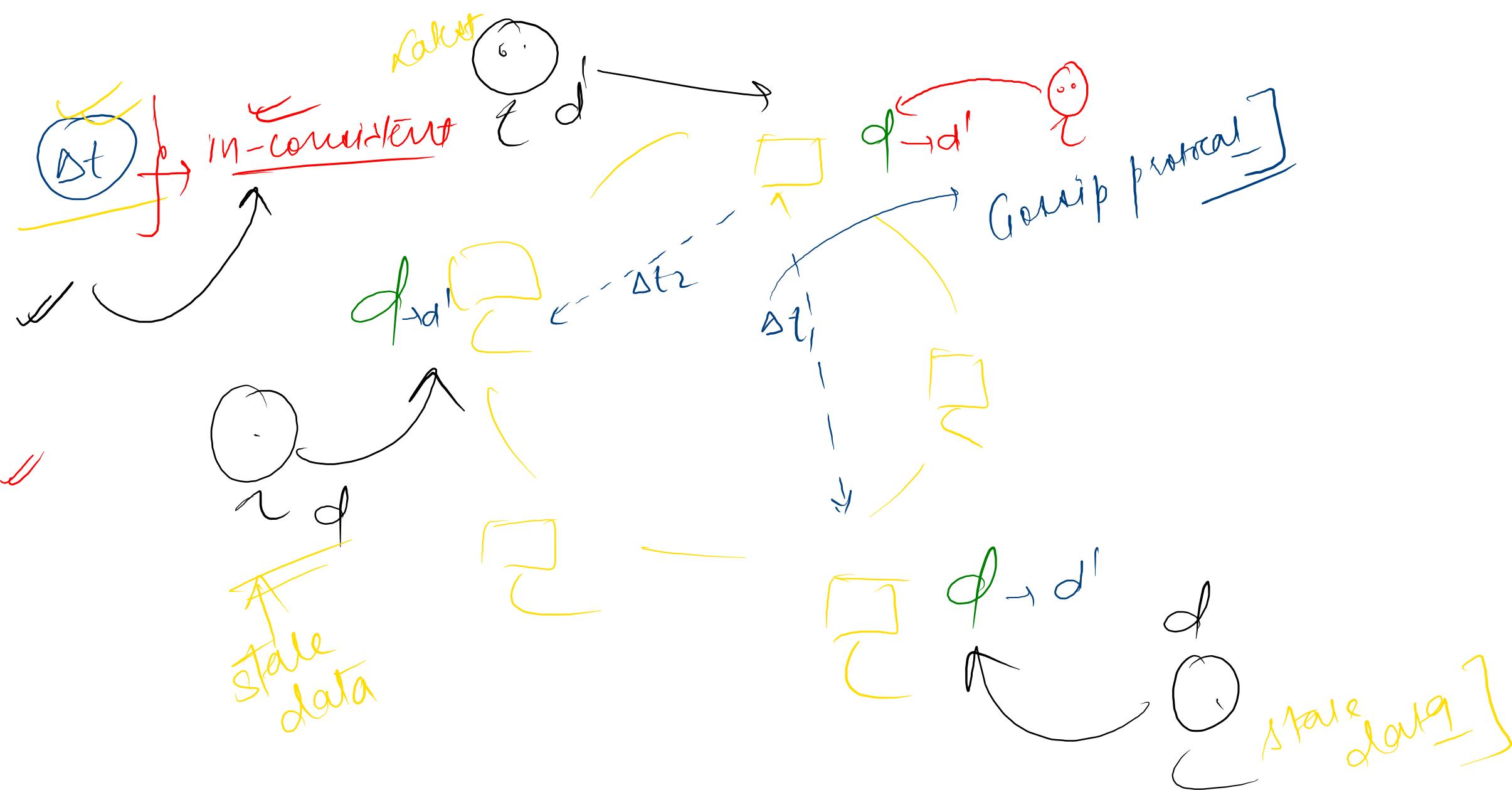
Handle failures

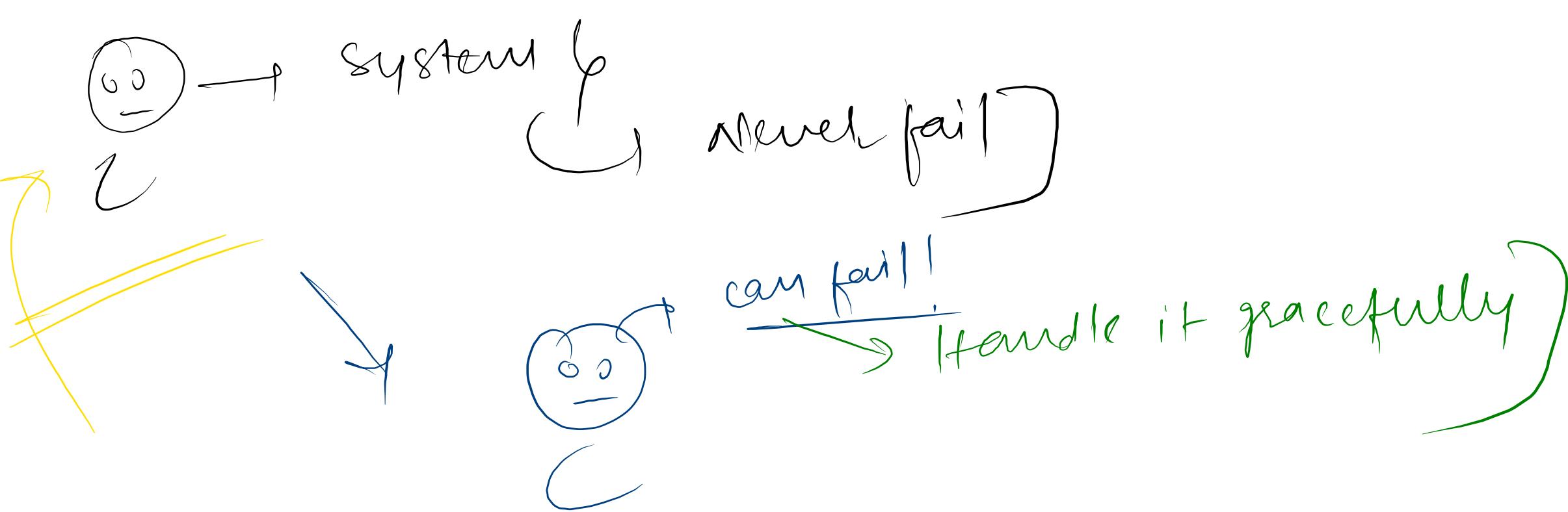


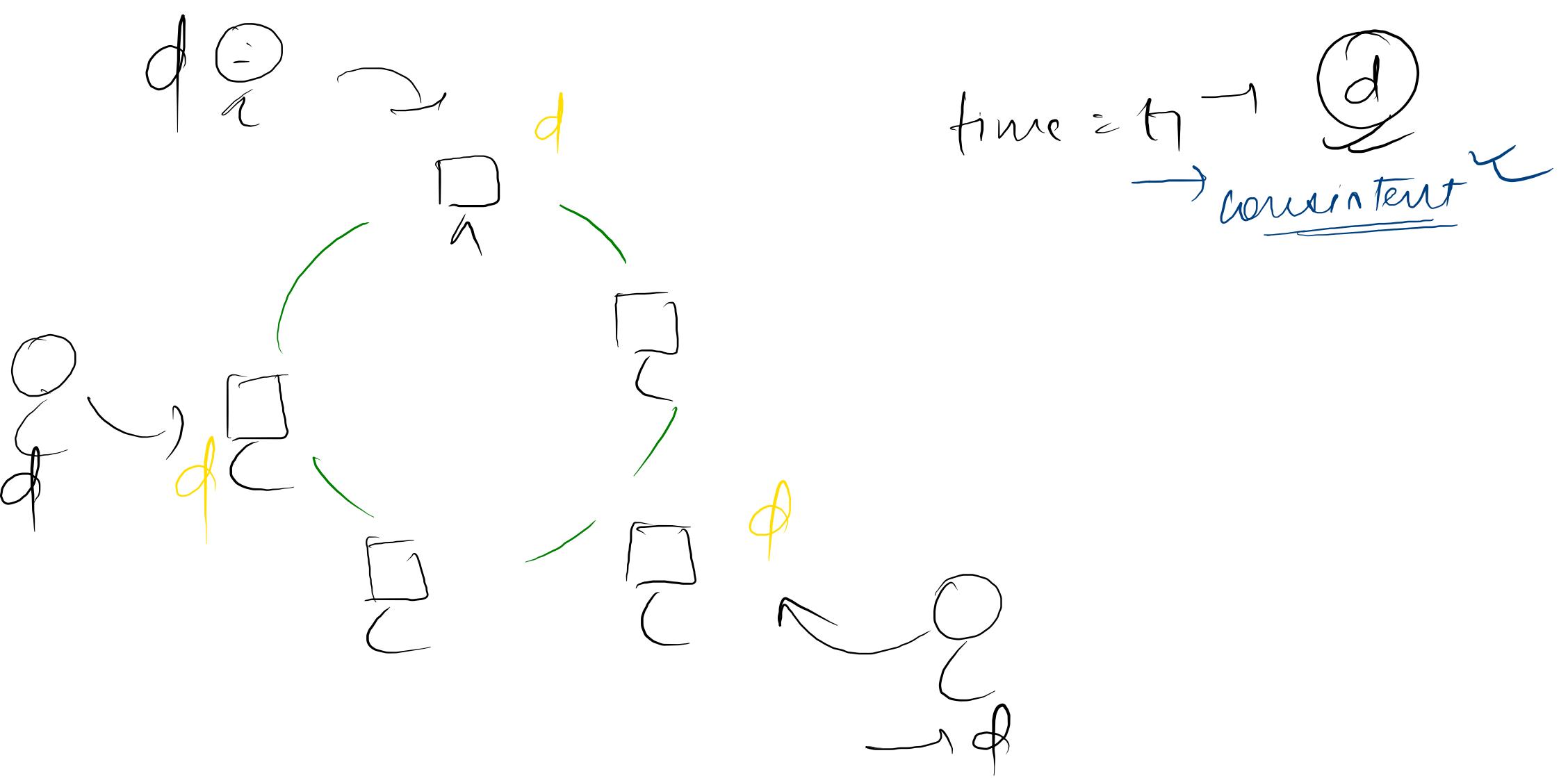


Refinement }
→ consistency

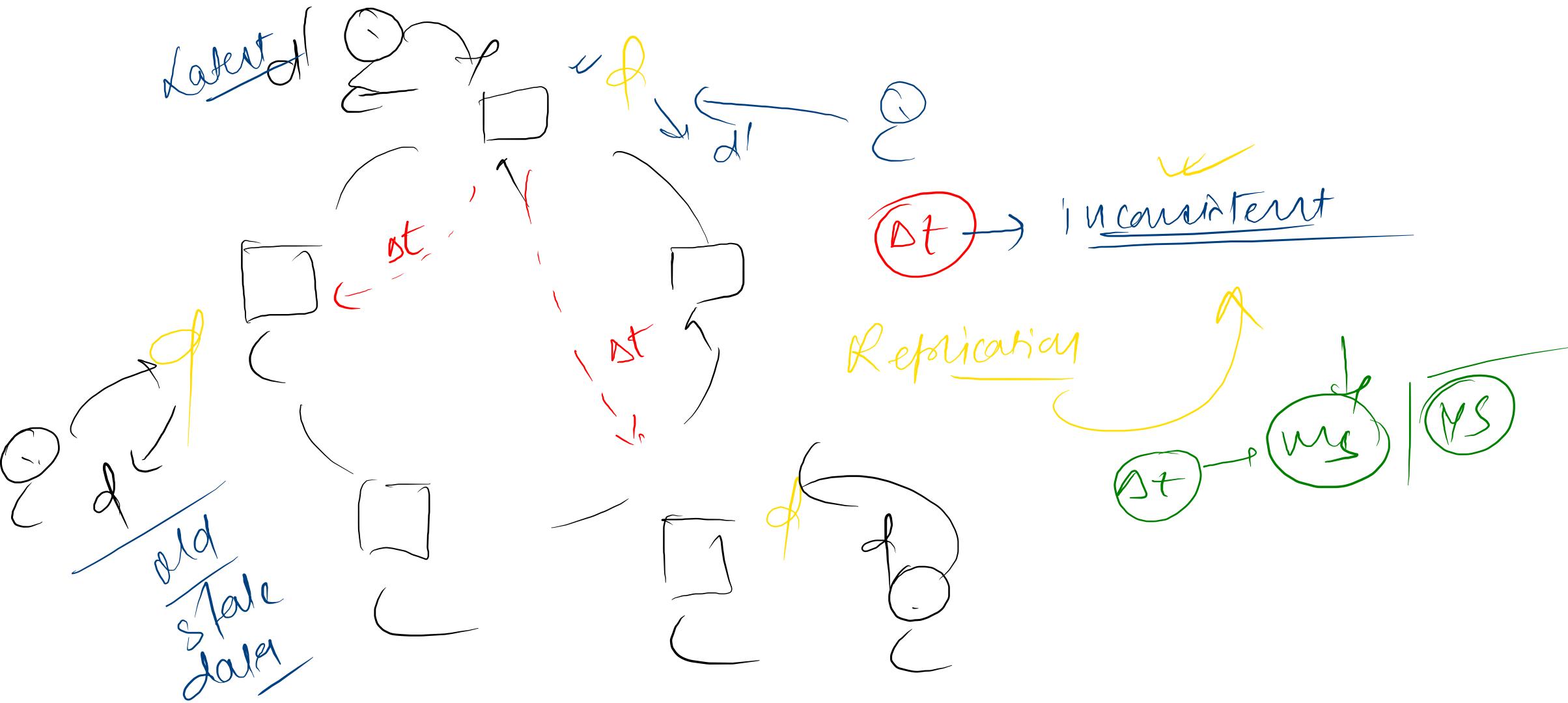


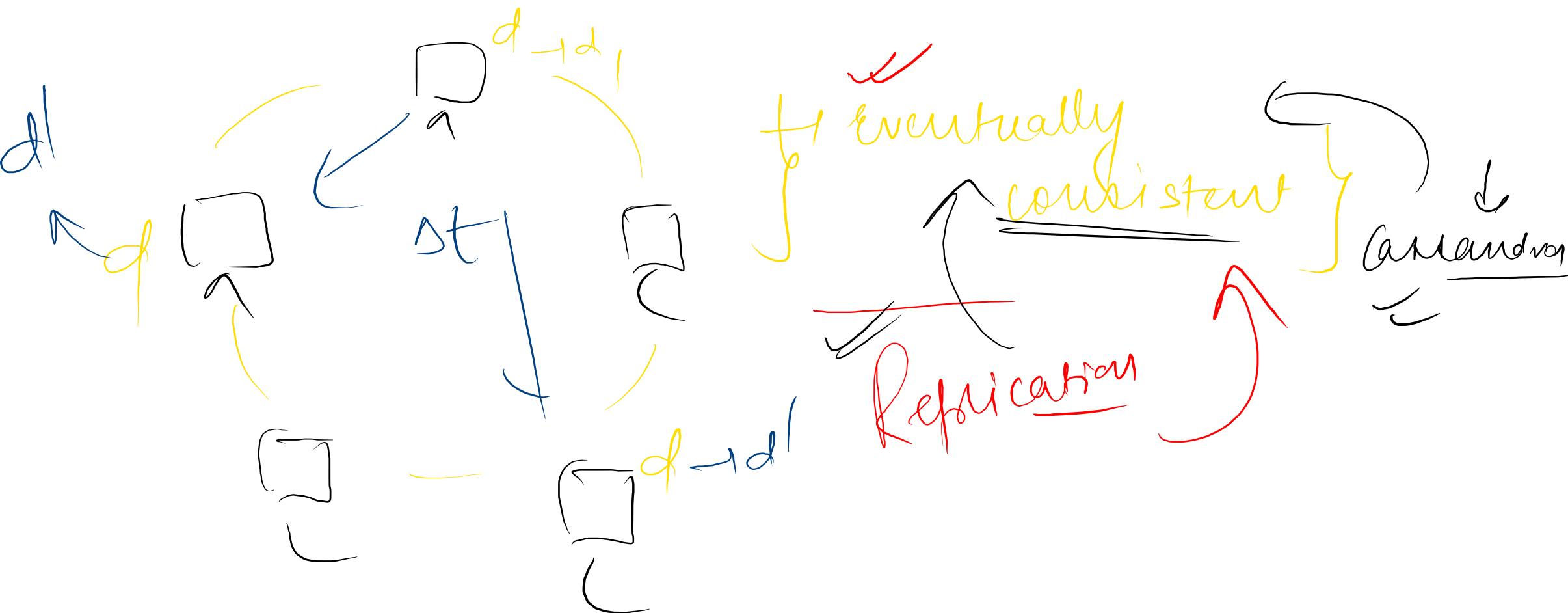




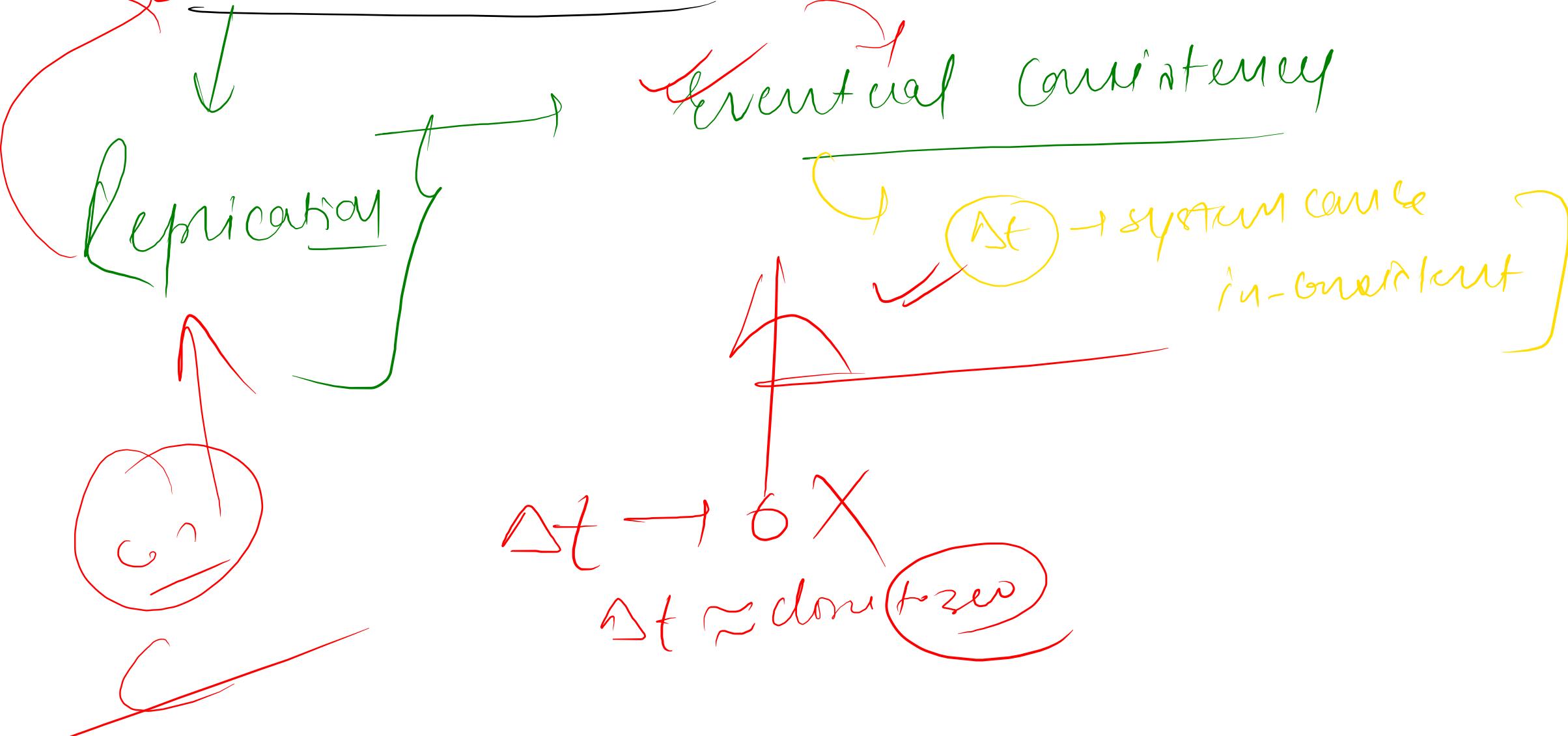


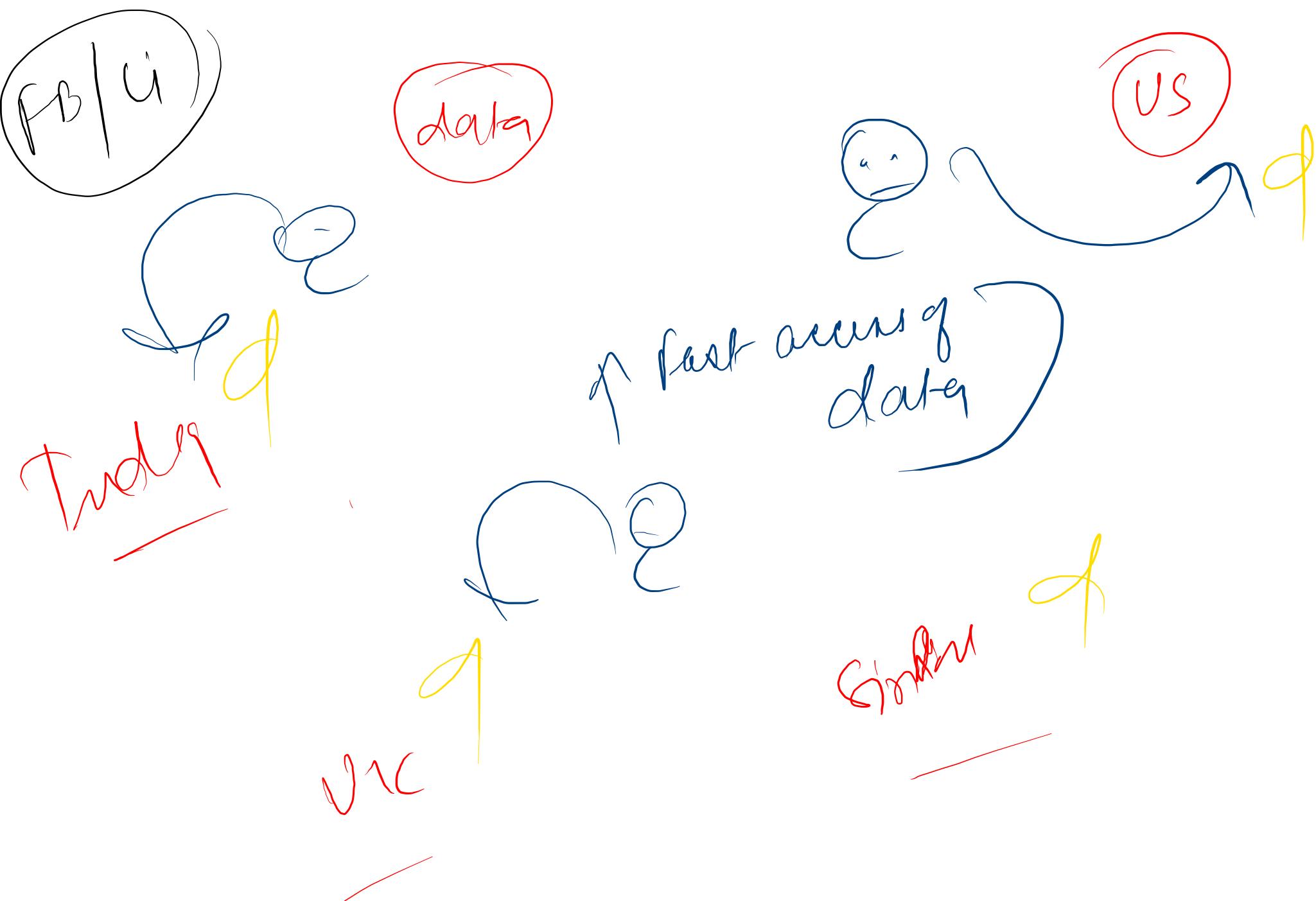
time = $t_1 \rightarrow$ 
consistent ✓

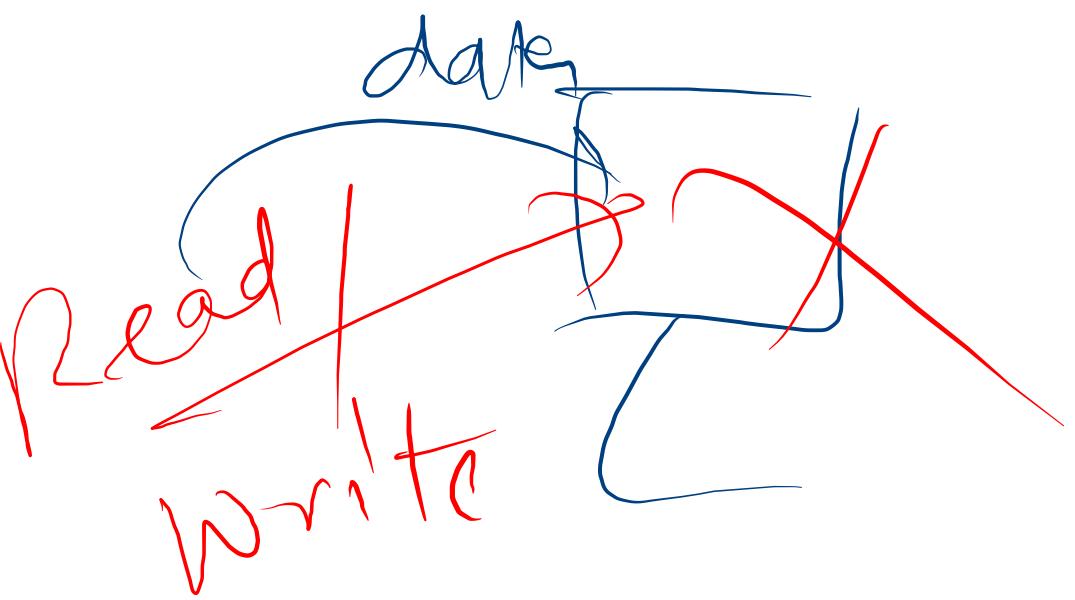


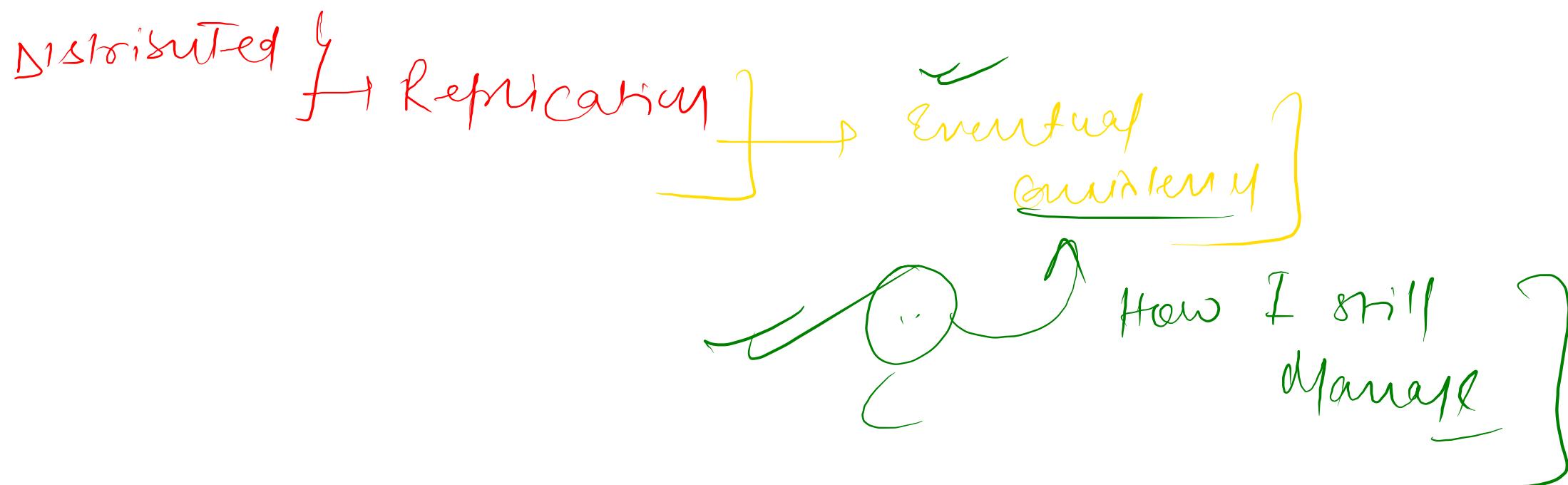


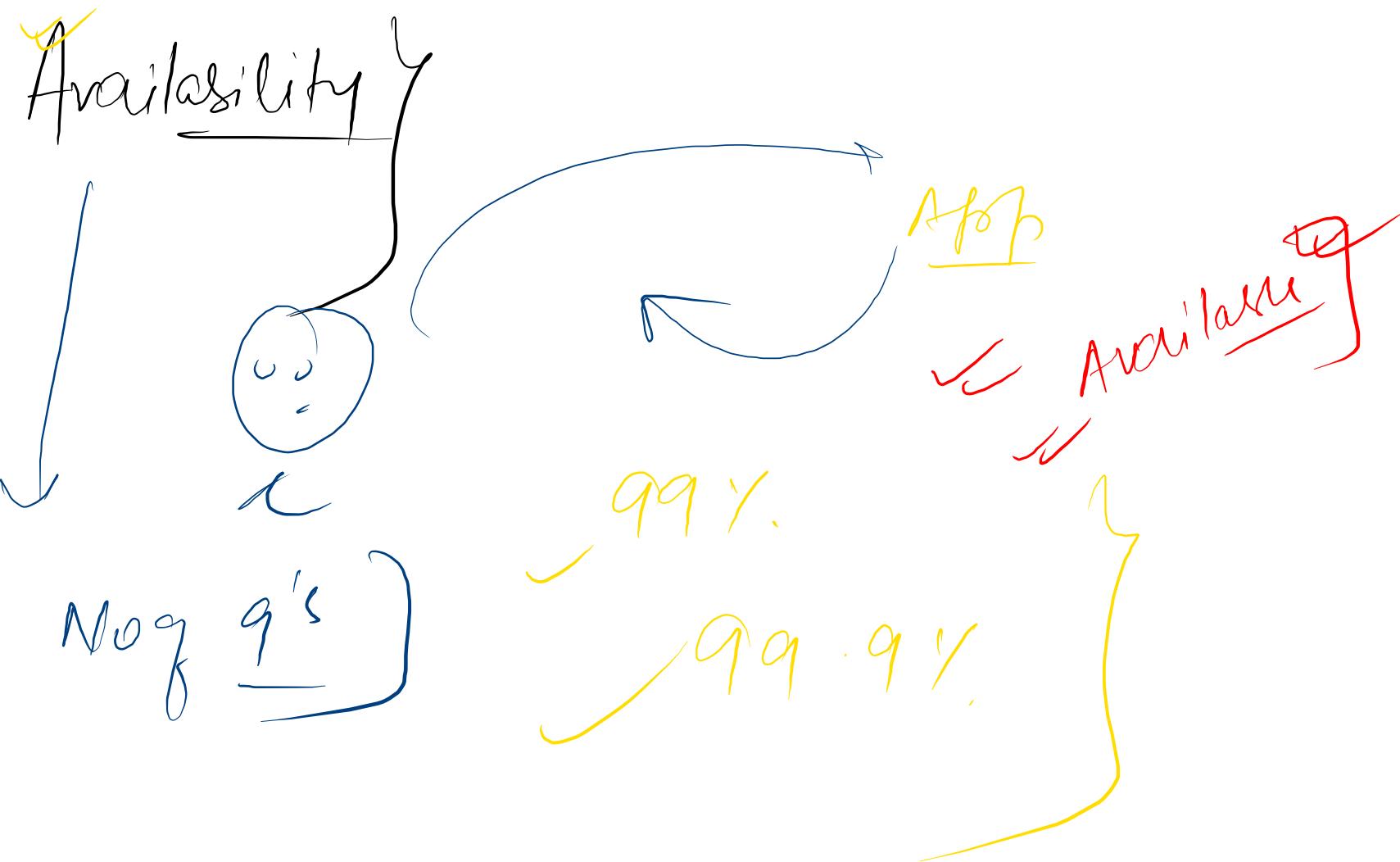
