CS & IT ENGINEERING

Introduction to C Programming

Lecture No.2

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TOPICS TO BE COVERED

o1 printf() function

o2 scanf() function

o3 Data Types

Variable

being able to vary (change)

mail-id :

Password :

$$y = 4x$$

$x = 1, \ y = 4$

$x = 2, \ y = 8$

$x = 3, \ y = 12$

$x = 4, \ y = 16$

Container

Rice ~~Rice~~
Tea

Tea ~~Tea~~
Sugar

Sugar
RICE

Lunch box :

data/value

store

10

retrieve

1026		
	a	→ Identifier
	2016 10	

→ Identifier

$$a = 10$$

movie

$\hookrightarrow$ Ticket

$\left(\text{A-6}\right)$

$\hookrightarrow$ (label)

a

10

2136

Google map :   dest :   ✗

```
┌─────────────────────────────┐
│ 1234                        │
└─────────────────────────────┘
```

i/p ──▷Goa

```
┌─────────────────────────────┐
│      Goa                    │  ✓   (Text)
└─────────────────────────────┘
```

ATM m/c

Pin

```
┌─────────────────────┐
│    a bcd            │   ✗
└─────────────────────┘
```

```
┌─────────────────────┐
│ 1234                │   ✓
└─────────────────────┘
```

