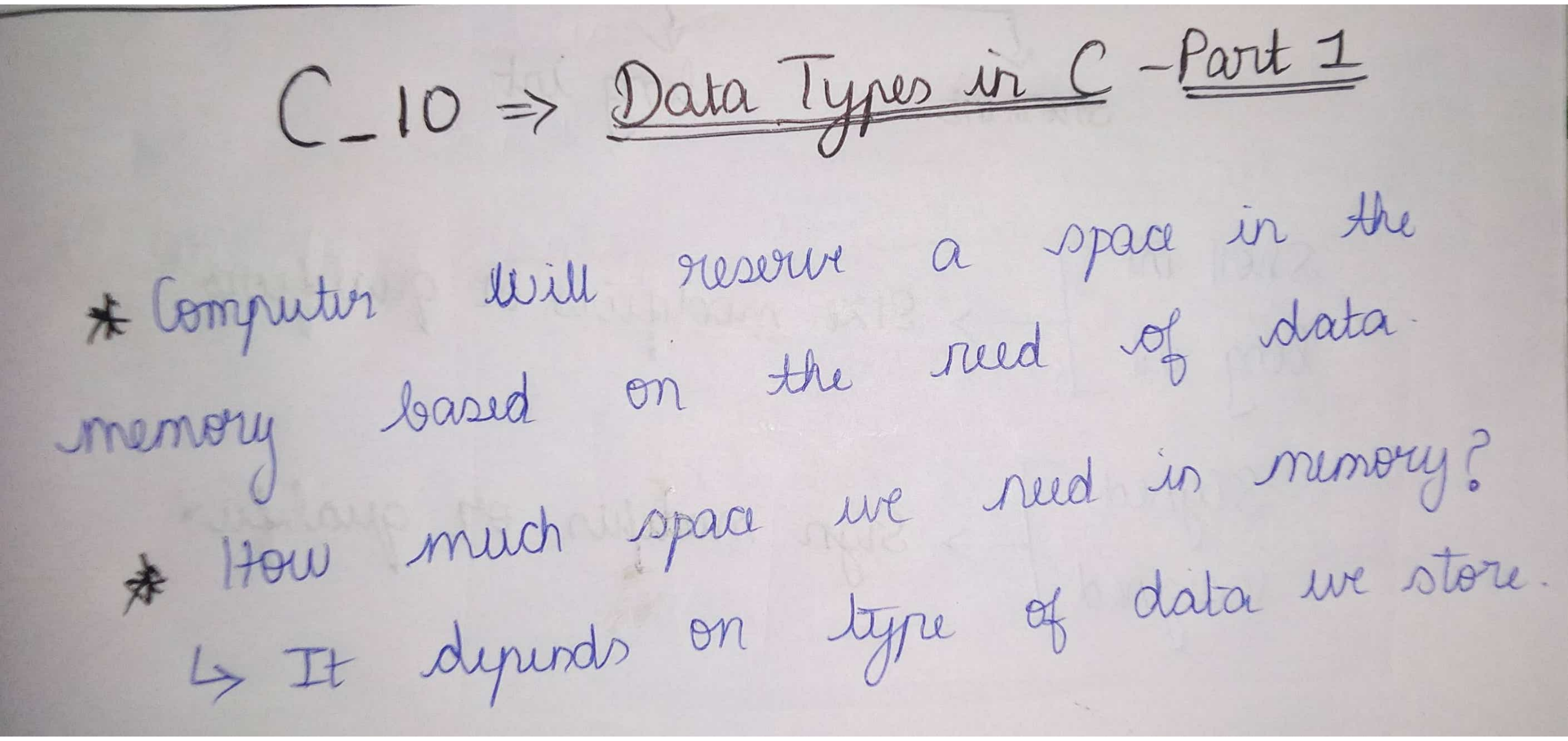

C_10 => Data Types in C - Part 1

* Computer will reserve a space in the memory based on the need of data.

* How much space we need in memory?

↳ It depends on type of data we store.

Data Types:

* It tells how much storage/memory to be allocated to a variable.

Data Types

- Primary
  - int
  - float
  - Char
  - double
- Derived
  - Array
  - Structure
  - Union
  - pointers
- User defined
  - type def
  - Enum (or) Enumerated Datatype

```
typedef int jay;
jenny a;
```

Primary Data Types:

① Integer:

int

- short int
- long int

Short int, long int → size modifiers or qualifiers.

Signed, unsigned → Sign modifiers or qualifiers

* Size of integer depends upto the machine (ie) 16 bit or 32 bit.

16 bit Machine : (2 bytes)

(int)
* Range of signed integer : -32768 to 32767
* Range of unsigned integer : 0 to 65535
(no -ve)

%d → format specifier.

32 bit Machine :

* Range of signed integer : -2147483648 to 2147483647.

To find size of integer in machine :

* We have predefined function, size of ( )

printf (" %lu, size of (int));

* But generally, size of int is 2 bytes.
* If number is short or long; according to that memory is allocated in memory, so we declare short int, long int

Eg:-
short int (1 byte)
int (2bytes)
long int (4 bytes)
→ size of int depends on machine

* Example; 2GB memory RAM

$$2GB = 2[1024 \times 1024 \times 1024 \times 8]$$

$$2GB \Rightarrow \underbrace{(2 \times 1024 \times 1024 \times 1024 \times 8)}_{\text{Total bits}} \text{ bits}$$

1 GB = 1024 MB
1 MB = 1024 KB
1 KB = 1024 bytes
1 Byte = 8 bits

Within this total bits only we can store values, where value depends on type of data size.

* **Check values are valid for 16 bit machine :-**

(Signed)

-250 ✓	4,442 ✗
15053 ✓	-31.8 ✗
+2100 ✓	
0 ✓	8888888 ✗.

$\xrightarrow{}$ exceeds 32767

② **Character DataTypes :-**

* size of character datatype is 1 byte (8 bits)

$$\boxed{\underset{\text{keyword}}{\underset{\downarrow}{\text{Char}}}\ a;}$$

char a; (1 bytes (8 bits))

↳ signed character range: -128 to 127

↳ unsigned character range: 0 to 255

%c → format specifier.

③ Float Data Type

* floating point numbers Eg:.10.0; used to store decimal points.

* size of float datatype is 4 bytes.

float a=10.0; (4 bytes)

↳ range: $-3.4e^{38}$ to $+3.4e^{38}$

%f → format specifier.

Eg:. float a = 10.0;

printf("%f", a); → $10.\underbrace{000000}_{\text{6 digits after precision}}$

float

↳ double ⇒ 8 bytes ⇒ (%lf) format specifier.

↳ long double ⇒ 10 bytes ⇒ (%Lf) format specifier.

Literals

* These are constants. In ANSI, alphabets with lower case and upper case, symbols have constant values called literals.

Eg:. 'A' → 65.