~~Distributed System~~









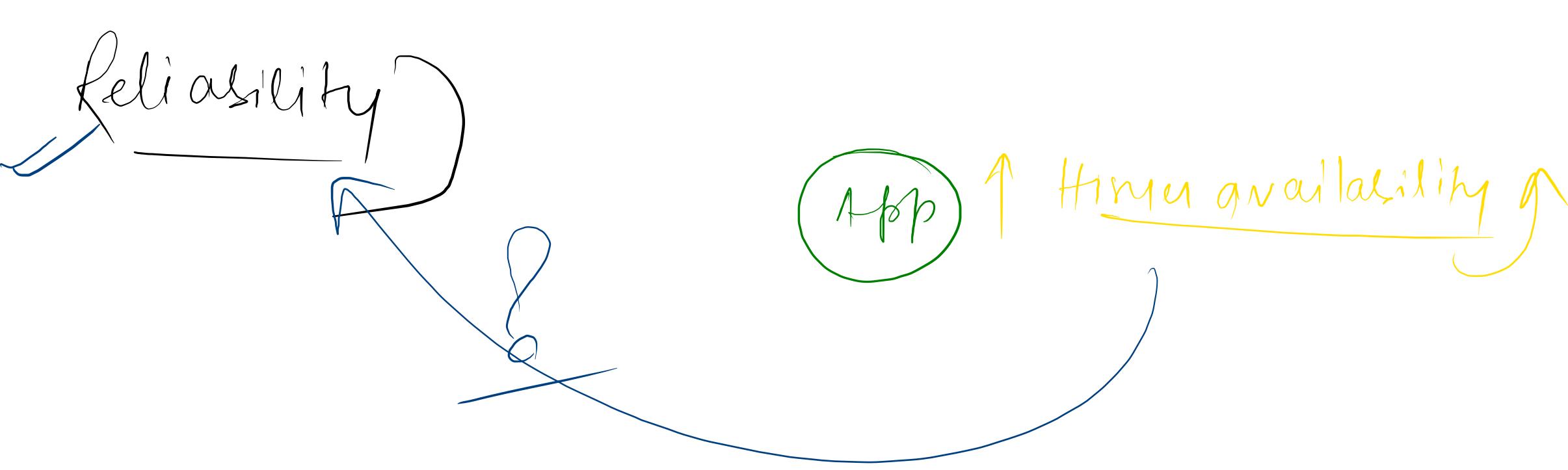


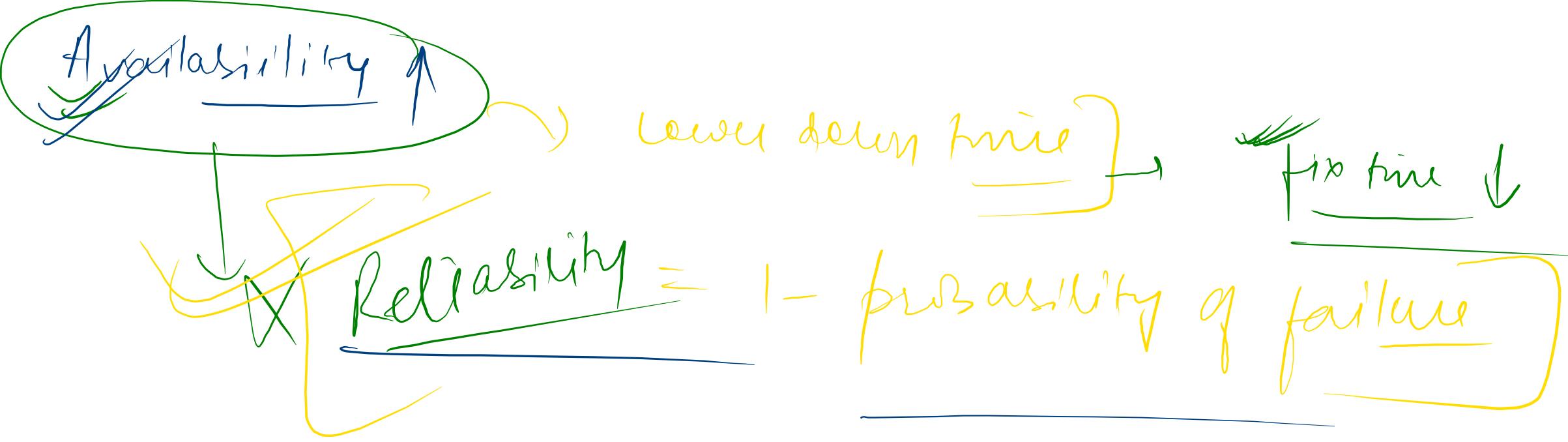
~~99%~~, available

1% decay

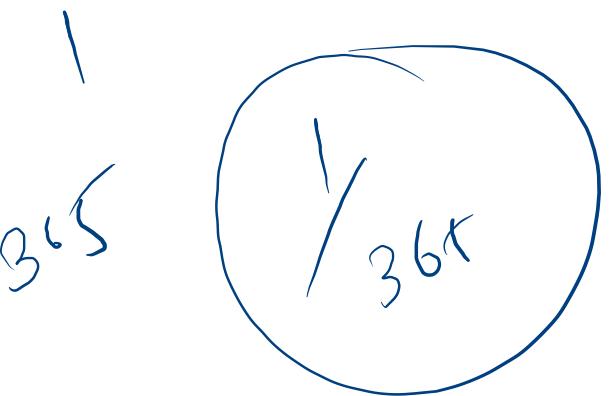
1 years
decay

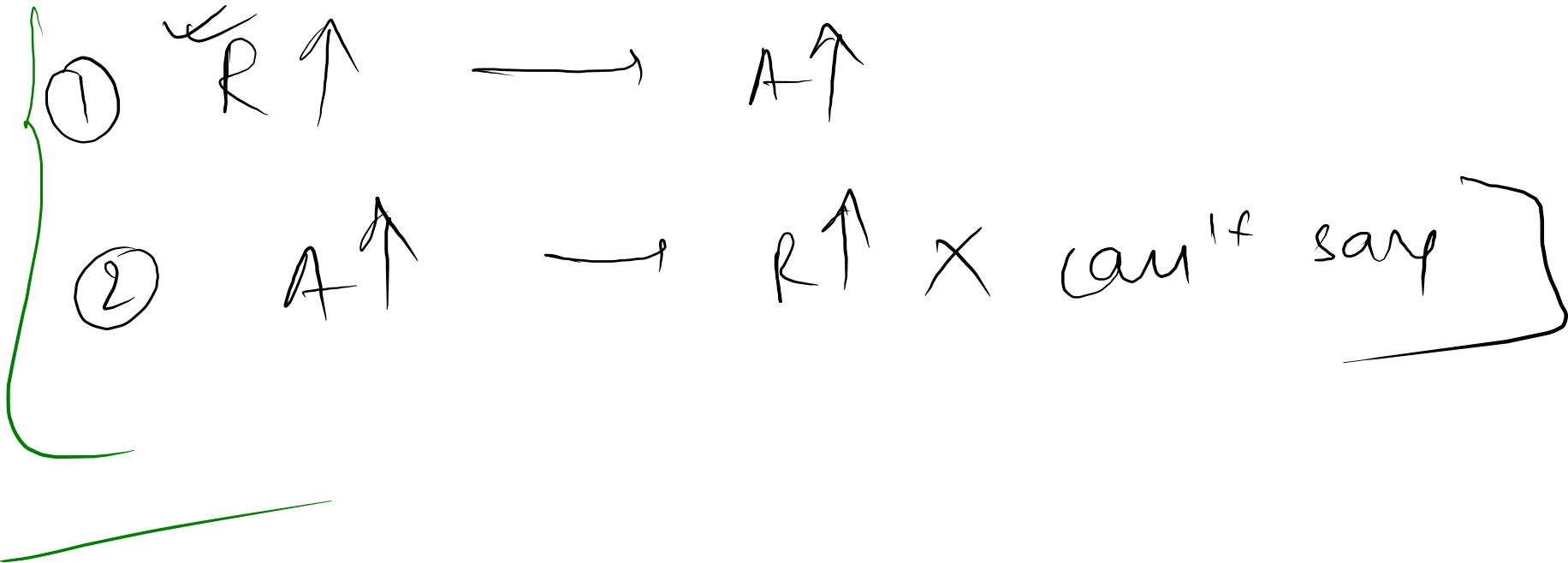
$$\frac{1}{100} \times 365 = 3.65 \text{ days/year}$$





Reliability = $1 - \frac{\text{probability of failure}}{1}$



- 
- ① $R \uparrow \rightarrow A \uparrow$
 - ② $A \uparrow \rightarrow R \uparrow \times \text{can't say}$