Integer

<u>data</u>
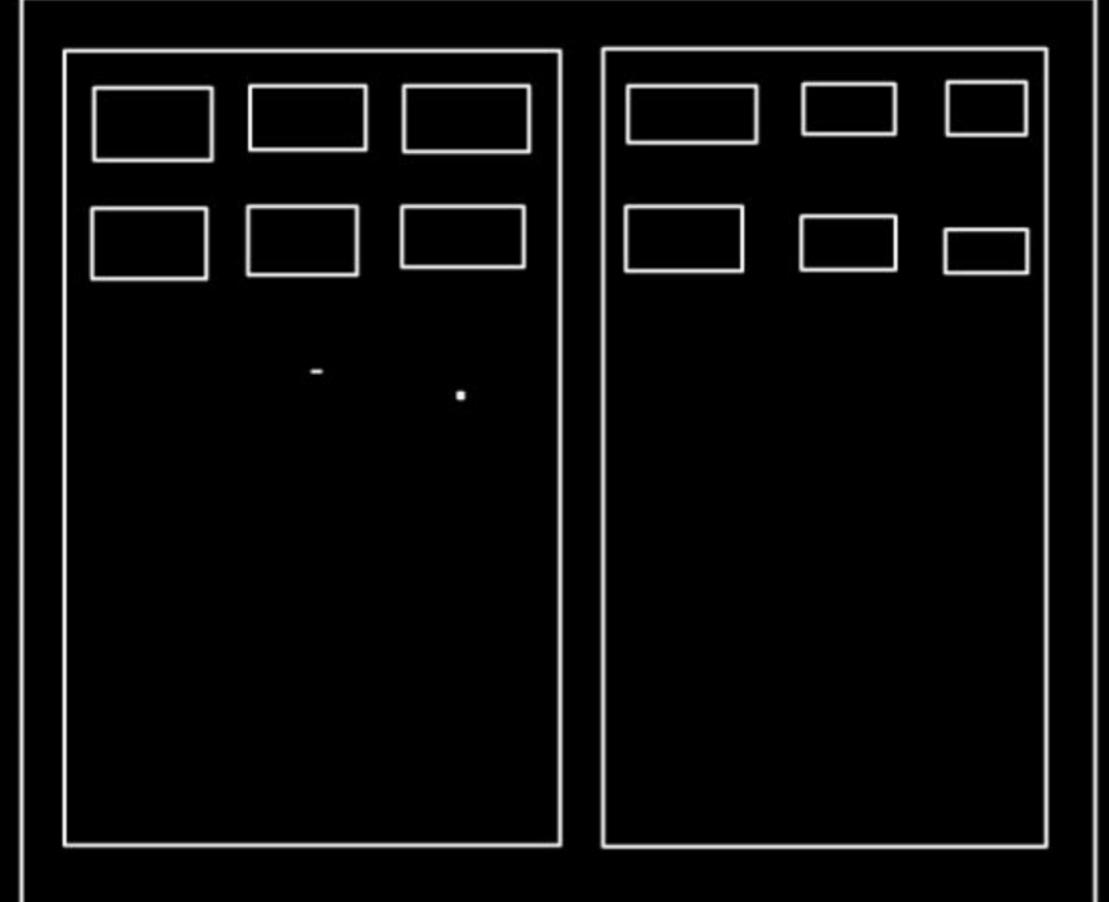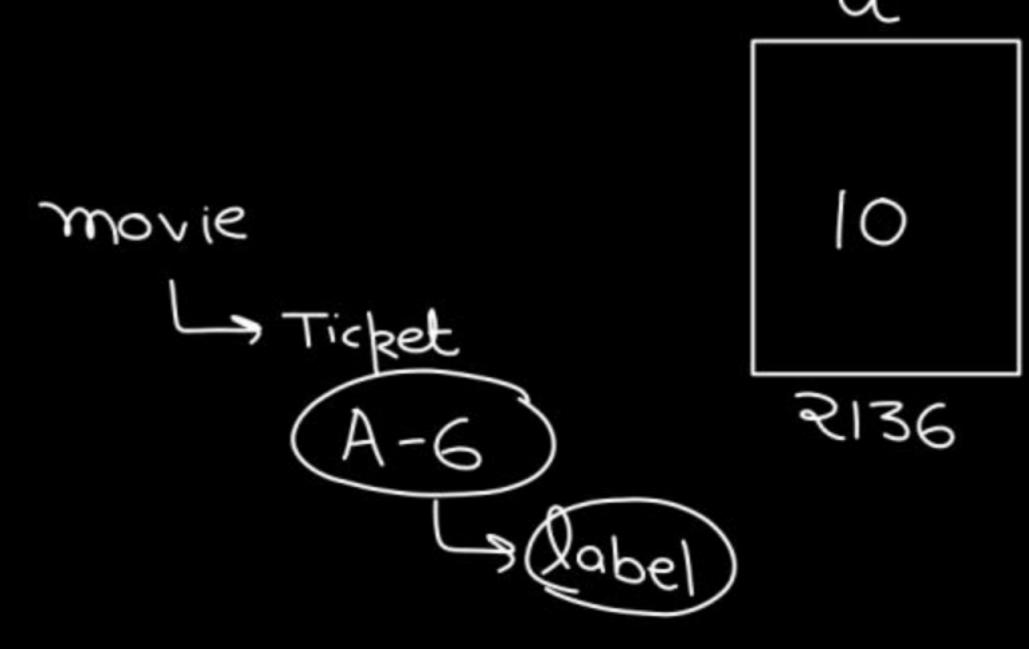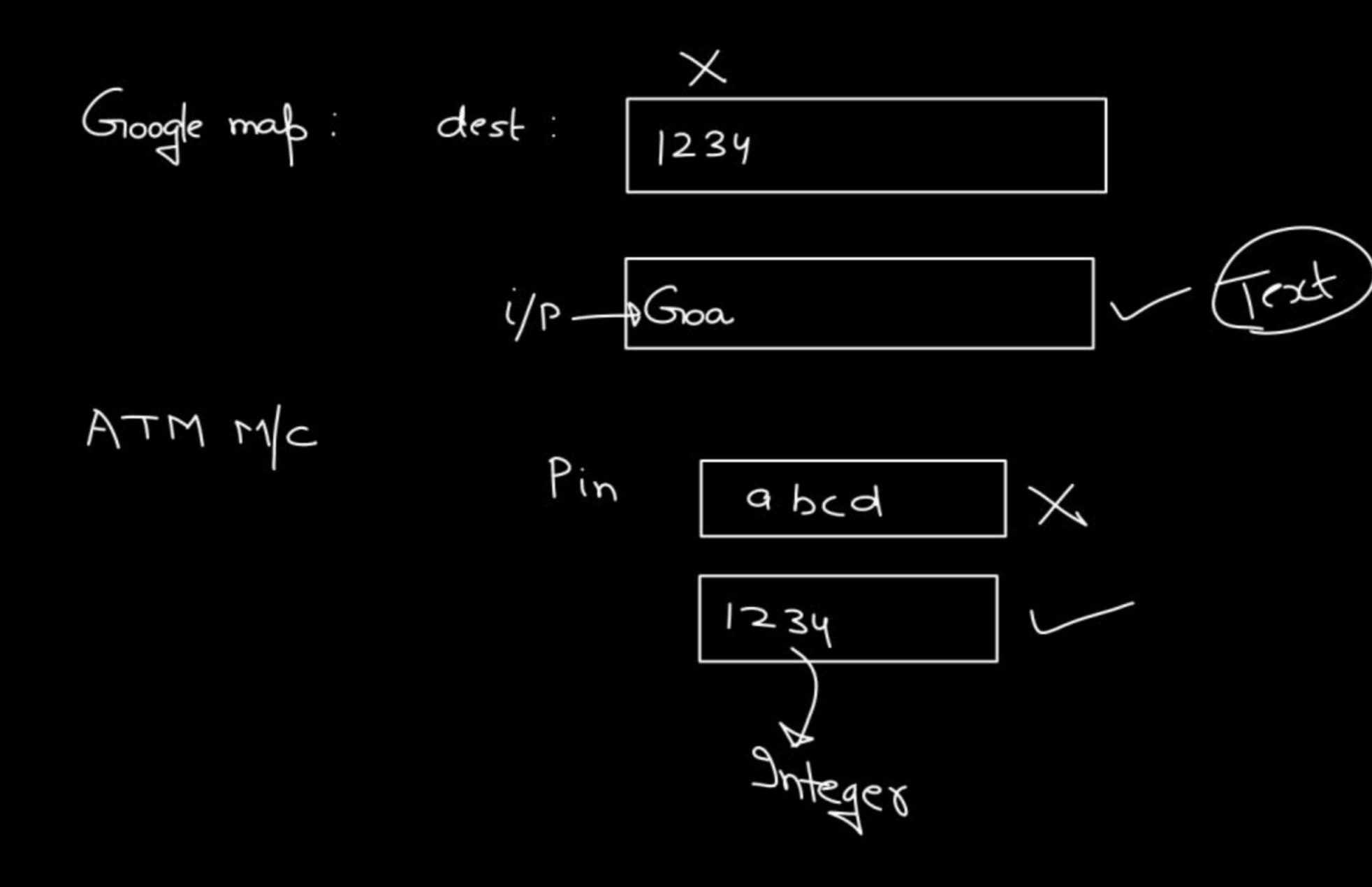
