

## Topics :

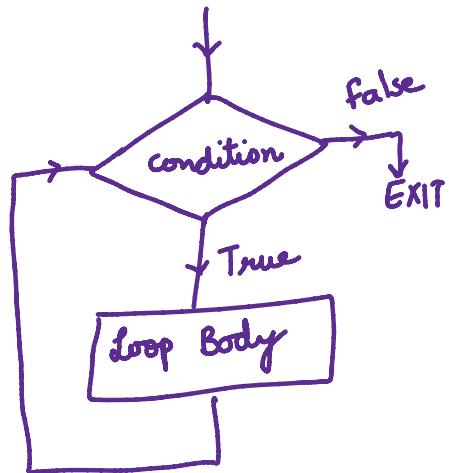
1. While and Do while loop
2. Pointer
3. 1 D Array
4. Questions

### While Loop.

```
while (condition) {
    //Loop body
}
```

Print numbers from 1 to 5 :

```
int i=1;           ← Initialisation
while (i <= 5) {
    cout << i;
    i++;           ← Updation
}
```



✓ FOR  $\equiv$  WHILE

↑  
how many  
times loop  
should run  
(No. of iterations)

(Syntax)

10 times

1 to 10

1 to 5.

51 to 100

•      1 + 2 + 3 + 4 + 5

•      10 + 11 + 12 + 13 + 14 + 15

Sum of nos from 10 to 15.

$$10 + \underline{11} + \underline{12} + 13 + 14 + 15$$

$$\text{Sum} = 0$$

$$0 + 10$$

$$+ 11 \\ \underline{6 \text{ times}} \\ + 12$$

int sum = 0; ✓

for (int i=10; i<=15; i++) {

    sum += i; // sum = sum + i

}

cout << sum;

Using while loop.

int sum = 0;

int i = 10;

while (i <= 15) {

    sum += i; // sum = sum + i

    i++;

}

for (int i=<sup>10</sup><sub>10</sub>; i<=10; i--) {

    true  
    while (1) {

}

}

Sum of digits of a number

N = <sup>2</sup><sub>45</sub>

N = 263

4 + 5 = 9.

$$2 + 6 + 3 = 11$$

No. of iterations = 3

$$4 + 5 = 9$$

alpha-10

No. of iterations = 3

Sum = 0

2 times

No. of iterations = 2

$$N = 51436$$

No. of iterations = 5

int sum = 0  
N = 45

$$N = 8653$$

$$N \% 10 = 3$$

$$N \% 10 = 5 \checkmark$$

$$\text{sum} = 0 + 5 = 5$$

$$N = N/10 \Rightarrow 45/10 = 4$$

$$N = 4$$

$$N \% 10 = 4$$

$$\text{sum} = 5 + 4 = 9$$

$$N = N/10 \Rightarrow N = 0$$

$10 \rightarrow 0 \text{ to } 9$   
 $100 \rightarrow 0 \text{ to } 99$

$$N = 863$$

Sum = 0

digit =  $N \% 10 = 1$   
Sum =  $0 + 1 = 1$   
 $N = N/10$

$$N = 863$$

digit =  $N \% 10 = 3$   
Sum =  $1 + 3 = 4$

$$\begin{array}{r} 47 \\ 10 \overline{)473} \\ -40 \\ \hline 73 \\ -70 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 473 \\ 470 \\ \hline 3 \end{array}$$

$$\begin{array}{r} 8651 \\ 8650 \\ \hline 1 \end{array}$$

$$\text{Sum} = 1+3=4$$

(1)

$$N = N/10$$

$$N = 86$$

$$\text{digit} = N \% 10 = 6$$

$$\text{Sum} = 4+6=10$$

$$N = N/10$$

$$N = 8$$

$$\text{digit} = 8$$

$$\text{Sum} = 10+8=18$$

$$N = N/10$$

$$N = 0$$

$$\begin{matrix} 8 \\ 0.8 \\ \hline \end{matrix}$$

int sum = 0;