Distributed system

→ Horizontal scaling

↳ commodity H/w

N/w issue

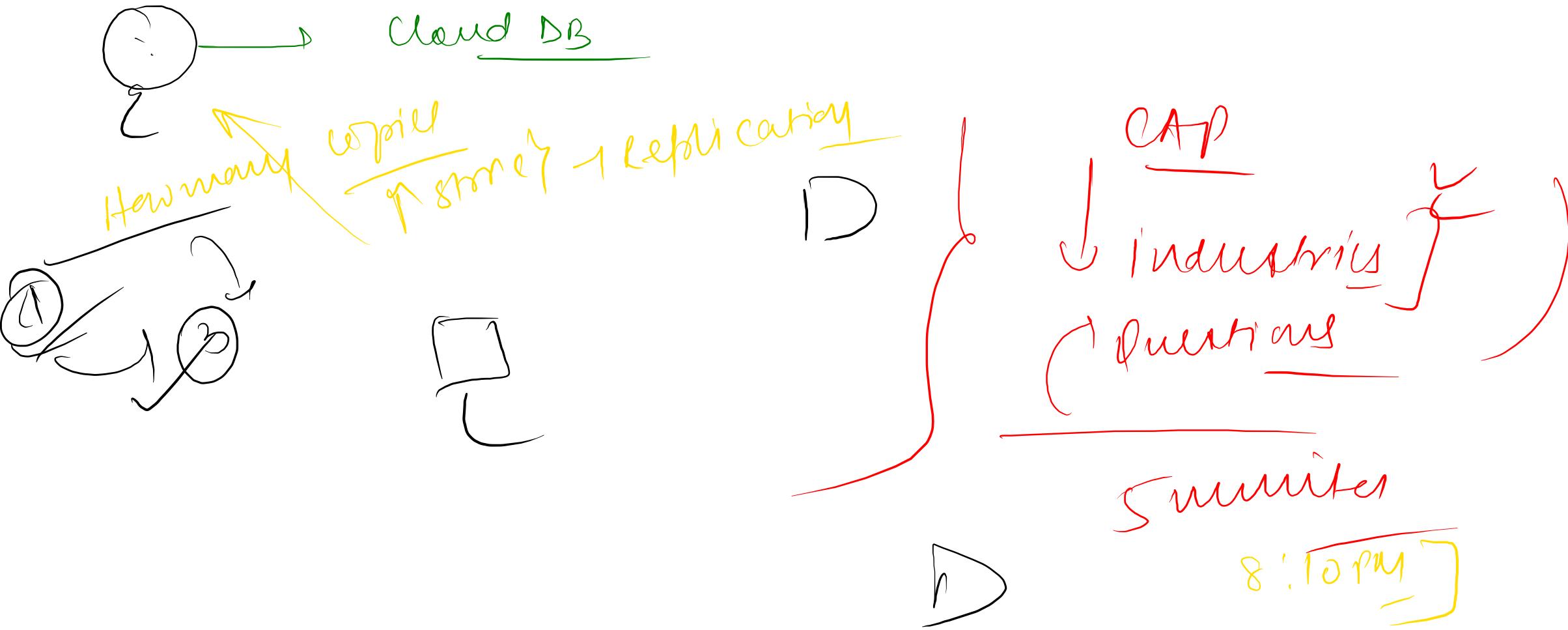
↓

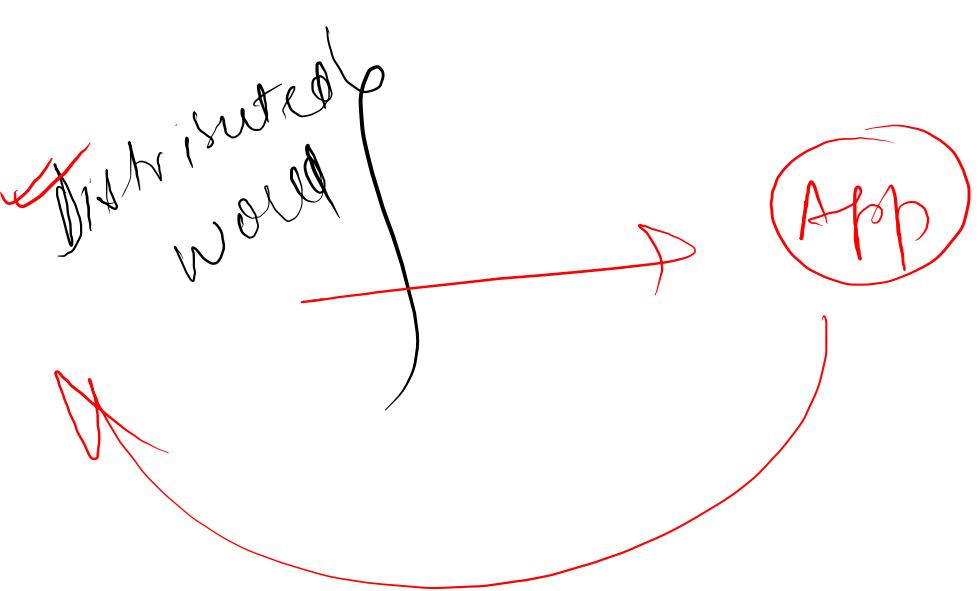
Replication

↳ eventual consistency

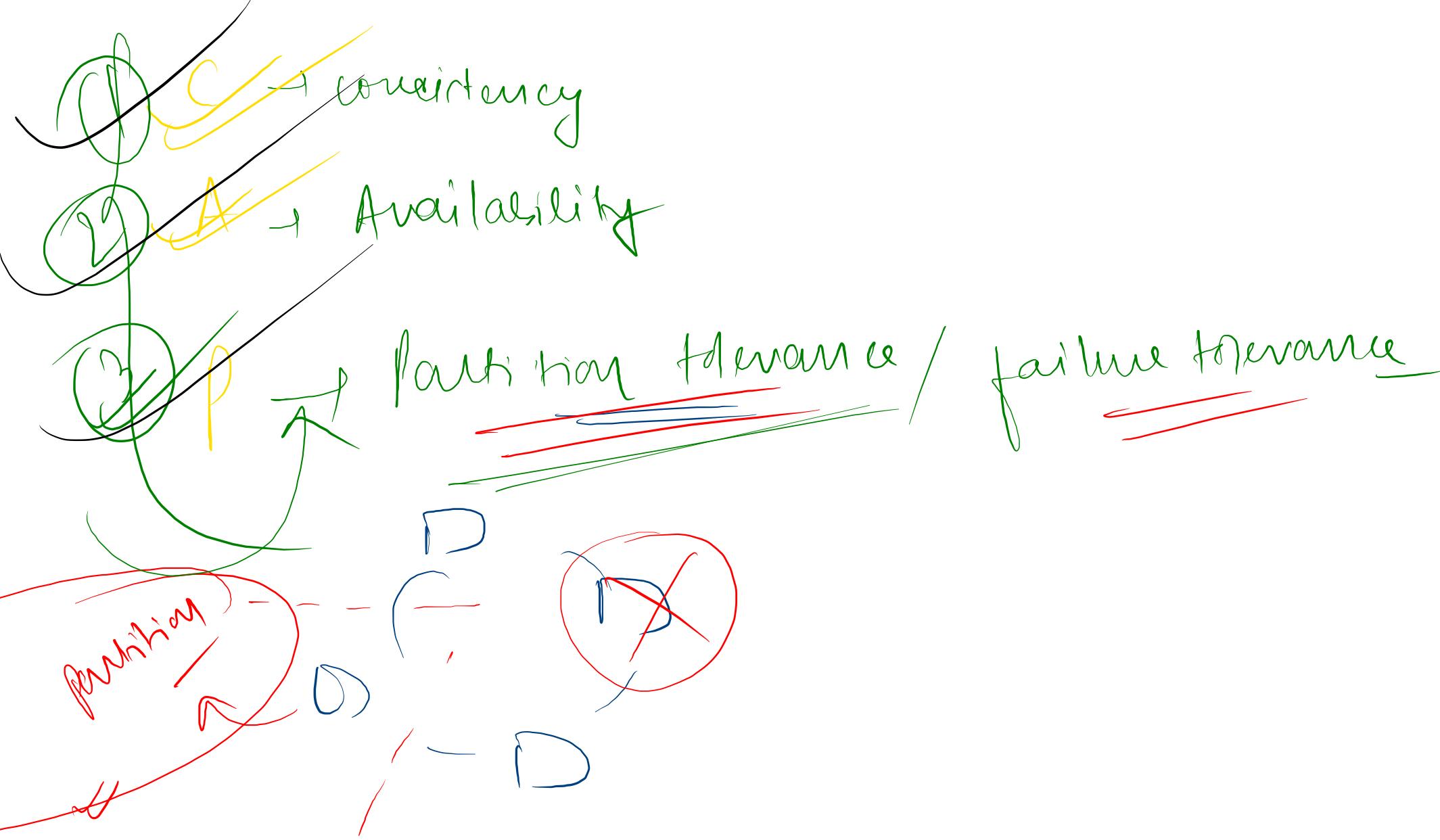
Availability

Reliability = 1 - probability of failure

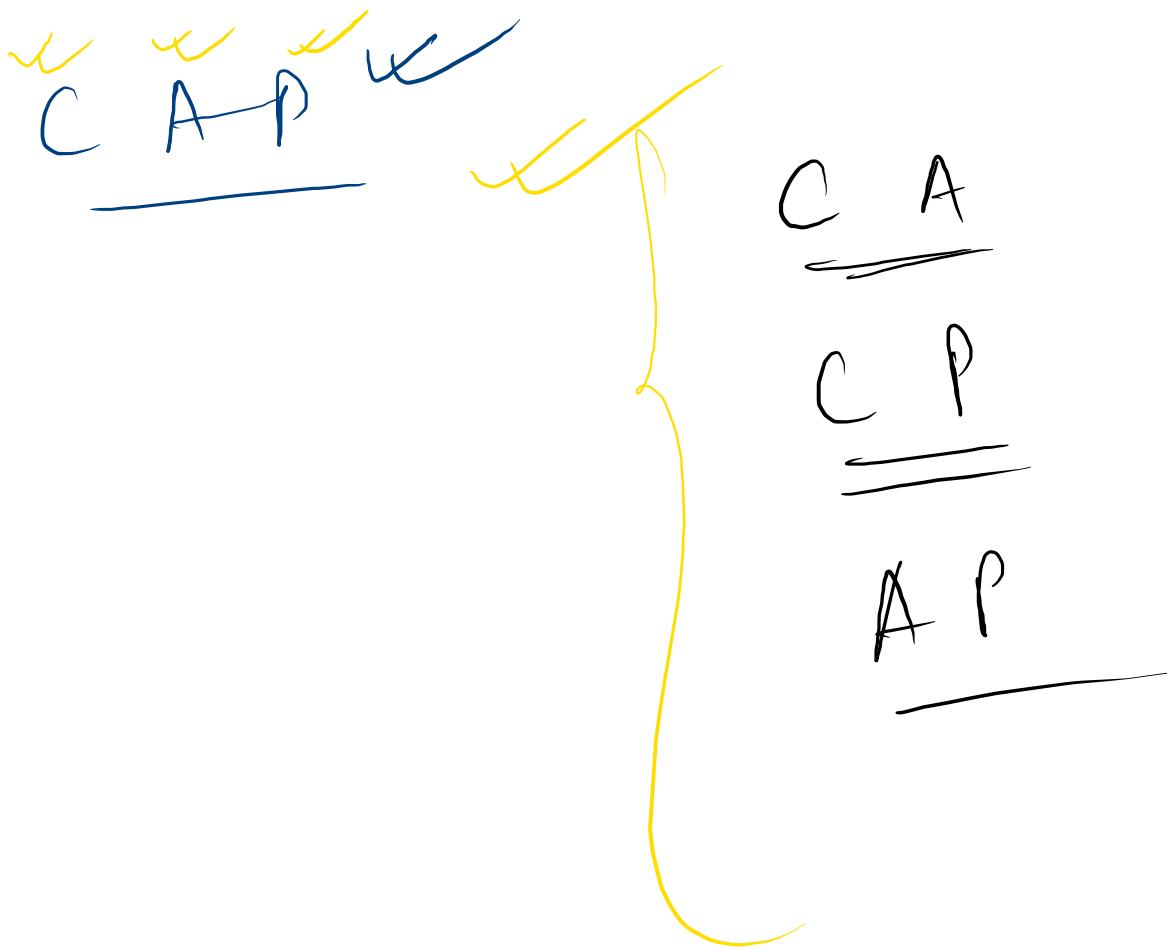




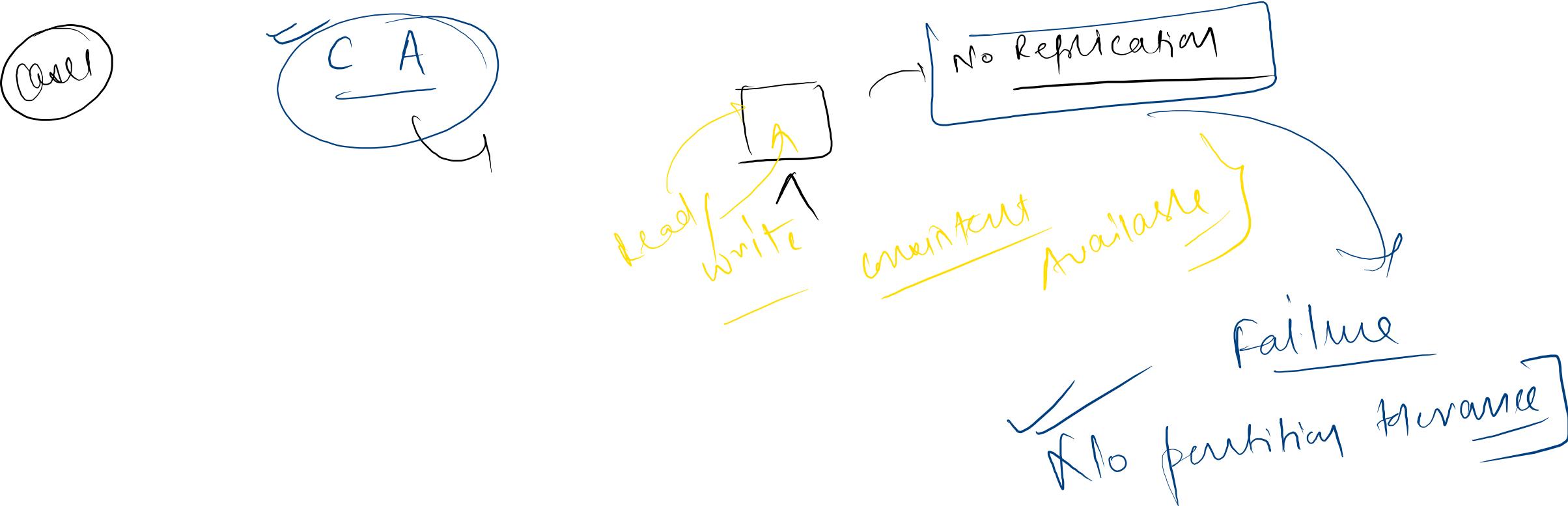
C A P



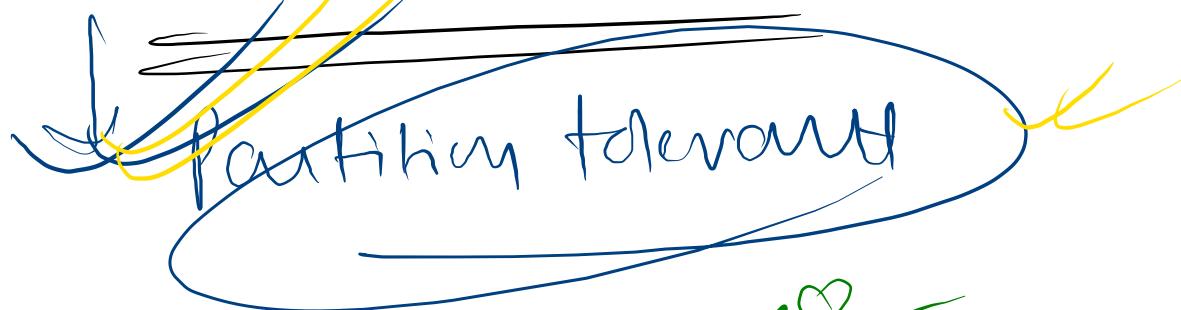
Distributed
would



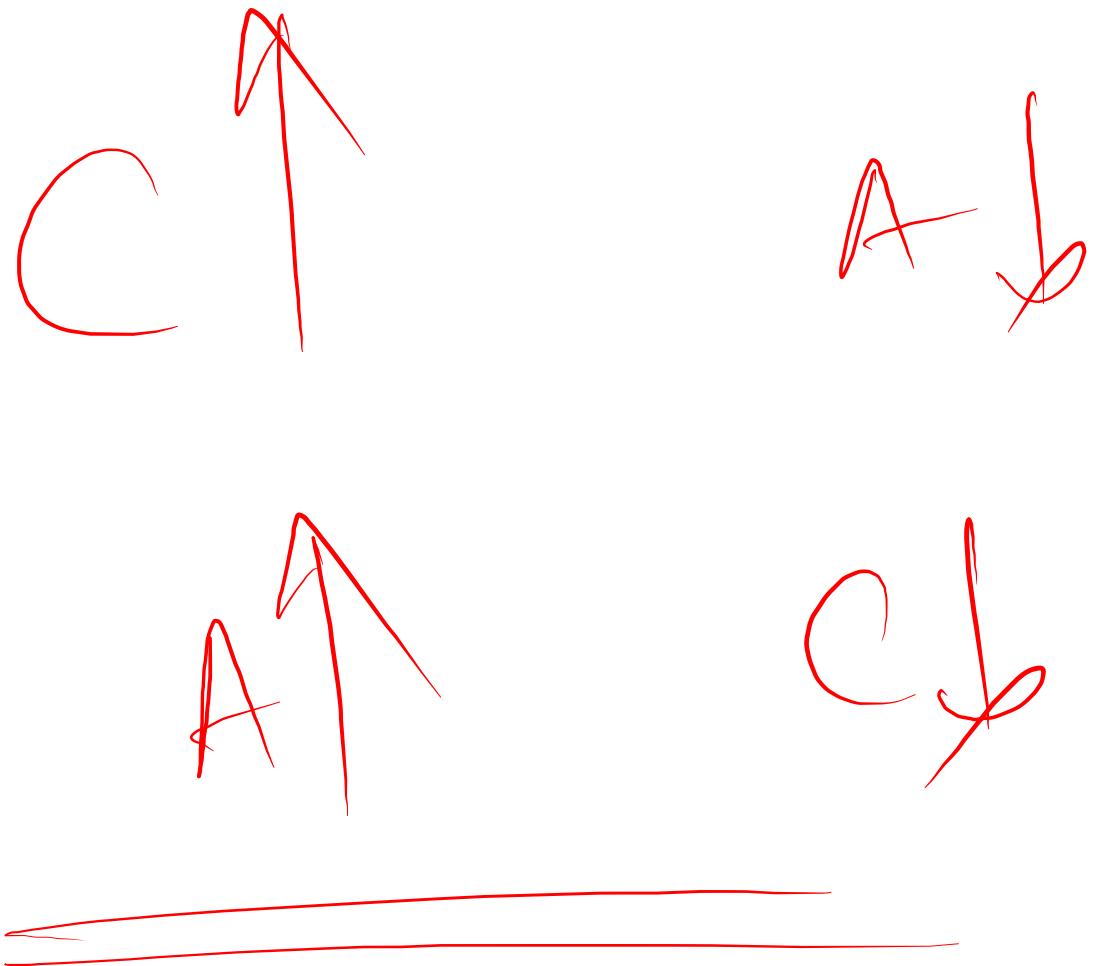
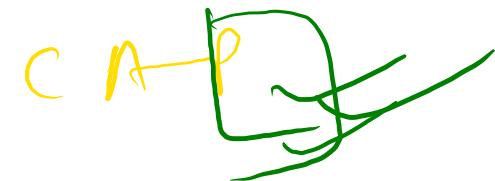
P X
A X
C X