1) Numeric → Whole number   12, 14, 1234,
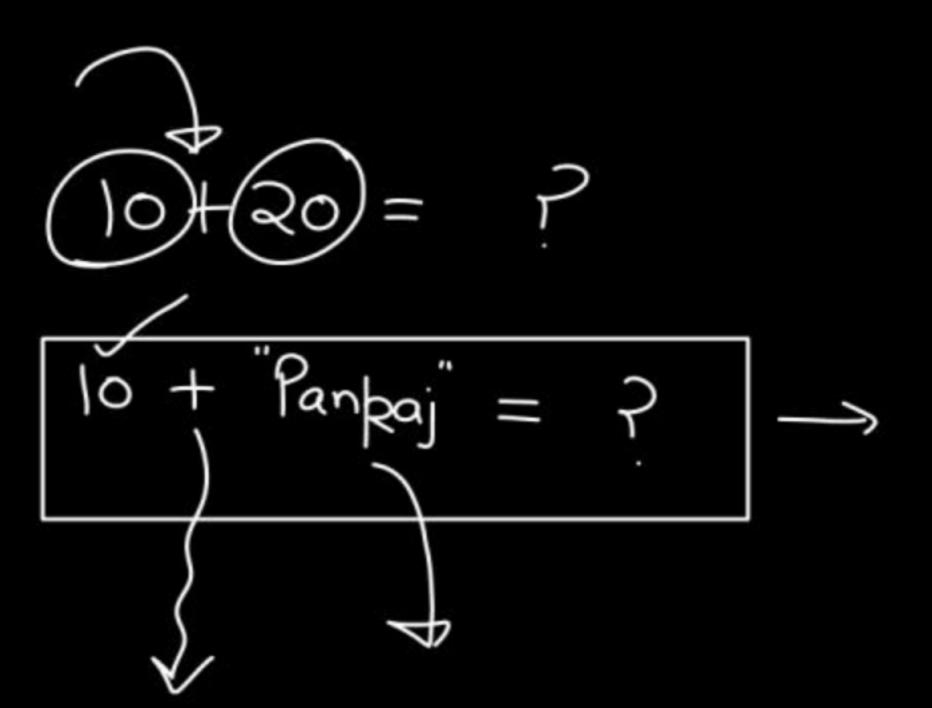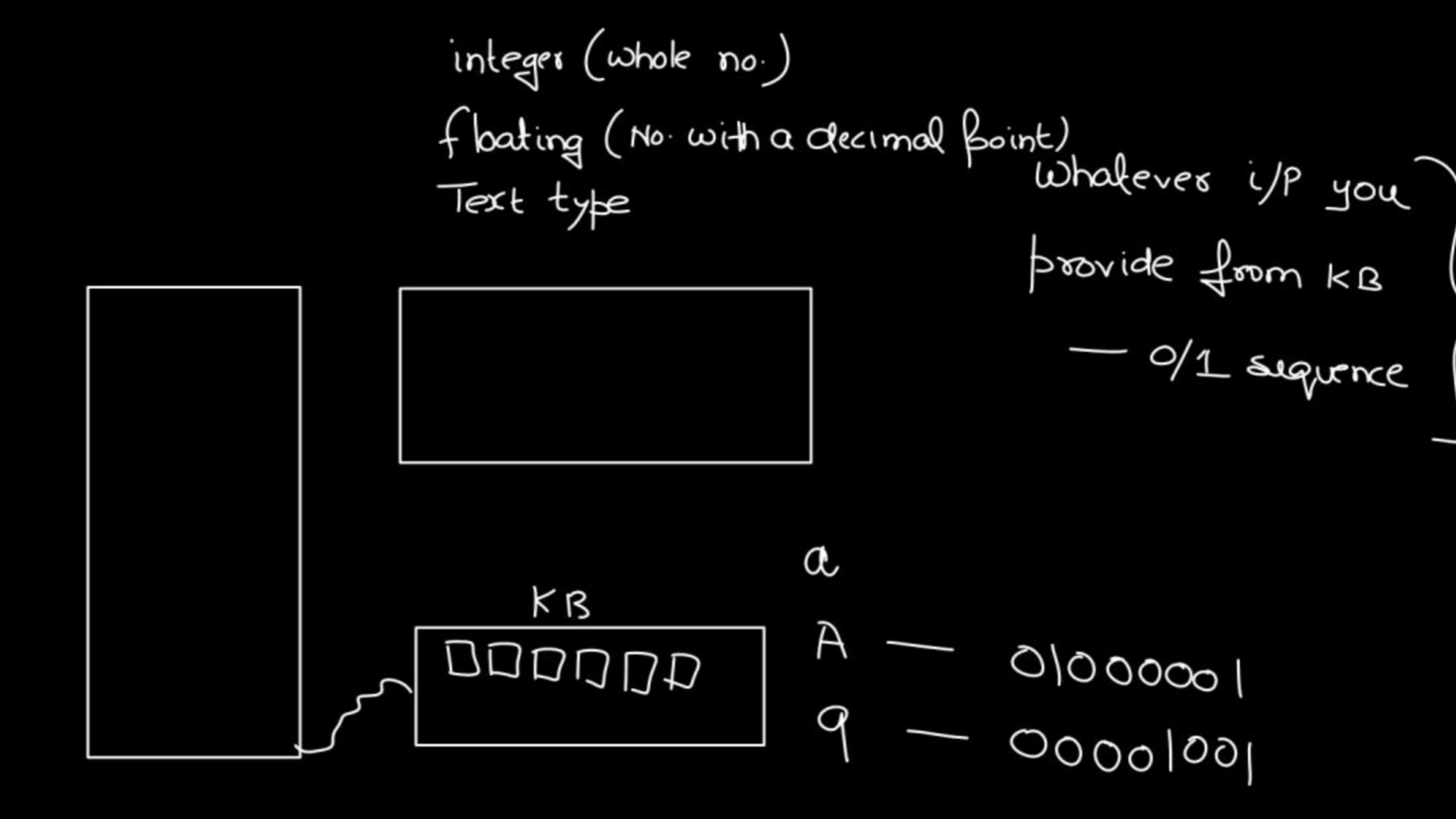