Headstart To CP

Online tests → 1hr + 2-3

10% 90%

Sprinkler / Calculate

Google, Directi ... Dun

Agenda →

- What is CP?
- Why you should start CP as early as possible
- What are tools & pre-requisite for CP
- What are the platforms where we can practice
- Hands On
- What prog lang to prefer
- Free resources to learn CP
- Relevance of CP in placements
- :
- AMA

Quiz → Top 9 → Goodies

→ DSA / DBMS / OS / CN / SD

What is CP ??

* Programming X → Solving problems

SE

Amazon

Business problem

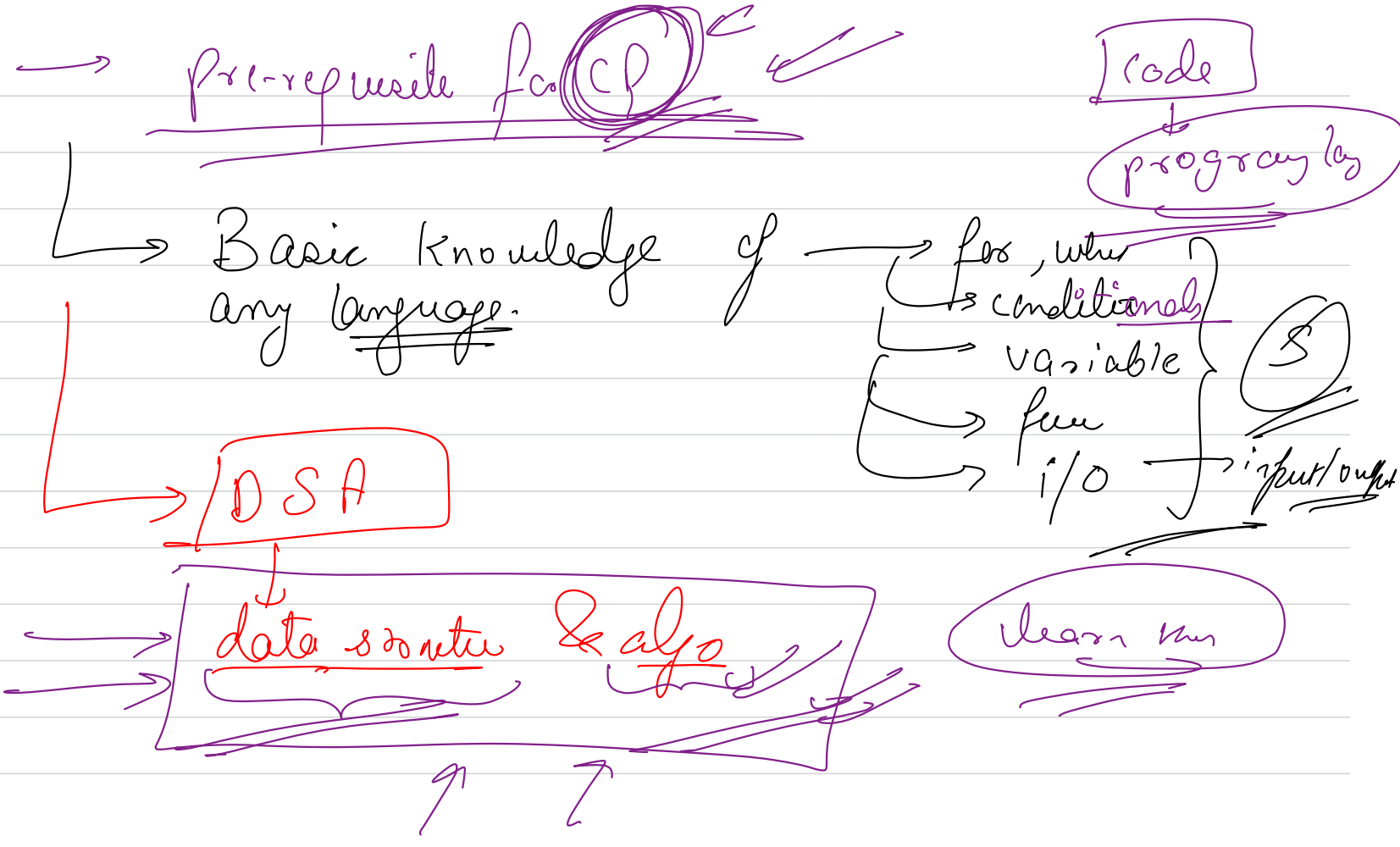
Steam

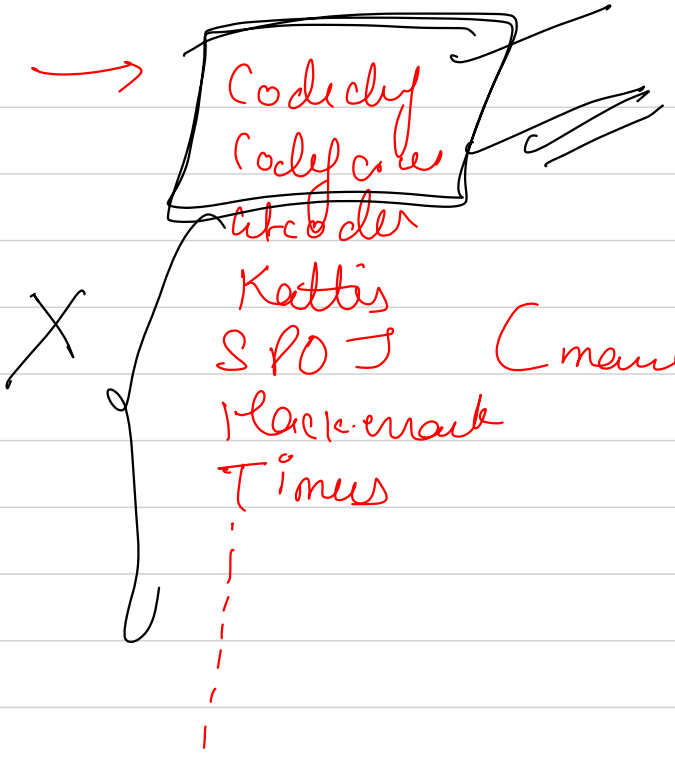
sport programming, contests (exams)/(exam)

contest or exam to cop ...

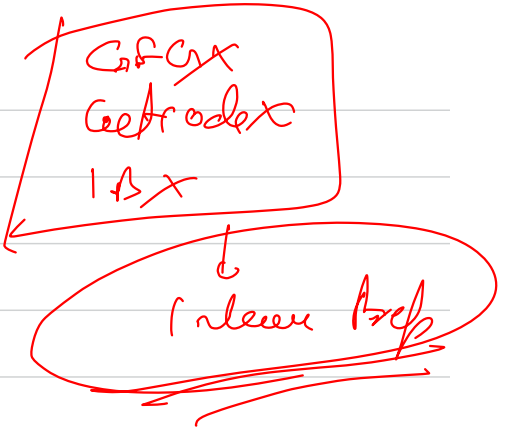
Why do CP??

- It's free and fun ⟷ chess
  - no
- You will be able to publicly demonstrate your skills.
- Prepares you well for technical interviews.
- Helps you to solve complicated problems
- Sometimes even makes you a better team player


Pre-requisite for CP
Code
programming
Basic knowledge of any language.
for, while
conditionals
variable
func
i/o
S
input/output
DSA
data structure & algo
learn this



(mainly for practice)



TLE

$2 \times gcd(a,b) = lcm(a,b)$

$(a,b) = (b,a)$

$^nC_2 \rightarrow \frac{n \times n-1}{2} \approx n^2$

Brute force $\rightarrow$ prepare all the pairs

$\approx 10^{10}$

$N \leq 10^5$

a) $^nC_2$ ✓

b) $^nC_2/2$

c) $n!$

d) None

10^8

a) 10^{100} ✗

b) 10^{10} ✗

✓ c) 10^8 ✓

d) 10 ✗

2, 3, 6

(2, 3)

(3, 6)

(2, 6)