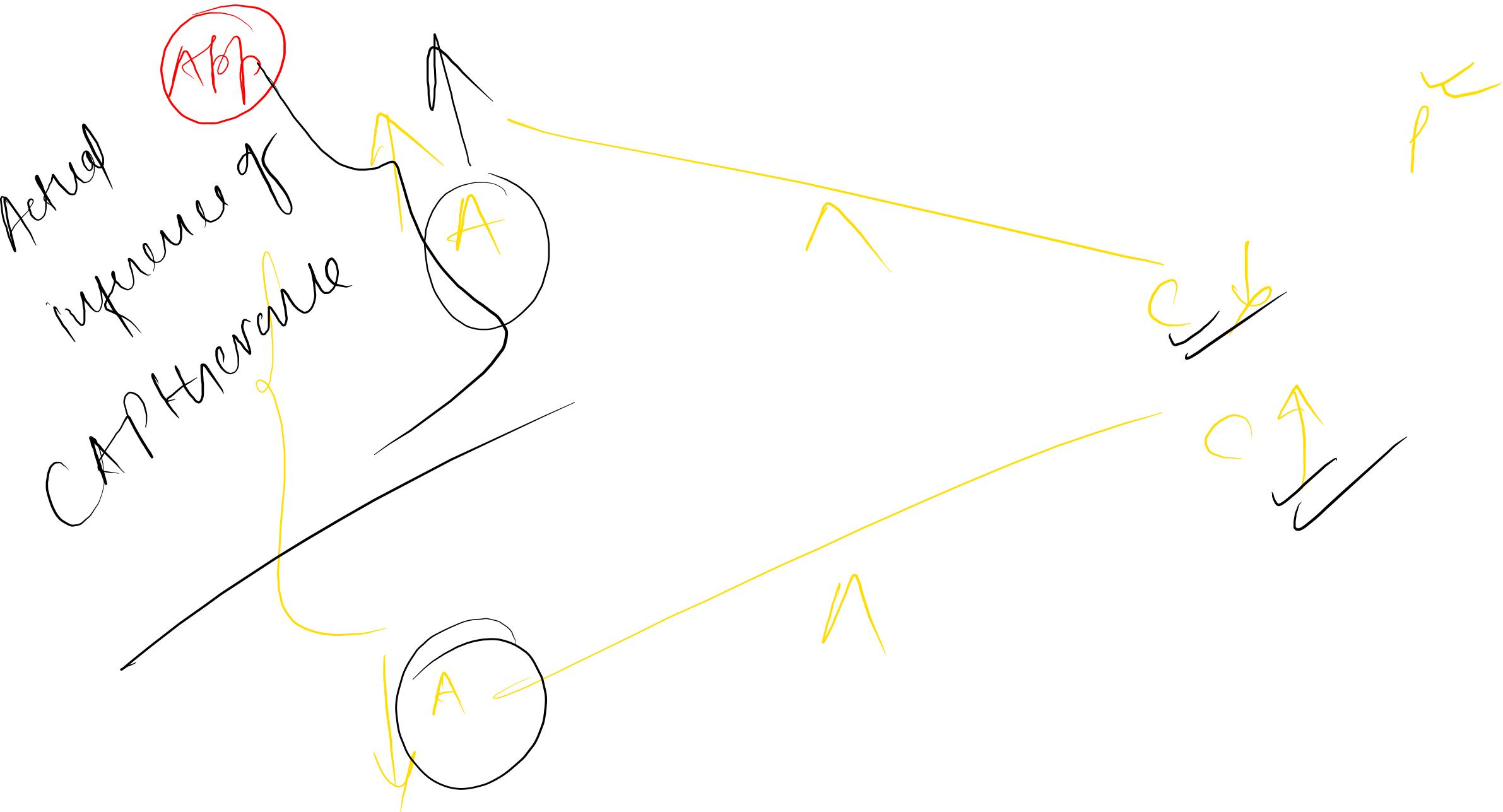


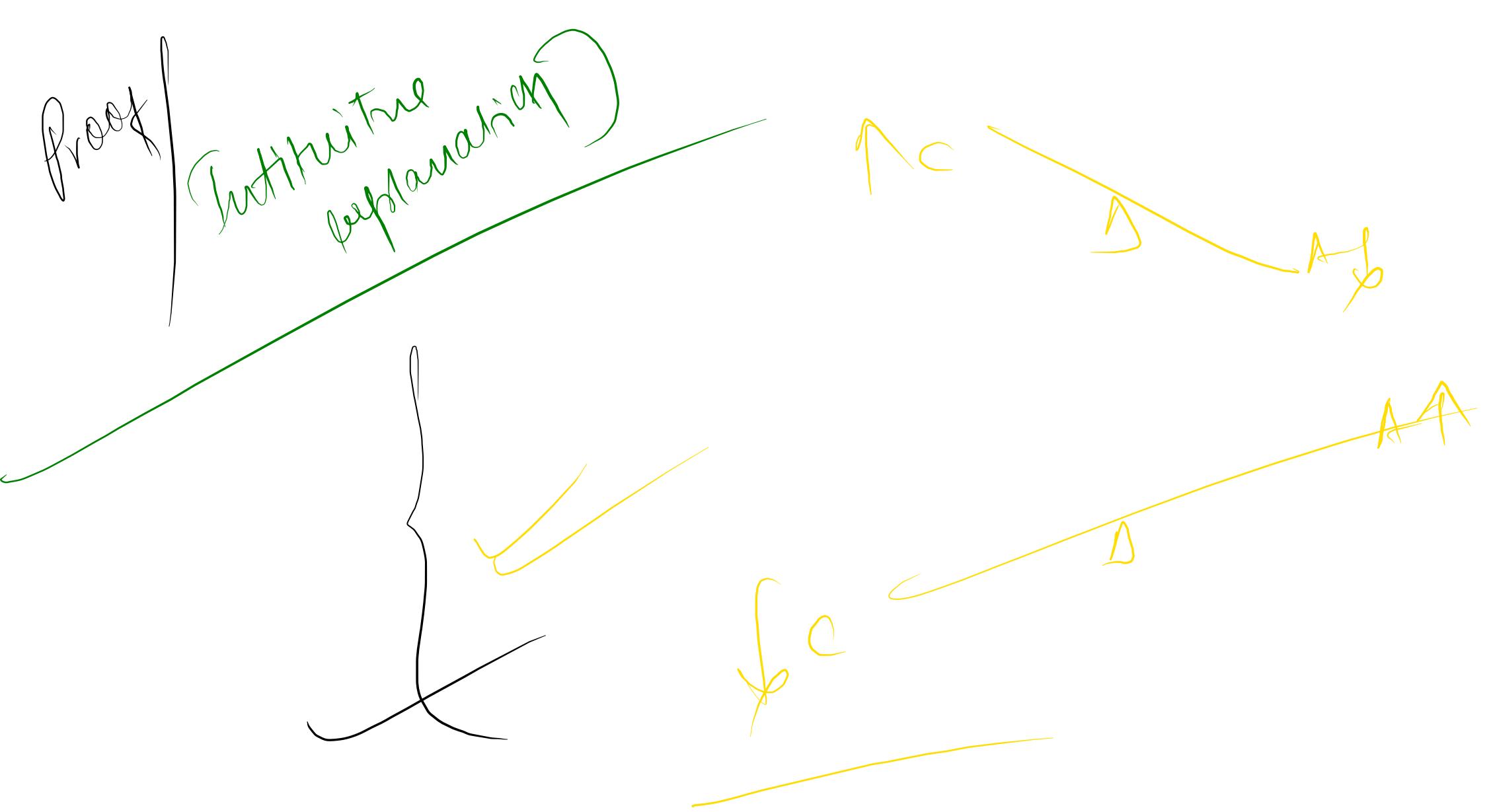
Distributed system



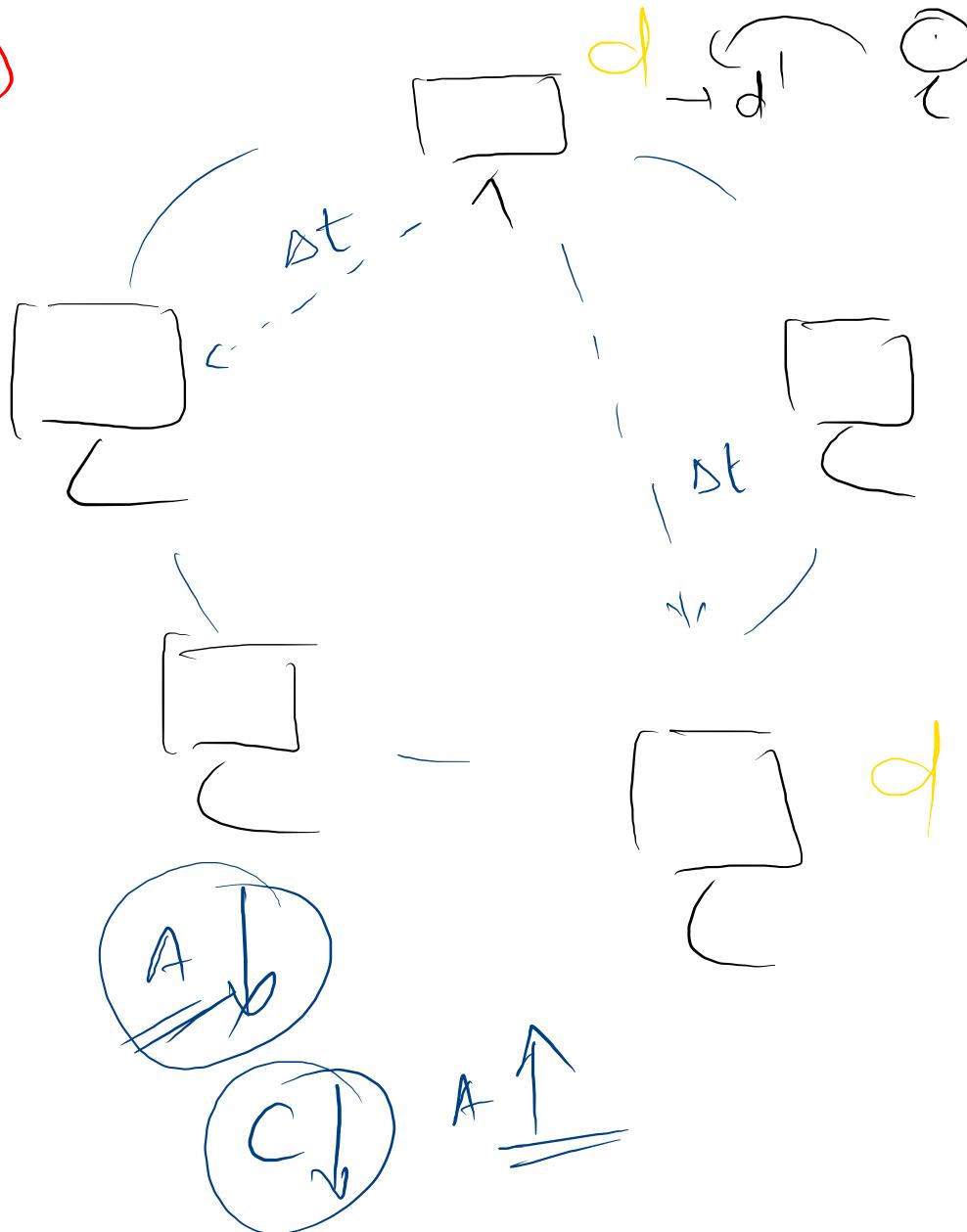
Real world applications







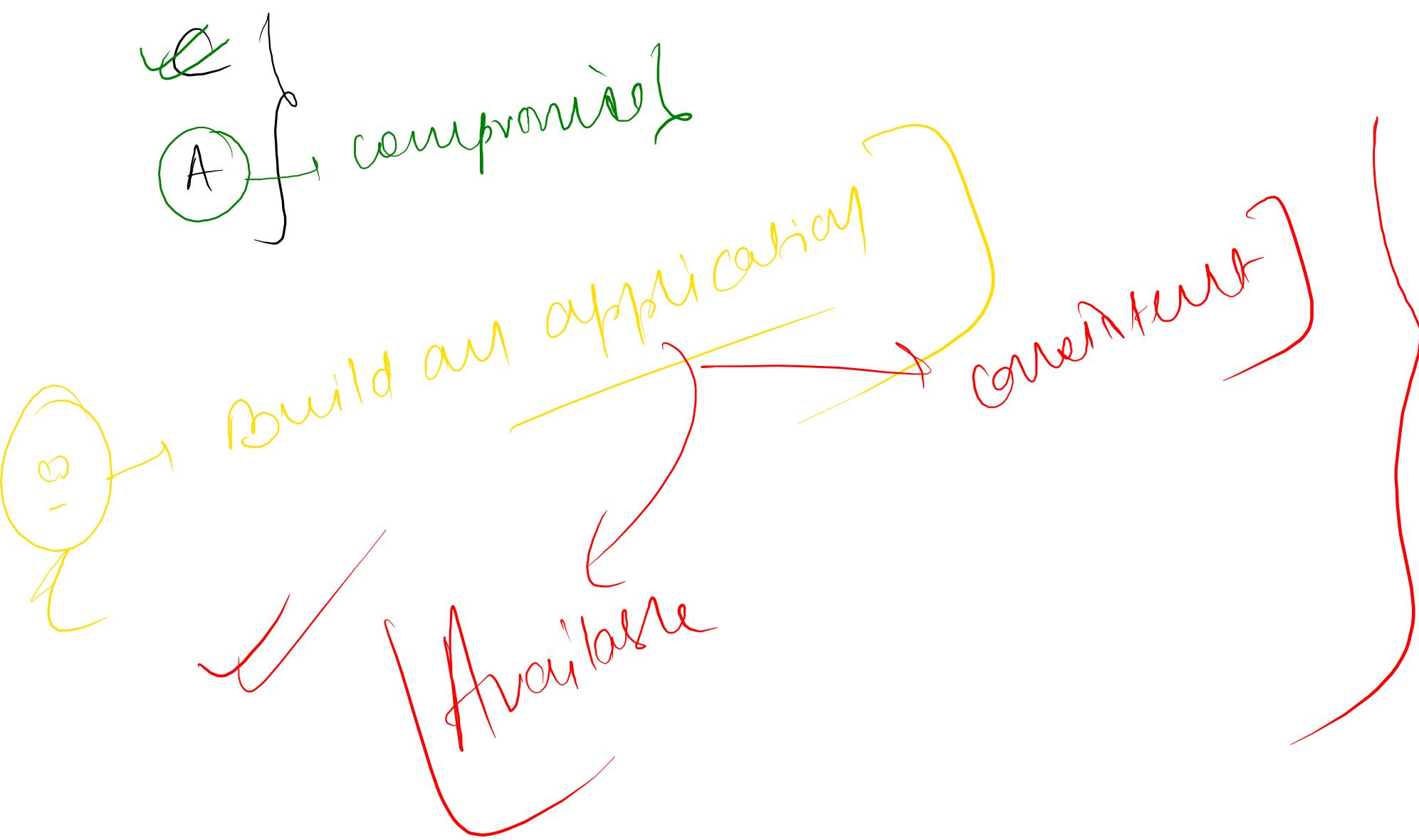
A hand-drawn diagram consisting of a vertical red line. A red bracket is positioned above the line, enclosing the top portion. Inside the bracket, the text "No one is able to read state data" is written in red ink. To the right of the red line, there is a yellow circle containing the letter "d". Below the red line, there is a blue line with a blue bracket below it. The blue bracket encloses the bottom portion of the blue line. Inside the blue bracket, the letter "c" is written, and to its right is a blue arrow pointing upwards.