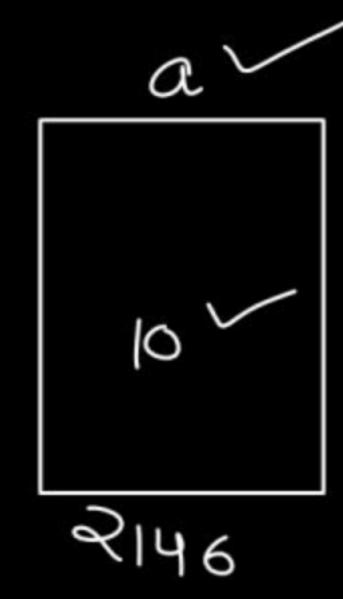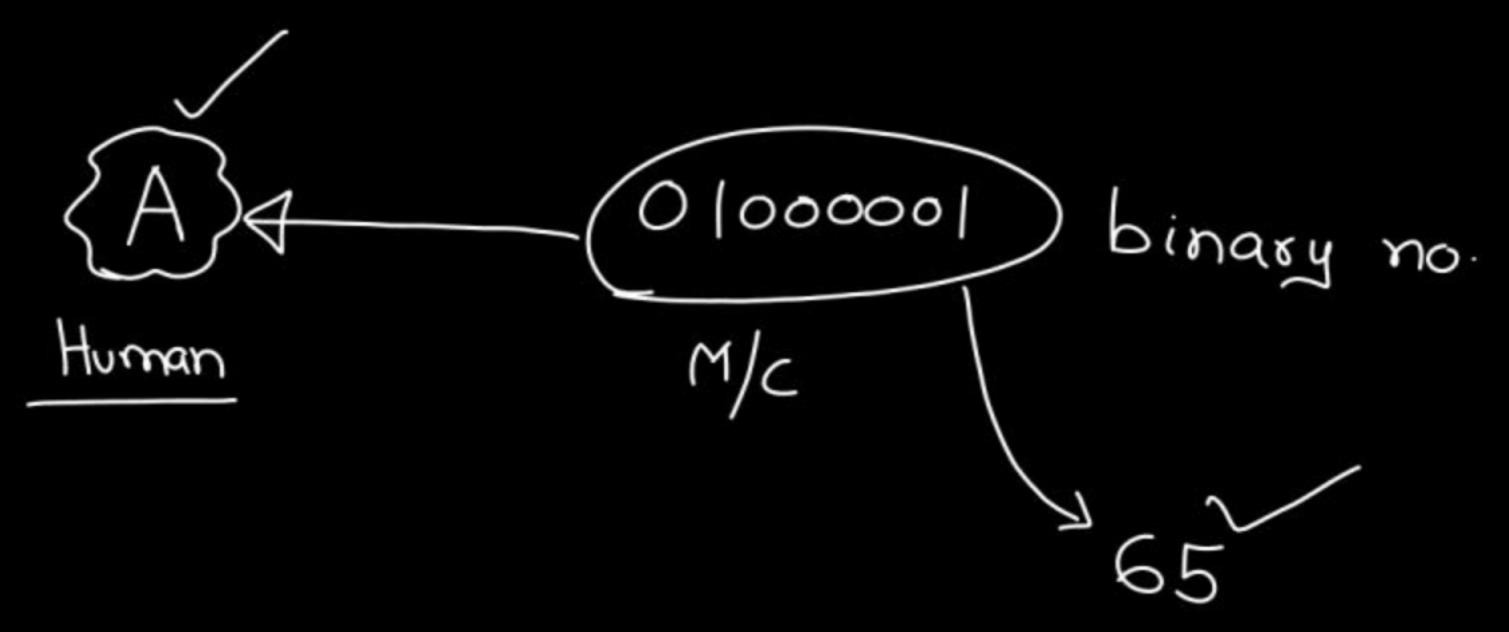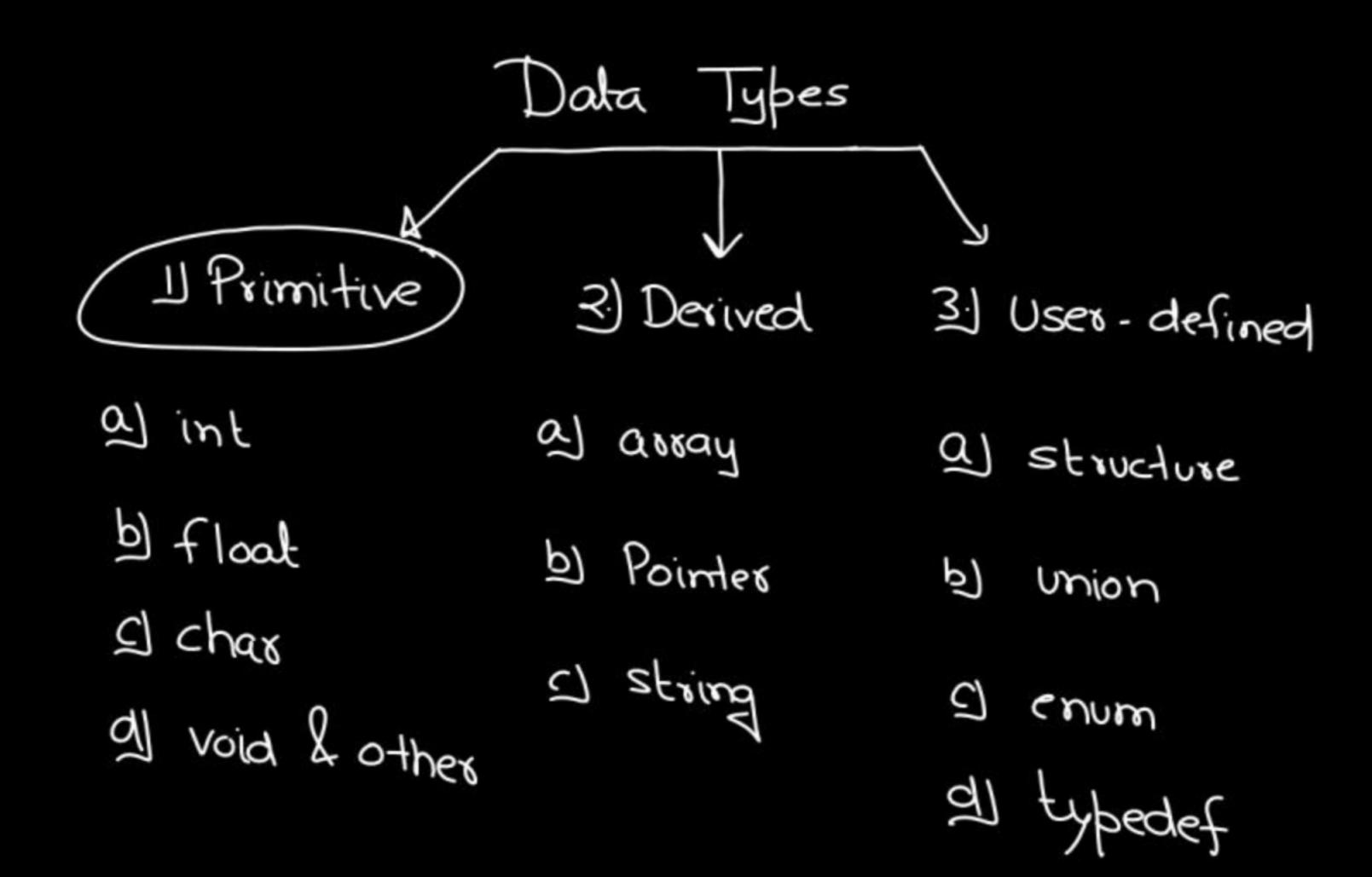
↘ Numbers with   −1698