$\checkmark N \neq 0$

while ( $N > 0$ ) {

abcd

$$\text{int digit} = N \% 10;$$

$$\text{Sum} = \text{Sum} + \text{digit};$$

$$N = N/10;$$

}

cout << Sum;

$$N = 572 \checkmark$$

$$\text{Sum} = 0$$

$$\rightarrow \text{digit} = 2$$

$$\rightarrow \text{sum} = 0 + 2 = 2$$

$$\rightarrow N = N/10 \quad N = 57$$

$$N = 57 > 0 \checkmark$$

... -

$$N = 57 > 0 \quad \checkmark$$

$$\rightarrow \text{digit} = 7$$

$$\rightarrow \text{sum} = 2 + 7 = 9$$

$$\rightarrow N = N/10 \quad N = 5$$

$$N = 5 > 0 \quad \checkmark$$

$$\rightarrow \text{digit} = 5$$

$$\rightarrow \text{sum} = 9 + 5 = 14$$

$$\rightarrow N = N/10 \quad N = 0$$

$$\text{sum} + = (N \% 10)$$

$$N = 0 \quad \times$$

$$\text{Sum} \rightarrow 14$$

$$N^0 = -21$$

$$N = \text{abs}(N)$$

digit

if  $(N < 0) \{$

$$N = N * -1;$$

$$-21 * -1$$

$$21$$

}

### Reverse of a number

$$N = 21$$

$$\text{o/p: } 12$$

$$N = 165$$

$$\text{o/p: } 561$$

$$N = \overbrace{\begin{array}{ccc} 5 & 6 & 3 \\ \uparrow & \uparrow & \uparrow \\ ? & & N \% 10 \end{array}}$$

$$(Rev * 10) + \text{digit}$$

     ✓

$$+ Rev = 0 \quad n * 10 + 7$$

$$N = \boxed{23} \checkmark$$

$$N \% 10 = 7$$

$$N = N/10$$

$$N = 23 \checkmark$$

$$\underline{N \% 10 = 3}$$

$$N = N/10$$

$$N = 2$$

$$N \% 10 = 2$$

$$N = N/10$$

$$Rev = 3.$$

4

$$\begin{array}{l}
 \text{Rev} = 0 \quad 0 * 10 + 7 \\
 \text{Rev} = \underline{\underline{7}} \quad 7 * 10 + 3 \\
 \text{Rev} = \underline{\underline{73}} \quad 73 * 10 + 2 \\
 \text{Rev} = \underline{\underline{732}}
 \end{array}$$

$(Rev * 10) + \text{digit}$

34

$$Rev = \underline{\underline{(3)}} * 10$$

$$+ 4$$

$$\underline{57} = 50 + 7$$

$$321 = 300 + \underline{20} + 1$$

$$\begin{array}{l}
 \text{Rev} = 52 \\
 \text{Rev} = 52 * 10 + 1 \\
 = 520 + 1 \\
 = 521
 \end{array}$$

$$\begin{array}{l}
 \text{Rev} = 52 * 10 + 1 \\
 = 520 + 1 \\
 = 521
 \end{array}$$

$$\text{Rev} = \text{Rev} * 10 + \text{digit}$$

~~N = 57~~ ✓

~~N / 10 = 7~~

Rev = 0

$$\begin{aligned}\text{Rev} &= 0 * 10 + 7 \\ &= 0 + 7 = 7\end{aligned}$$

N = N / 10

N = 5

N / 10 = 5

N = N / 10      5 / 10 = 0

Rev = 7 \* 10 + 5  
= 70 + 5 = 75

```
int rev = 0;
while (N > 0) {
    int digit = N / 10;
    rev = rev * 10 + digit;
    N = N / 10;
}
```

cout << rev;

N = 965

rev = 0

N > 0 ✓

digit = 5

rev = 0 \* 10 + 5 = 5

N = N / 10      9 6

N > 0

digit = 6

$$\begin{aligned}\text{rev} &= 5 * 10 + 6 \\ &= 56\end{aligned}$$

N = N / 10      9

N > 0

digit = 9

$$\begin{aligned}\text{rev} &= 56 * 10 + 9 \\ &= 569\end{aligned}$$

N = N / 10

$N = N/10$  (96)

$N = N/10$  (9)

$\overbrace{N = N/10}^{\sim \sim \sim}$   
 $\overbrace{N=0}^{=}$

569

for (`int rev=0; N>0; N=N/10`) {  
    `int digit = N%10;`  
    `rev = rev*10 + digit;`

}

Check if a number is palindrome

Palindrome:  $no = rev$

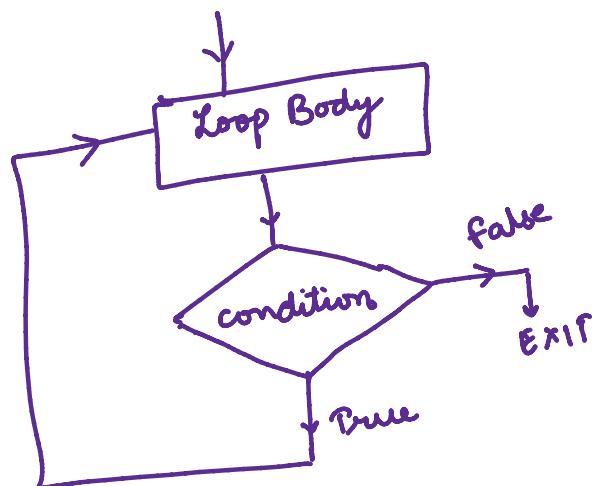
$121 \leftarrow$   
 $rev = 121 \leftarrow$

121 is palindrome

Do while

`do {`

`} while ( condition );`



Print 1 to 5.