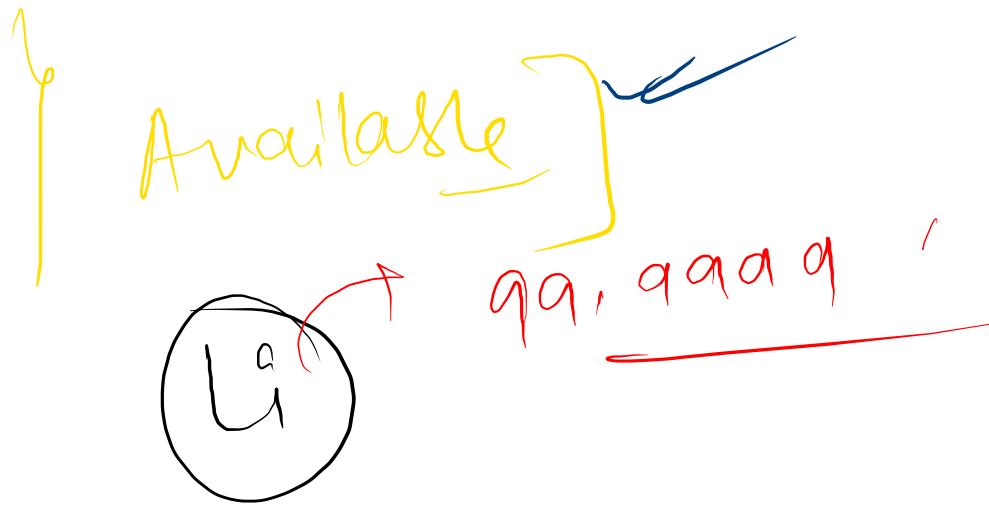
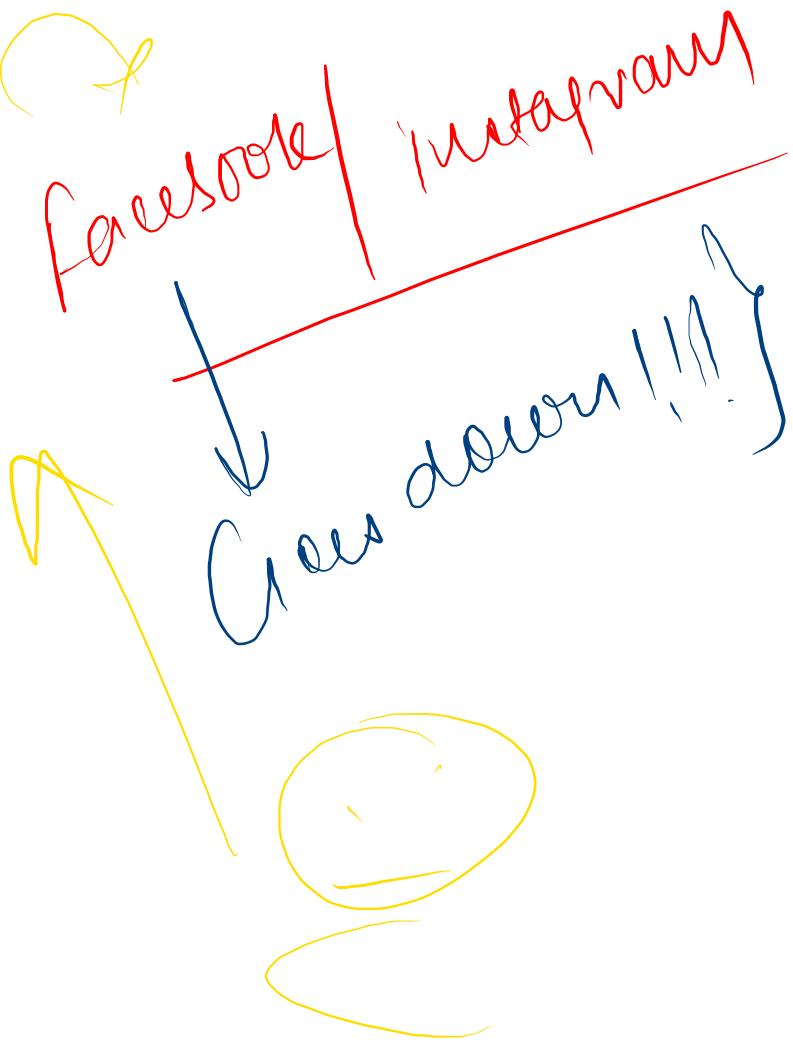