        decimal point   9.8, −12.3

2) Text :   Address :

        mail

$(10) + (20) = \quad ?$

$$10 + \text{"Pankaj"} = \quad ? \quad \rightarrow$$

integer (whole no.)

floating (No. with a decimal point)

Text type

whatever i/p you

provide from KB

— 0/1 sequence

KB

a

A — 01000001

q — 00001001

Data Type

Integer

$$a = 10; \quad \times$$

$$\text{int } a = 10;$$

Only Numbers without decimal point

a
| 10 |
2196

a ✓
| 10 ✓ |
2146

```c
#include<stdio.h>
    void main() {

        b = 12.78 ;

        b = 200.4 ;

    }
```

variable

float

Numbers without decimal point

b

| 200.4 |
| ~~12.78~~ |

4096

A ✓

Human

01000001 binary no.

M/c

65 ✓

int a = 10; ✓

float b = 12.78; ✓

Textual ✓

Data Types

```
Data Types
    |
    +----------+----------+
    |          |          |
    v          v          v
```

1) Primitive

a) int

b) float

c) char

d) void & other

2) Derived

a) array

b) Pointer

c) string

3) User-defined

a) structure

b) union

c) enum

d) typedef

1) Integer : (short int) ✓   unsigned short int

              (int)   unsigned int
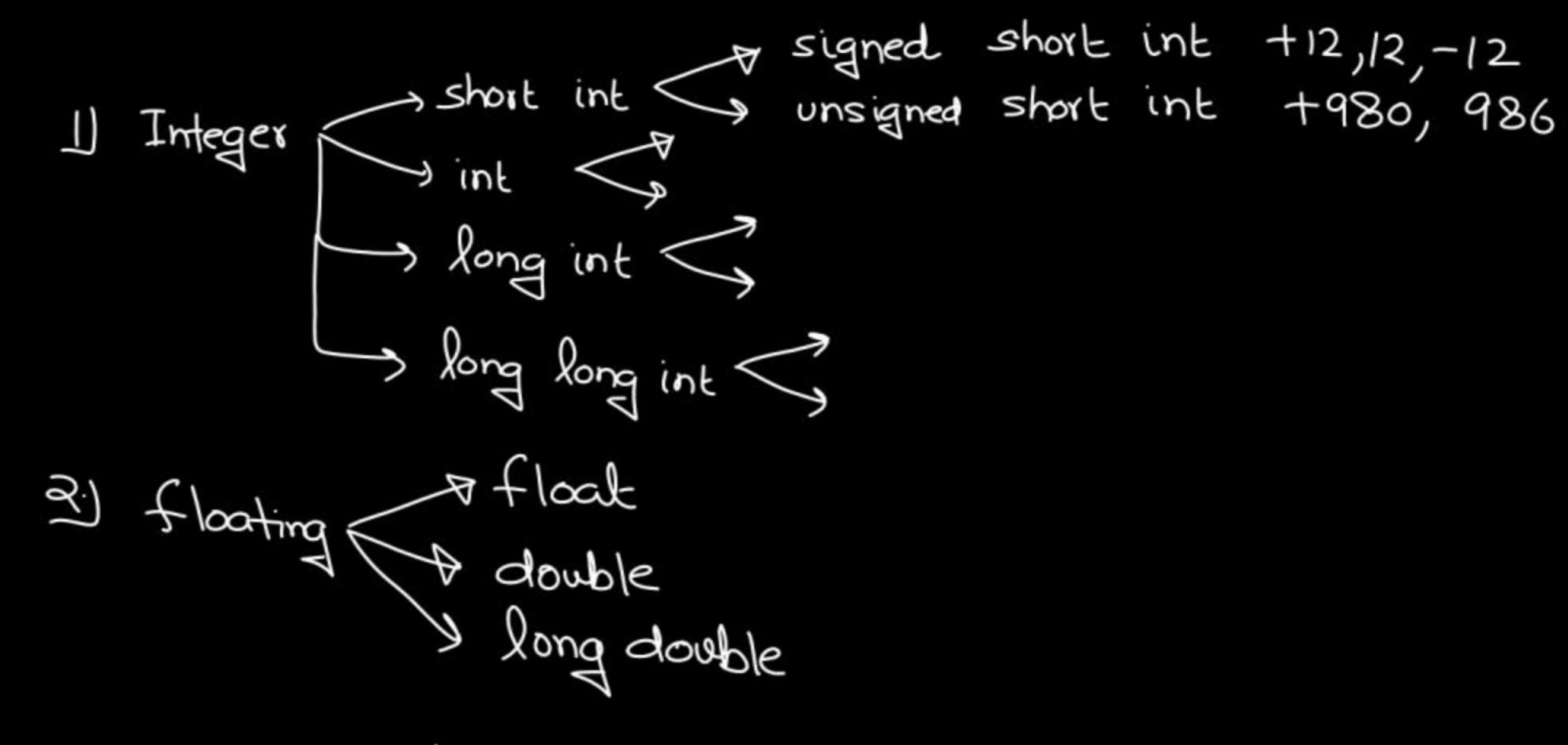
              (long int)   unsigned long int
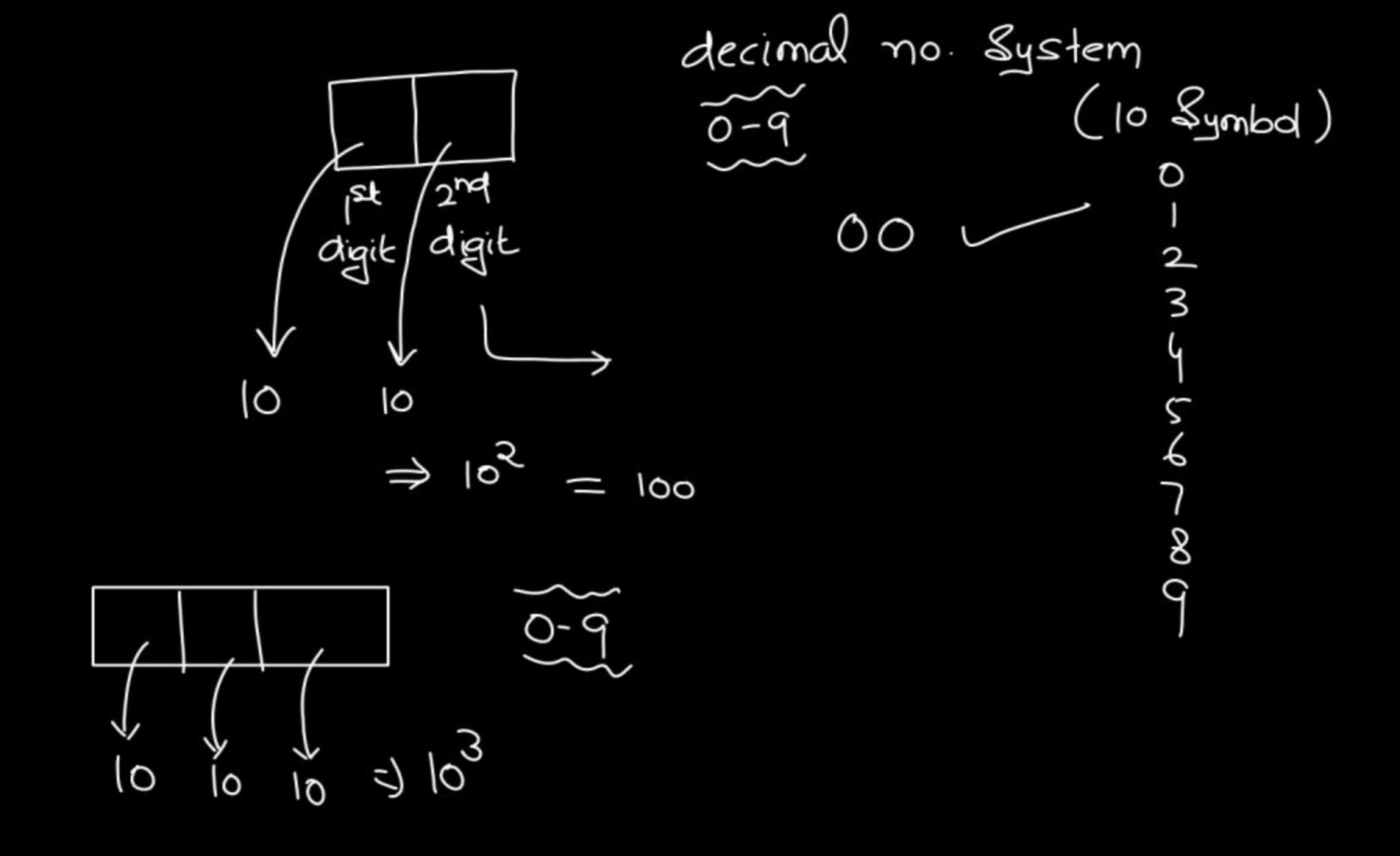
              long long int   unsigned long long int