`int i=1;`  
`do {`

$i=1$

`Print 1`  
`i++`       $i=2$

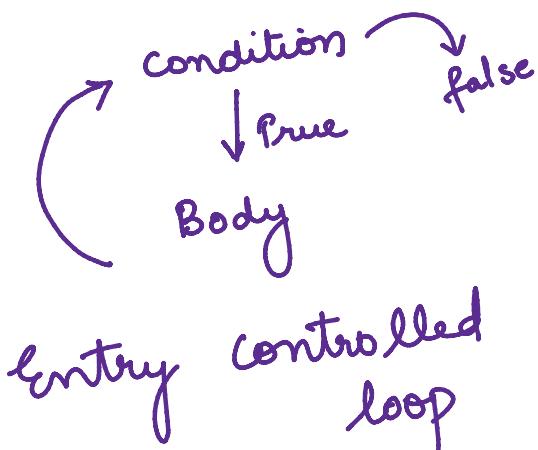
```

int i = 1;
do {
    cout << i;
    i++;
} while (i <= 5);

```

$i++ \quad i=2$   
 $2 \leq 5 \checkmark$   
 Print 2  
 $i++ \quad i=3$   
 $3 \leq 5 \checkmark$   
 Print 3  
 $i++ \quad i=4$   
 $4 \leq 5$   
 Print 4  
 $i++ \quad i=5$   
 $5 \leq 5 \times$   
 Print 5  
 $i++ \quad i=6$   
 $6 \leq 5$  false .

### while

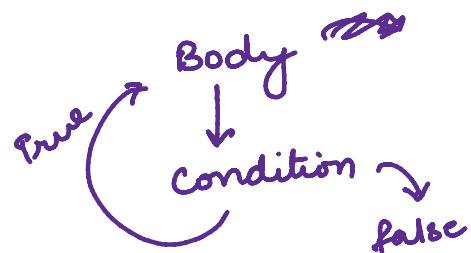


```

int i = 1;
while (i > 5) {
    cout << i;
    i++;
}

```

### Do while



exit controlled loop.

$i=1$   
 $i > 5$   
 $i > 5$  false X  
 no output

~~$i++$~~   
~~}~~

```

int i=1;
do {
    cout<<i;
    i++;
} while (i>5)

```

$i = 1$   
 Print 1  
 $i++ \quad i = 2$   
 $2 > 5 \quad \text{false } \times$

(o/p: 1)

MC:	show menu
1:	+
2:	-
3:	*
4:	/
9:	q

## Pointers

Variables which store addresses

```

int a;  

float b;  

char c;  

String s;

```

datatype \* ptr;

int \* ptr;

$\& \Rightarrow$  address.

int a = 5;



int \* ptr = & a

$\text{int* ptr = \& a}$

address



$\&(\text{var}) = \text{address of var}$   
m/m loc of var

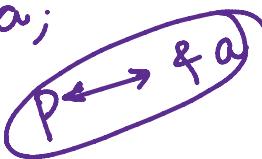
char ch;  
 $\text{char* ptr} = \& \text{ch};$   
 $\text{cout} \ll \text{ch}$

ch → Value of the character

$\& \text{ch}$  → Address of the character

int a = 7;  
 $(\text{int*})\text{p} = \& \text{a};$

$\text{int* p};$   
 $\text{p} = \& \text{a};$



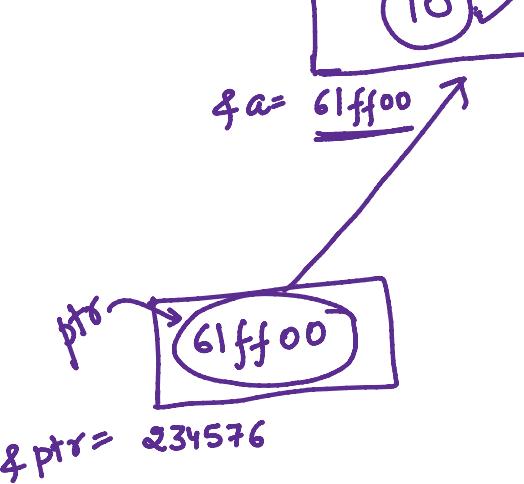
④ p

a → Value of the variable  
 $\& \text{a}$  → Address of the variable  
p → Address of the variable  
 $* \text{p}$  → Value of the variable