$^3C_2 \rightarrow \frac{3!}{2!(1)}$

Q-1

a) $gcd(a,b) \times lcm(a,b) = a \times b$ ✓

b) $gcd(a,b) \times a \times b = lcm(a,b)$

c) $gcd(a,b) / lcm(a,b) = a \times b$

d) None

↳ $lcm(a,b) = 2\, gcd(a,b)$

$lcm(a,b) = \frac{a \times b}{gcd(a,b)}$

↳ $a \times b = 2 \times gcd(a,b) \times gcd(a,b)$

↳ $a = c_i \times gcd(a,b)$

↳ $b = c_j \times gcd(a,b)$

For c_i, c_j to be co-integers

$$\left.\begin{aligned} a &= c_i \times \gcd(a,b) \\ b &= c_j \times \gcd(a,b) \end{aligned}\right\}$$

a) $c_i \geq 0$ and $c_j \geq 0$

b) $c_i \geq 1$ and $c_j \geq 1$

c) $c_i \geq c_j$

d) None

$$c_i \times c_j \times \gcd(a,b)^2 = 2 \times \gcd(a,b)^2$$

$$\boxed{c_i \times c_j = 2}$$

$c_i = 1 \quad c_j = 2$

$c_i = 2 \quad c_j = 1$

$$a = c_i \times \gcd(a,b) \quad —$$
$$b = c_j \times \gcd(a,b) \quad —$$

$$\frac{a}{b} = \frac{c_i}{c_j}$$ ← $c_i = 1$ $c_j = 2$ or ← $c_i = 2$ $c_j = 1$