                    (age store) : —ve

1) Integer
→ short int ⟨ signed short int   +12, 12, -12
            ⟨ unsigned short int   +980, 986
→ int ⟨
→ long int ⟨
→ long long int ⟨

2) floating ⟨ float
             ⟨ double
             ⟨ long double

3) char ⟨ signed
         ⟨ unsigned

decimal no. System

0-9   (10 Symbol)

                                                    0
                                                    1
                          00 ⟍   2
                                                    3
                                                    4
1st   2nd   5
digit digit   6
                                                    7
                                                    8
10   10   9

$\Rightarrow 10^2 = 100$

                          0-9

10 10 10 $\Rightarrow 10^3$

$$\square$$

$$\underline{bit}$$

$$\text{Possibilities} = 2 \begin{cases} \nearrow 0 \\ \searrow 1 \end{cases}$$

2 bit

0/1	0/1

$$2 \times 2$$

$$\text{Possible values} = 2^2 = 4$$

3 bit

$$2 \quad 2 \quad 2$$

Possible values $= 2^3 = 8$

8 bit = 1 byte

2 bit

$$\begin{array}{cc} 0 & 0 \\ 0 & 1 \\ 1 & 0 \\ 1 & 1 \end{array}\Bigg\}\ 4\ value$$

$\rightarrow$ 0,1,2,3 ✓

~~1,2,3,4~~

3 bit $\Rightarrow$ 2^3 value $=$ 8 value $\rightarrow$ 0,1,2,3,4,5,6,7

assume
short int $\Rightarrow$ 2 byte

(unsigned) short int $\rightarrow$ +ve 0,—..

$$2 \text{ byte} = 2 \times 8 = 16 \text{ bits}$$

$$\text{values} \Rightarrow 2^{16} \Rightarrow 65536$$

$$0 \text{ to} \quad 65535$$

Range unsigned short int $\Rightarrow$ 0 to 65535

$$\boxed{0 \text{ to } 2^{16} - 1}$$

$$16 \text{ bit} \implies 2^{16} \text{ values}$$

$$65536$$

$$\boxed{-ve}$$

$$\frac{65536}{2}$$

$$\frac{65536}{2}$$

$$32768 \text{ values}$$

$$32768 \text{ values}$$

$$-32768 \ldots, -2, -1$$

$$0, 1, 2, \ldots 32767$$

Signed short int $\implies$ -32768 to $+32767$

(2 byte)