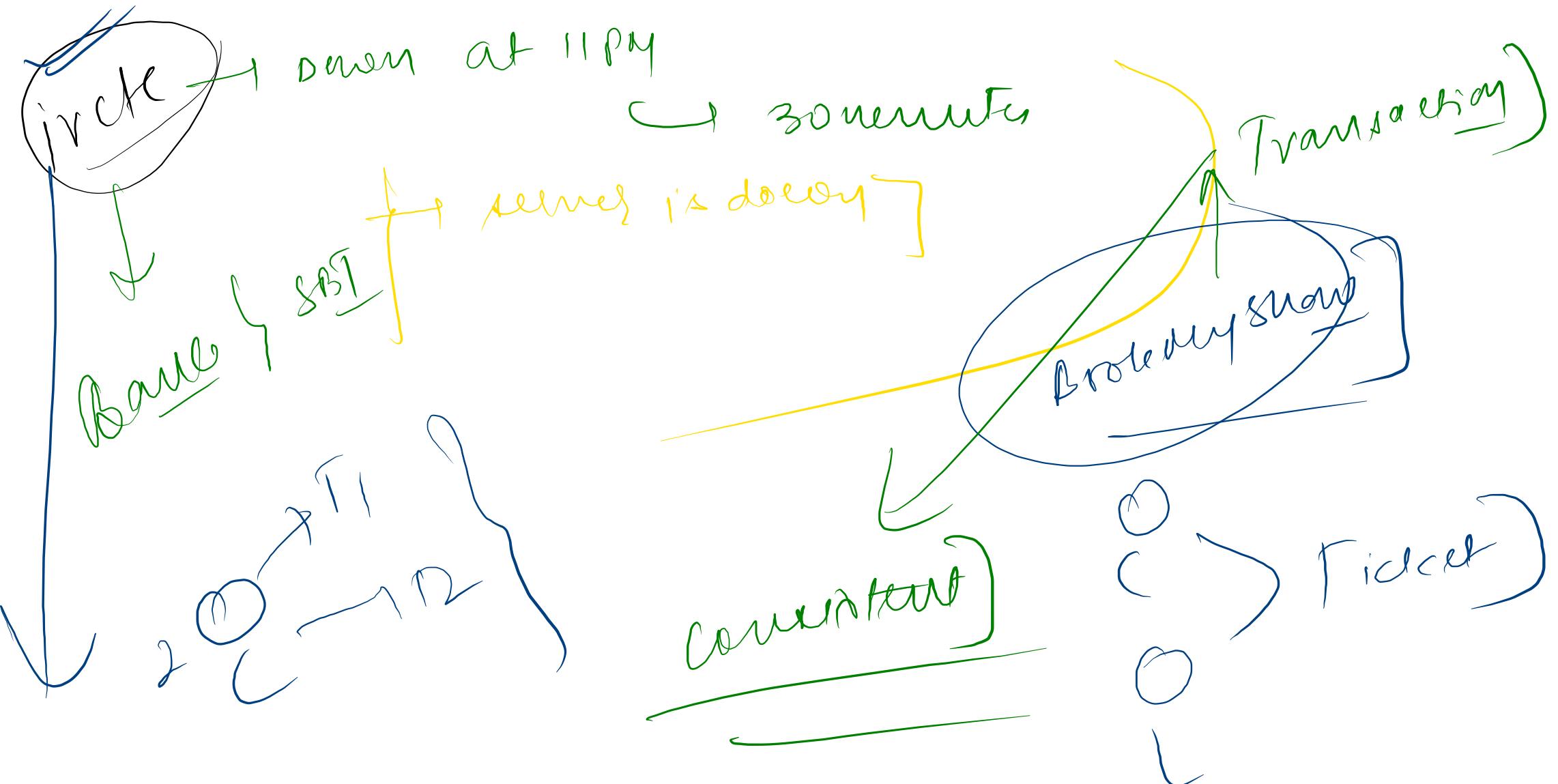
Δt → in-cassir text

Δt → Allow no read
operation

Unreadable
 \equiv unread

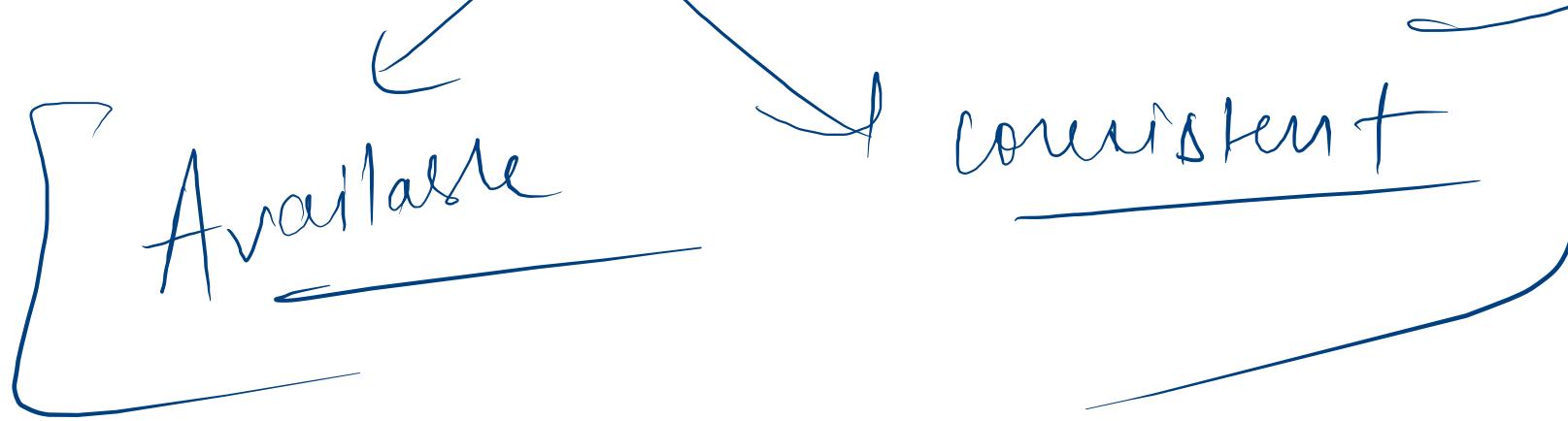


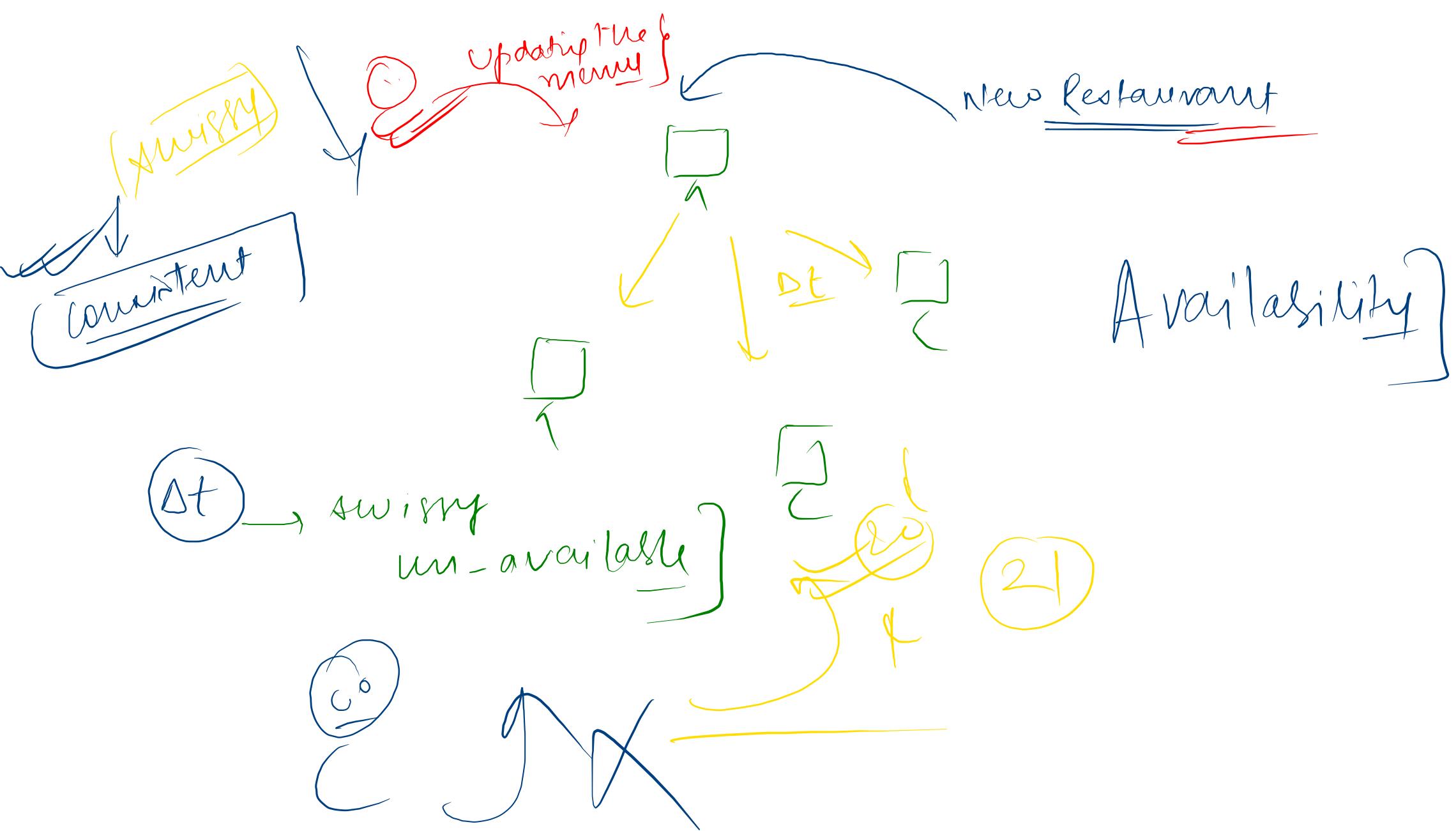




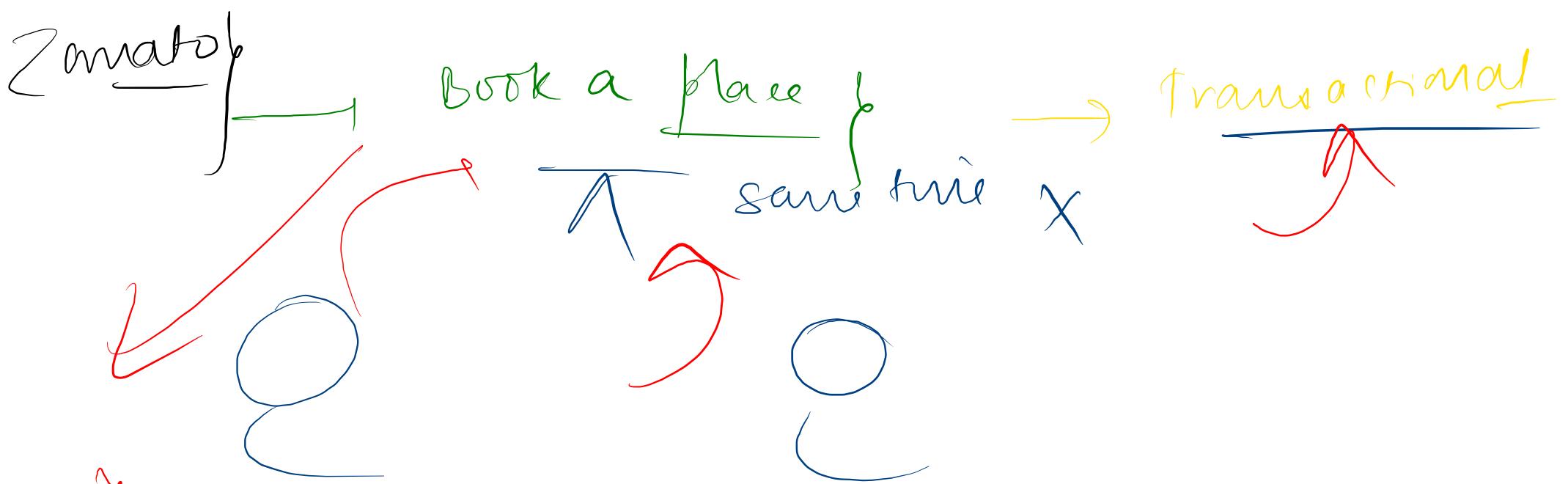


~~Landing page~~ | Swissky

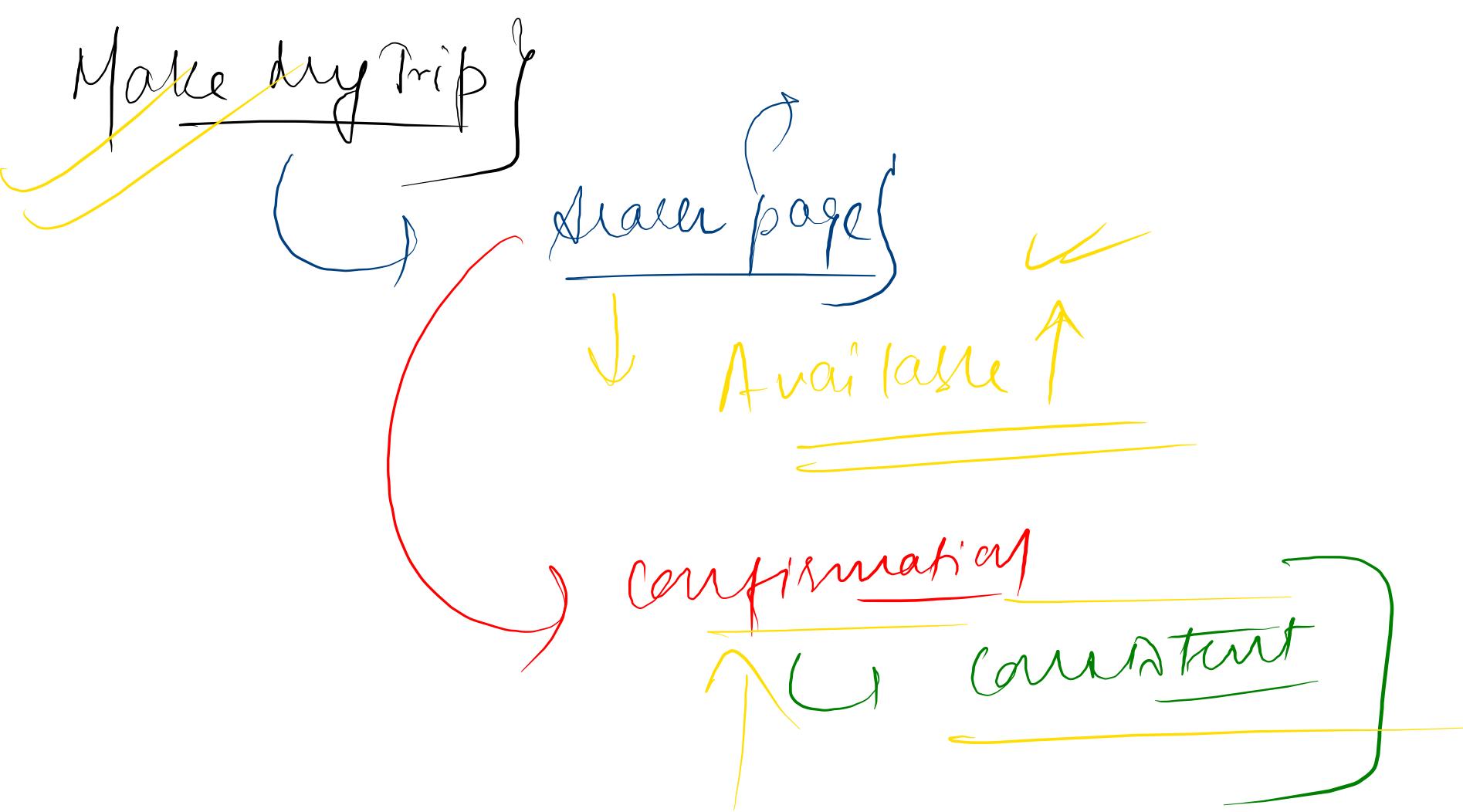




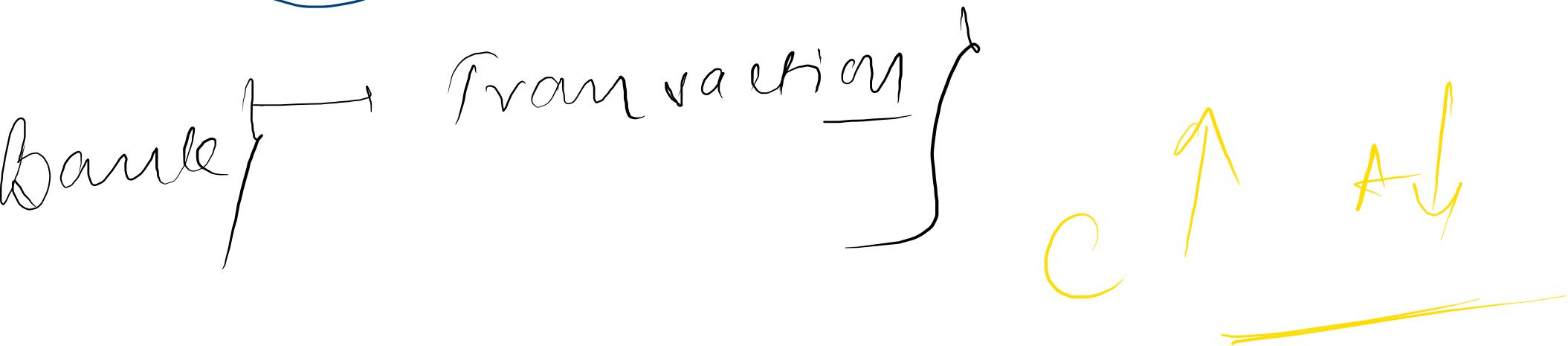
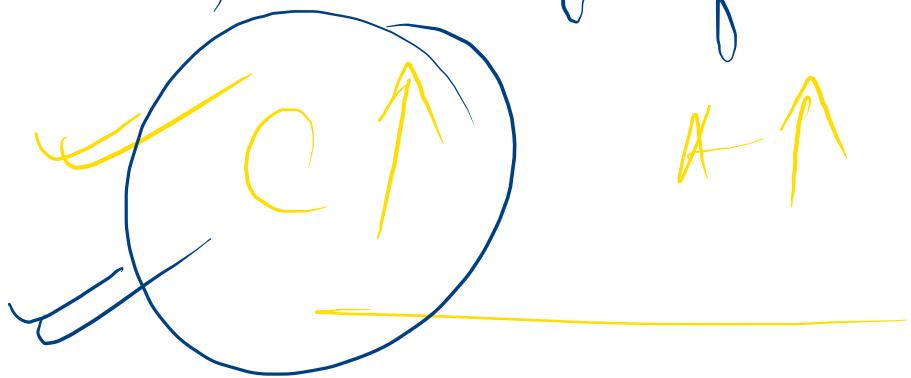