$$\frac{a}{b} = \frac{1}{2} \quad \text{or} \quad \frac{a}{b} = \frac{2}{1}$$

$(a,b) = (b,a)$

$2a = b$ or $a = 2b$

Now problem reduces to finding a value 2x for any x

Hashing

Data Structure → C++ unordered_map / Java HashMap / Python Dict

a) Linear probing
b) Separate Chaining
c) Quadratic probing
d) None

worst

exactly really less

a) $O(1)$ X → linear

b) $\theta(1)$

c) $\Omega(1)$

d) None

avg case

Const

$O(1)$

2 2 2 2 2

4, 3, 4, 6

2, 4
2, 4
3, 6

$O(n^2)$

$O(n \log n)$

value	freq
2	1
4	2
3	1
6	1

double of 2

2 - 2

ans += 2

ans += 1

$O(n)$

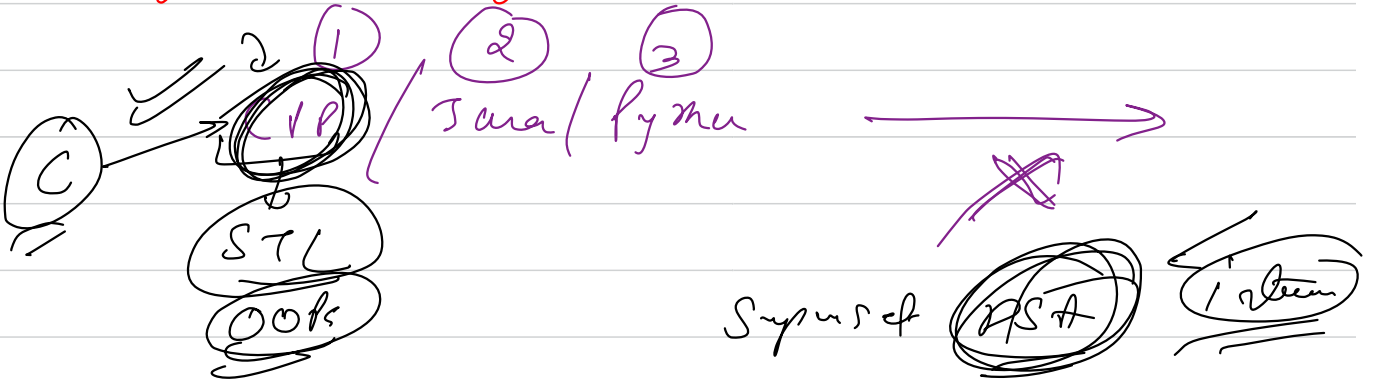
unordered-map

map → BBST

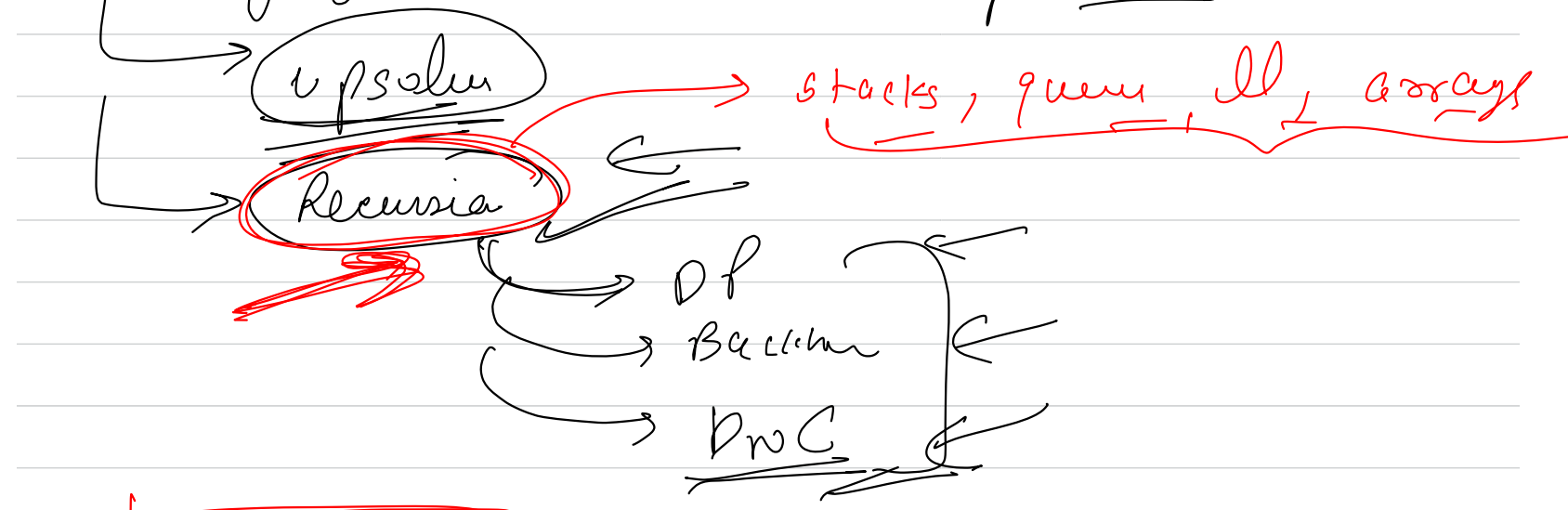
$\log n$

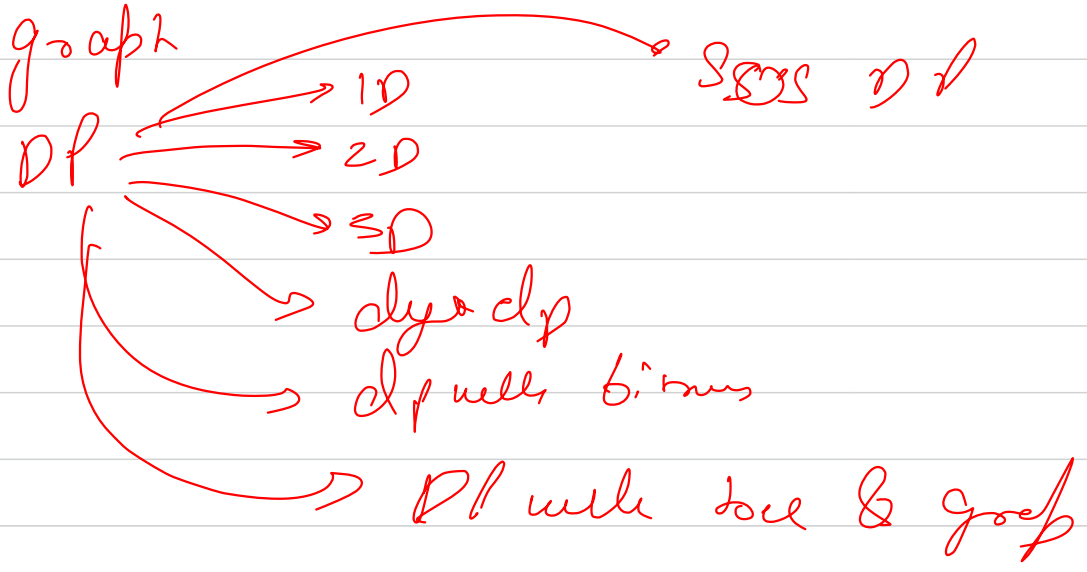
↳ CPP ⟶ is one of the best way to start with

- fast
- editorials
- good for beginner due to less obstacles



↳ Start guy atleast 2 contest per week





Game theory

RayCast → Sphere / BIT /
SQRT Decomposition
⋮