int (4 byte)   unsigned int

$$32 \text{ bit} \implies 2^{32} \text{ values}$$

$$0 \text{ to } 2^{32}-1$$

signed int $32 \text{ bit} \implies 2^{32} \text{ values}$

$$2^{31}$$

$$-2^{31} \cdots 2, -1$$

$$2^{31}$$

$$0 \text{ to } 2^{31}-1$$
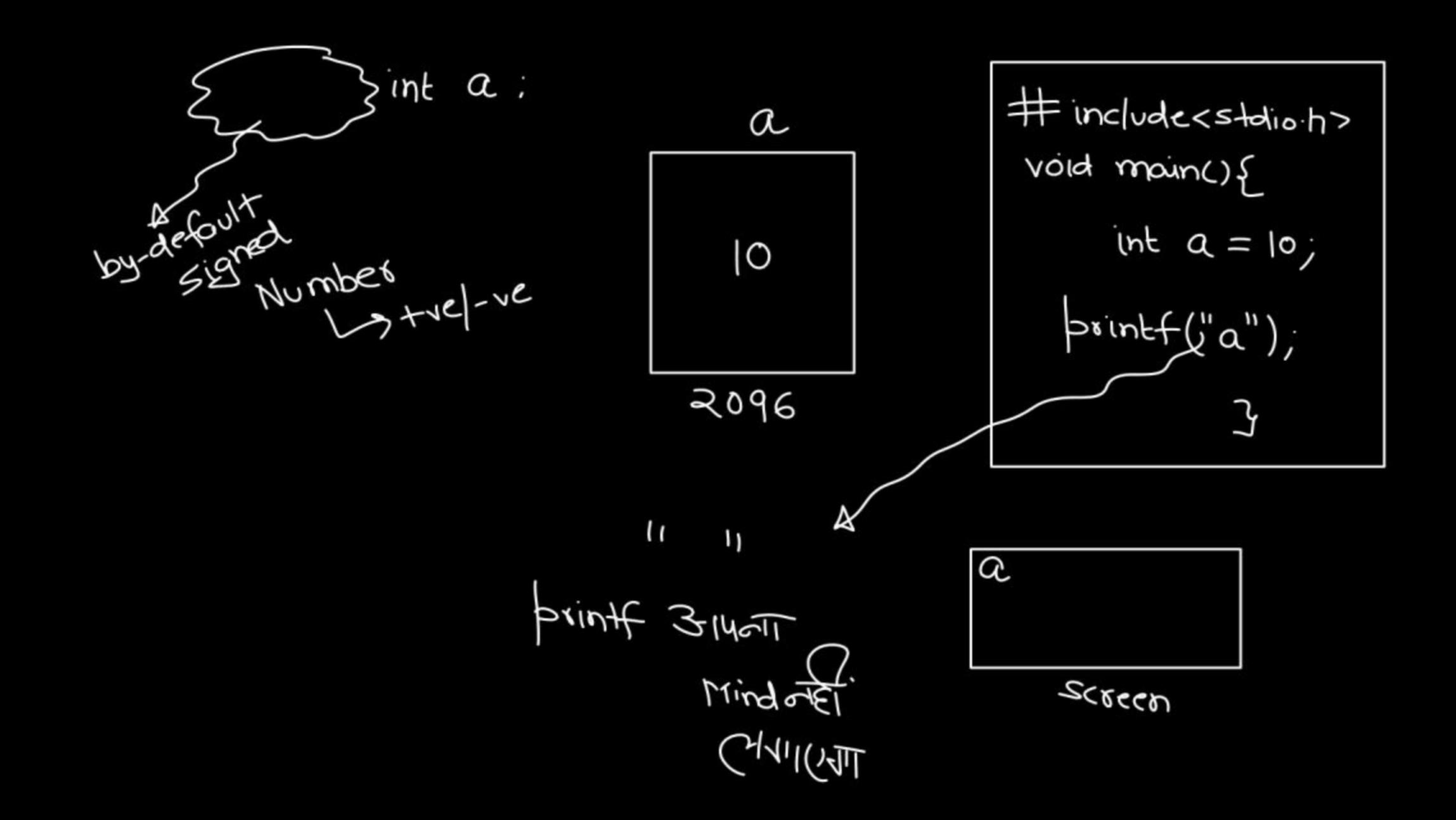
range : $-2^{31} \text{ to } 2^{31}-1$

n bit   int / short / long int / long long int
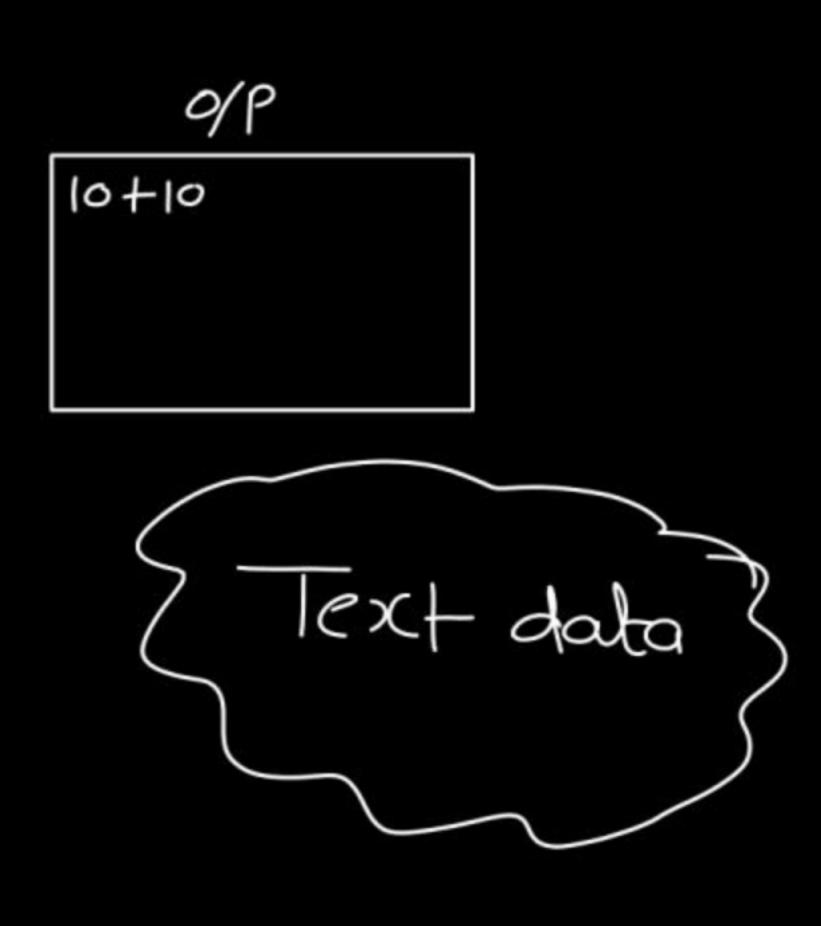
unsigned : n bit $\Rightarrow$ 2^n values

$$\boxed{0 \text{ to } 2^n - 1}$$

signed : n bit $\Rightarrow$ 2^n values

2^{n-1} 2^{n-1}

$-2^{n-1} \longrightarrow -, -2, -1$ $0 \text{ to } 2^{n-1} - 1$

$$\boxed{\text{range} = -2^{n-1} \text{ to } 2^{n-1} - 1}$$

int a;

by-default
signed
Number
↳ +ve/-ve

a

```
| 10 |
```

2096

```
#include<stdio.h>
void main(){
    int a = 10;
    printf("a");
}
```

" "

printf आपना
Mind नहीं
लगाएगा

```
| a |
```
screen

```
#include<stdio.h>
void main(){


    printf("10+10");

    }
```