Landing page → Available ↑ ↗



Constant



irate
↳ Booking of seat]



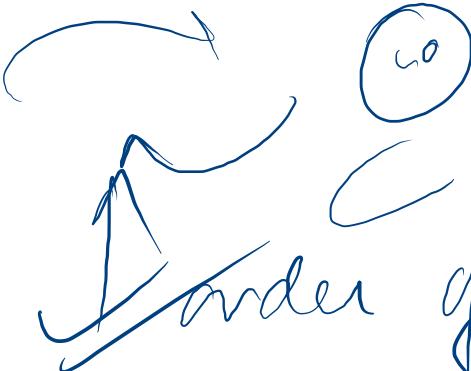
Messenger | chat App

Availability ↑

content

Group Chat

Order of messages



Order of messages are very very important

Line width
matter

Ground

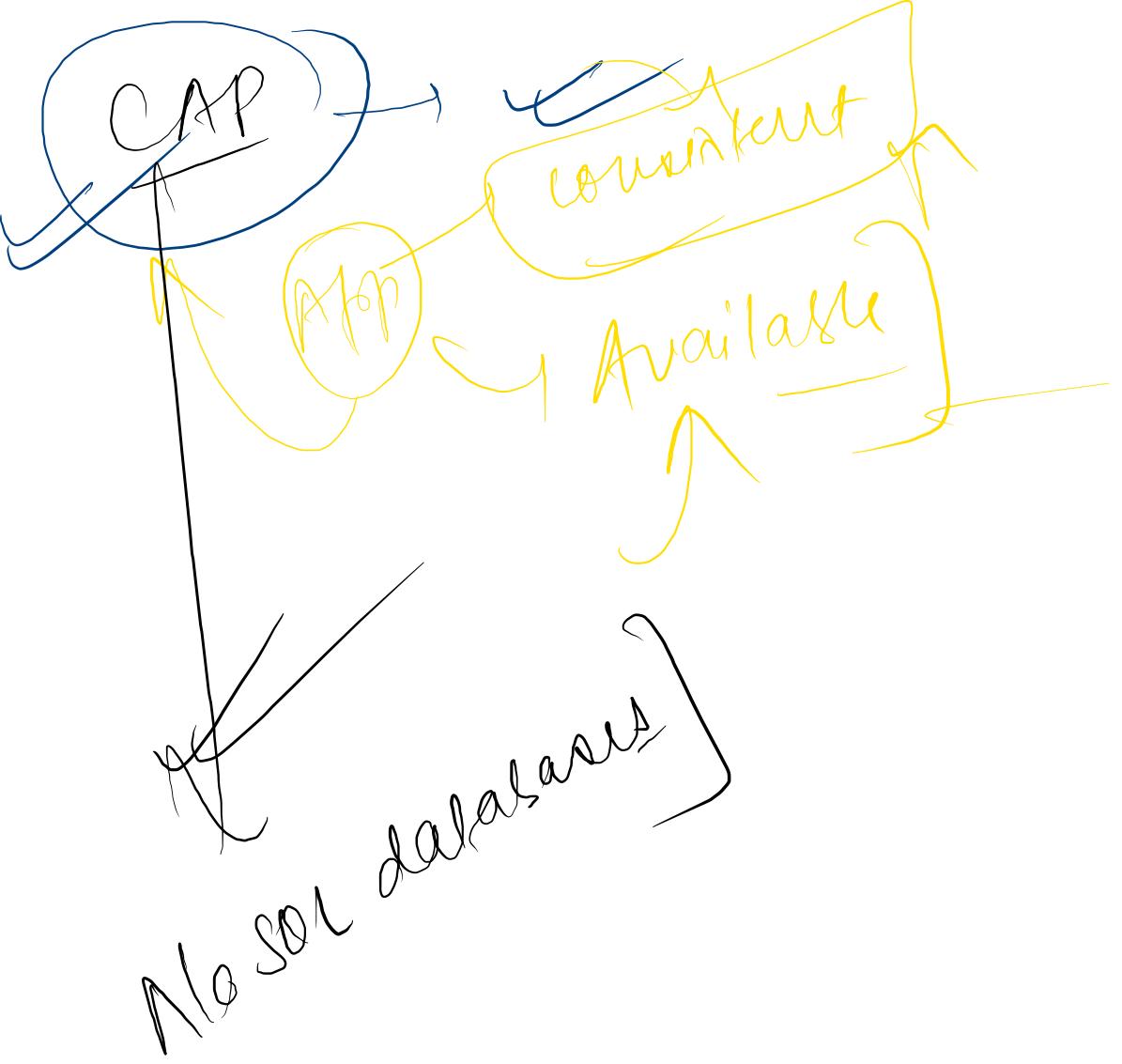
Δt

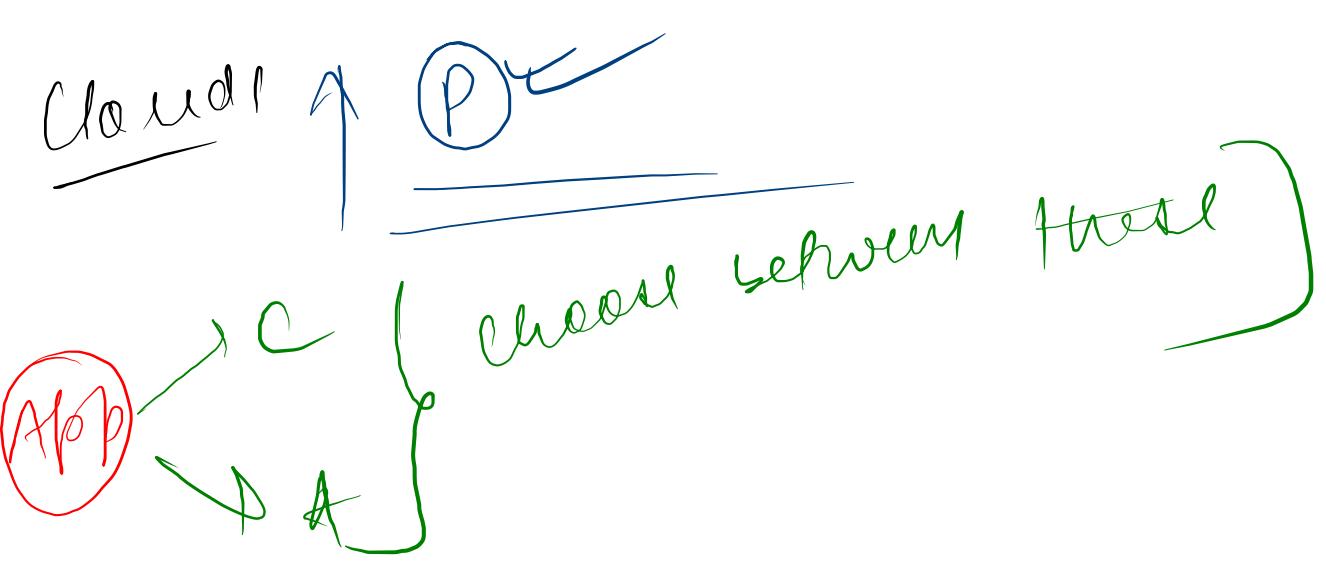
Ob

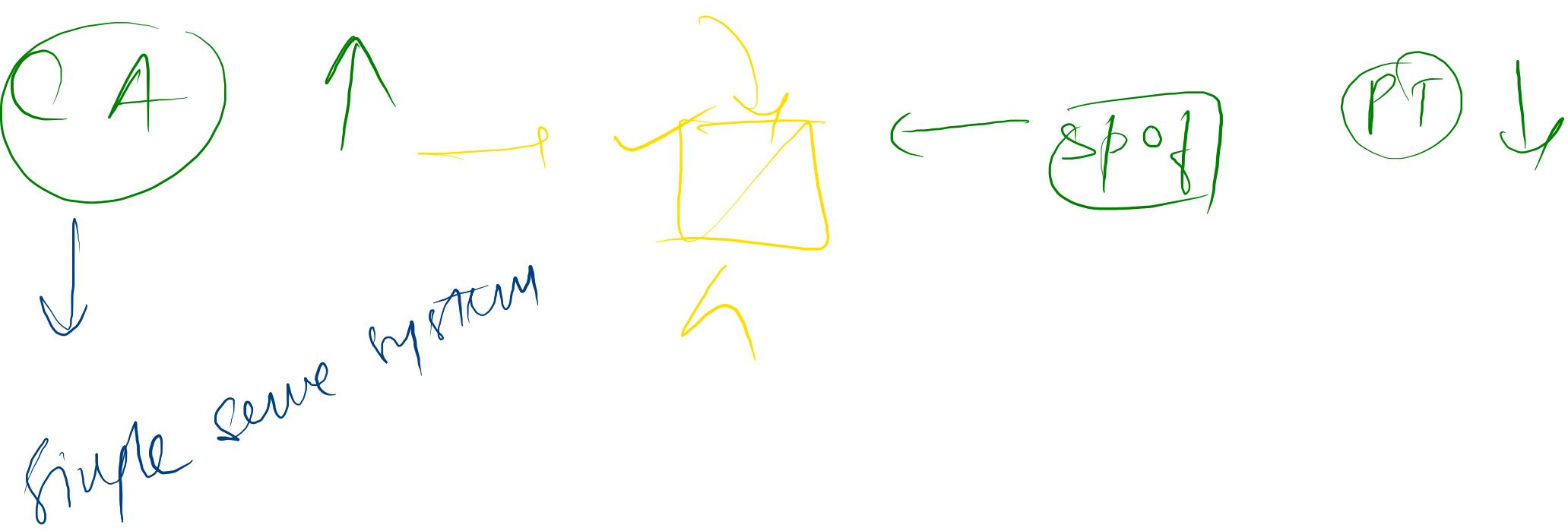
(Δc)