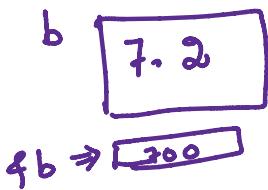
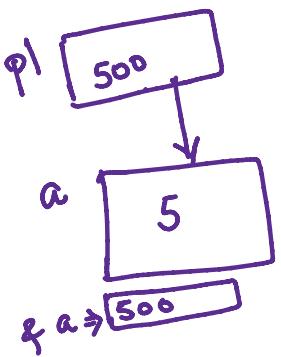
int a = 10;  
 $\text{int* ptr} = \& \text{a}$

$\text{a} \longleftrightarrow * \text{ptr}$   
 $\& \text{a} \longleftrightarrow \text{ptr}$

a  
 $\& \text{a} = \underline{\underline{61ff00}}$  ↗  
4 var



... - & ptr .



$\& \text{ptr} = \dots$

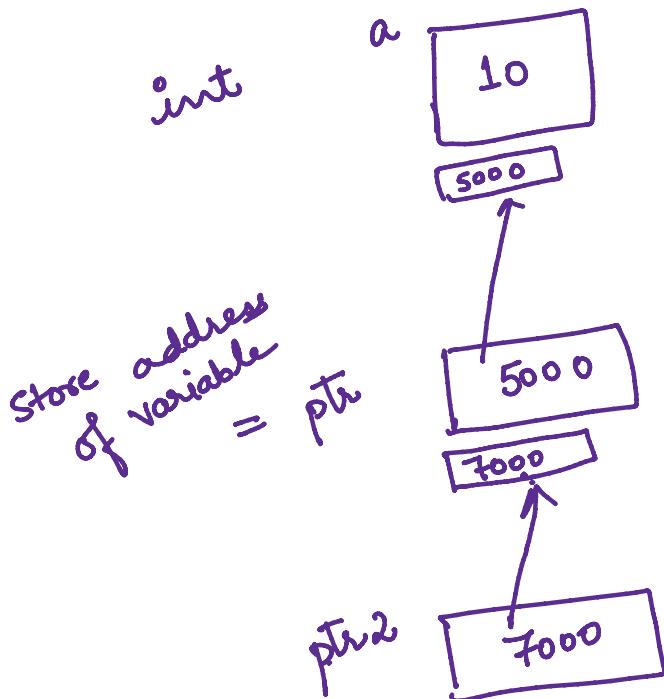
Address of  $\text{ptr} = \& \text{ptr}$ .

$*$   $\Rightarrow$  Value present at that address

$a \rightarrow 5$   
 $b \rightarrow 7.2$   
 $*p1$

$\text{int } *p1 = \& a;$

$p1$  and  $\& a$   
 $*p1$  and  $a$



$\text{int } a = 10;$   
 $\text{int } * \text{ptr} = \& a;$   
 $\text{int } ** \text{ptr2} = \& \text{ptr}$

Pointers to a pointers

## Pointer Arithmetic

Adding,

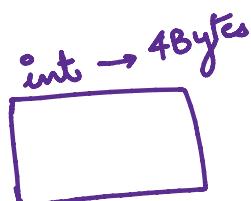
Subtracting  
 $(\dots - \dots)$

values

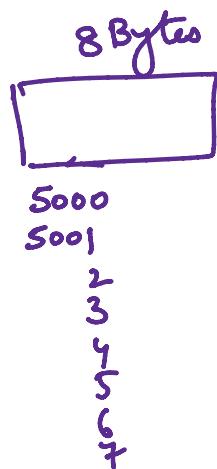
Adding ,      Subtracting  
                        → arrays.

eg:

$$\text{ptr} = 5000 \\ \text{ptr} + 1 \rightarrow 5001$$



eg:  $\text{ptr} = 5000$       int \* ptr  
~~ptr~~       $\text{ptr} + 1 \Rightarrow 5004$   
                     $\text{ptr} + 2 \Rightarrow$  next integer



double \* ptr  
ptr + 1 ⇒ next double  
 $\text{ptr} + 1 \Rightarrow 5008$

$\text{ptr} + 1$

$\Rightarrow (\text{ptr}) + \underline{1 * (\text{size of the variable})}$