No. X
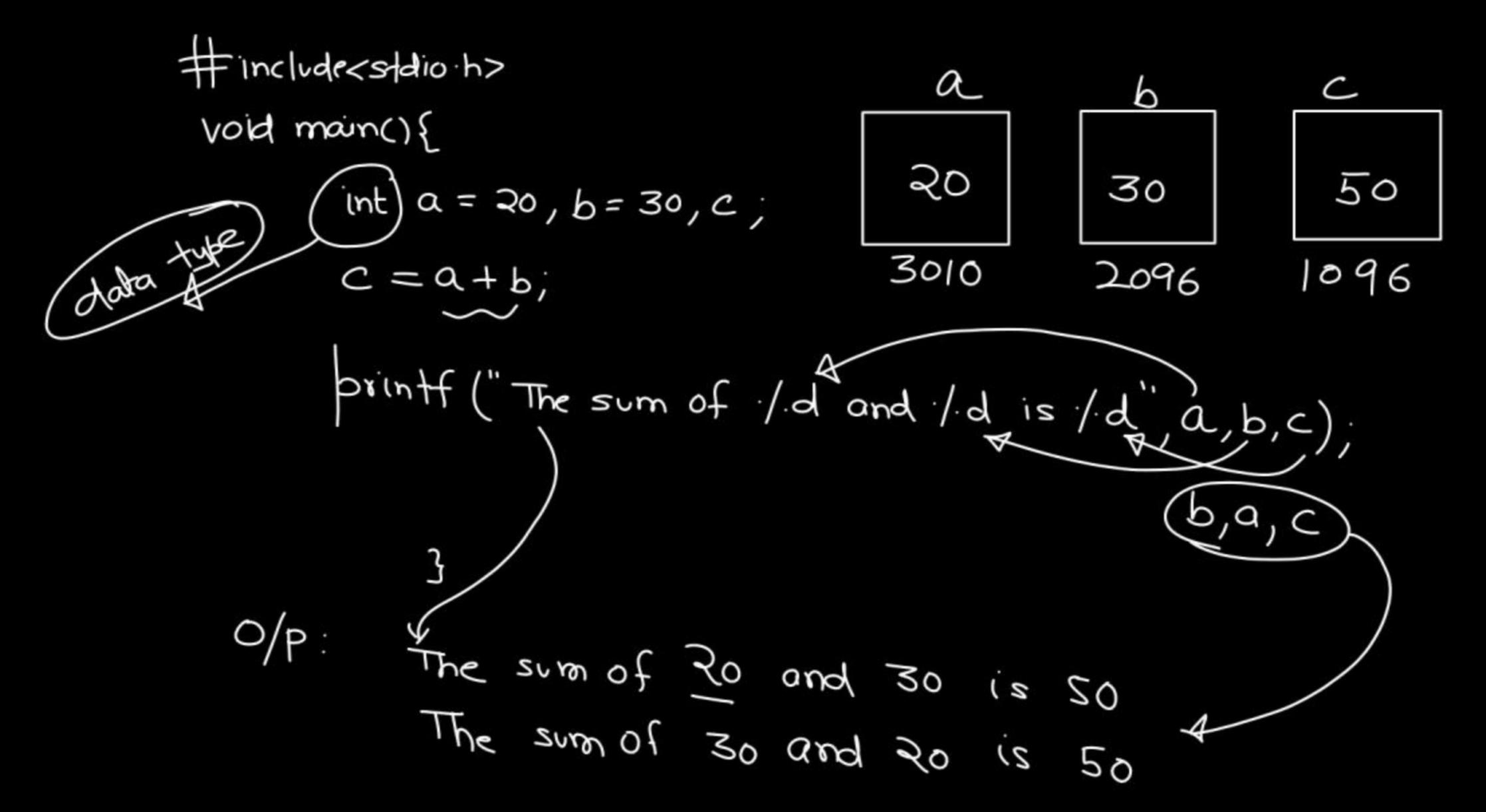
Textual data

```
10+10
```

Text data

mail

2-day leave (Text) form

"10 + 10" ⟶ Text

printf

format

```
#include<stdio.h>

void main(){

    int a = 20;

    printf(" %d ", a);
}
```

format
Specifier

a

20

long int %ld
short integer } %d
int
char   %c   }
float   %f

integer
value print
int

20

```c
#include<stdio.h>
void main(){

    int a = 20;

    printf("The value of a is %d",a);
}
```

a

20

2096

integer
value
print

The value of a is 20

```c
#include<stdio.h>
void main(){
    int a = 20;
    printf(" %d is %d",a,a);
    }
```

a

20

2096

20 is 20

```
#include<stdio.h>
void main(){
    int a = 20, b = 30, c;
    c = a+b;

    printf("The sum of %d and %d is %d", a,b,c);
}
```

data type

a	b	c
20	30	50
3010	2096	1096

b, a, c

O/P: The sum of 20 and 30 is 50
      The sum of 30 and 20 is 50

$\&\Rightarrow$ address of operator

How to take input

scanf

```
#include<stdio.h>
void main(){

    int a;

    printf("Enter a number");
    scanf("%d", &a);
```

user friendly

read integer from KB

store it at this address

Enter a number _

Cursor

Memory

a

12

3196

Screen

KB A

10

12.78

12

0/1
Seq

```c
#include<stdio.h>
void main(){
    int a;
    printf("Enter a number");
    scanf("%d",&a);
    printf("The value is 20");
    printf("The value is %d",a);

    }
```

a

20

Enter a number 20

Read 2 integer values
& print their sum

```c
#include<stdio.h>
void main(){

    int a,b,c;
    printf("Enter 2 numbers");
    scanf("%d %d",&a,&b);
    c = a+b;
    printf("The sum of %d and %d is %d",a,b,c);
}
```

A i/P

"Do no. De bhai"

THANK YOU GW SOLDIERS !