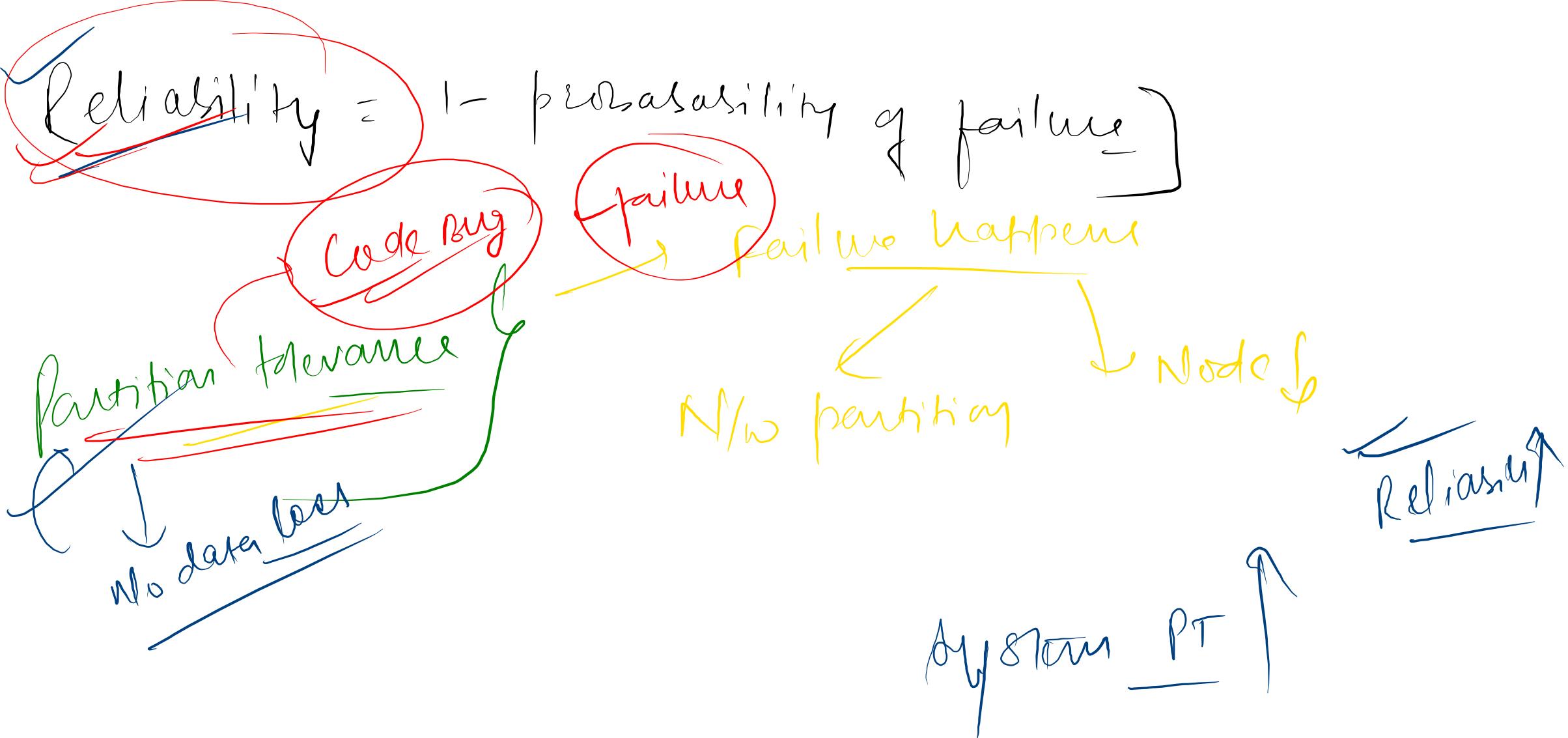
Synapse

Idea
Mobile phone

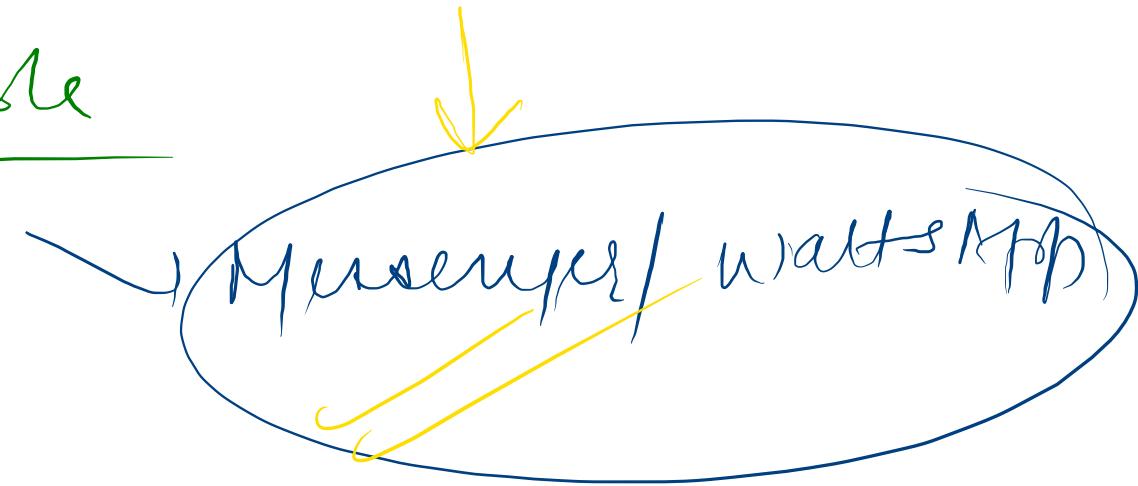




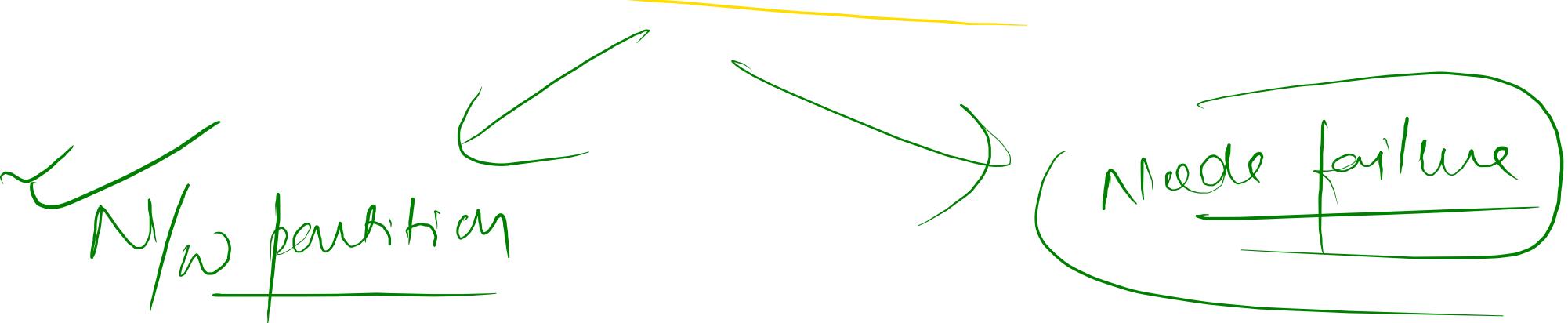


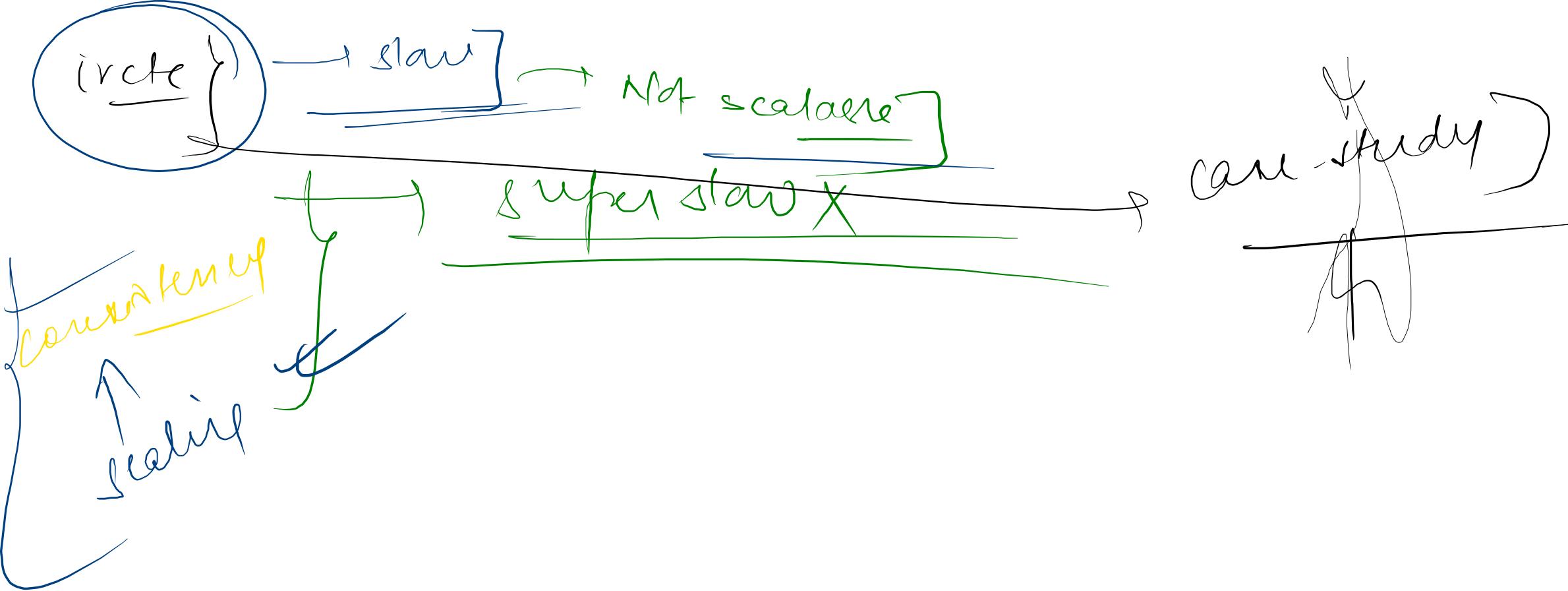


~~over~~ A system is unavailable



Partition Membrane



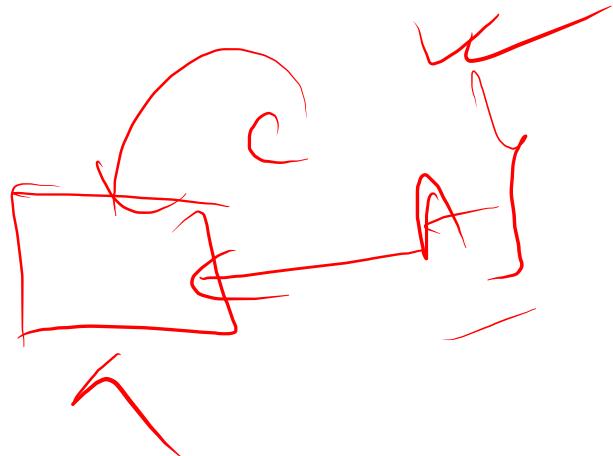
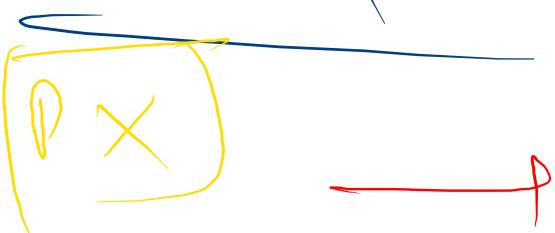


WhatsApp} 1-1
Group Chat

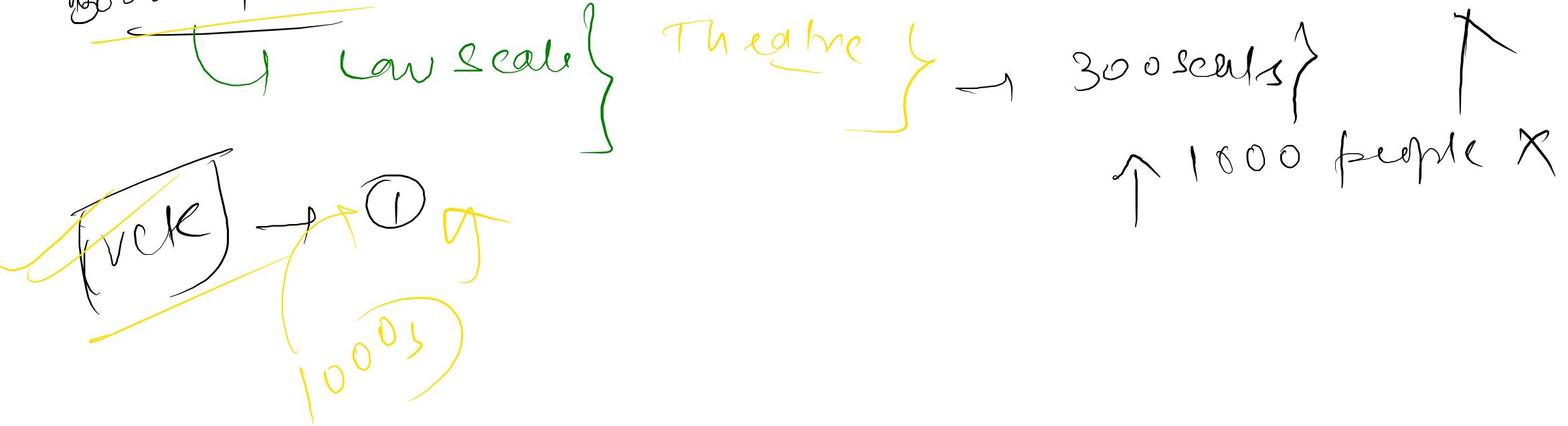
$P(X)$

$A \text{ and } C$

$A \text{ and } C$



Boo & my show



~~SW~~

→ OS

→ AI/w

internet

Database