Lecture - 15

Programming in C

⇒ Loops

Conditional
↳ if - else
Switch - case
goto →
<conio.h>

⇒ <math.h>
↓
Sqrt( ) ✓
Sin( )
⋮

Loop : Repetition of a particular block

3 types
- for loop ✓
- while loop ✓
- do-while loop ✓

Loop :
- Start
  - How many times the loop will Execute
  - Break / Termination Command / Condition

(A) FOR - Loop :

↳ We set the Start point and termination point in beginning of the loop.

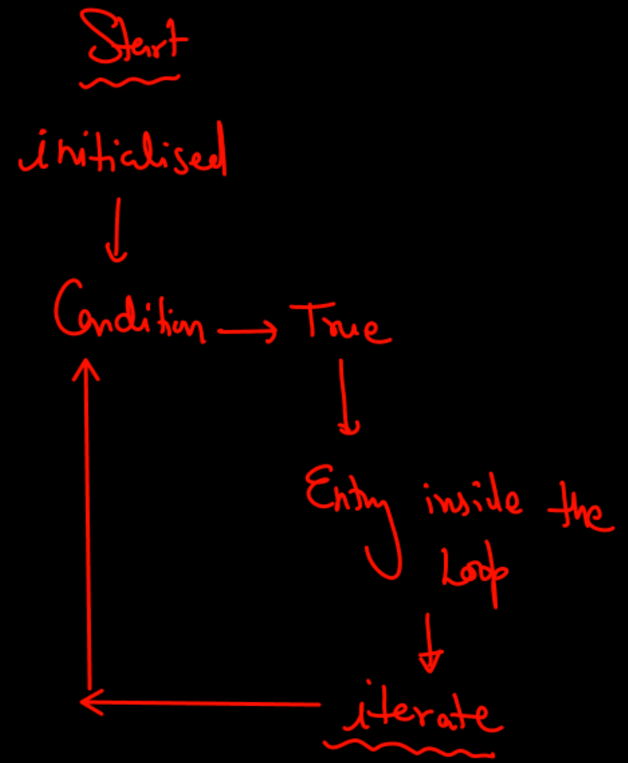
Syntax

```
for ( initialization ; Condition ; iteration / updation ) {
        // Body of the loop
}
```

Ex :

```
for ( int i=0; i<5; i++) {
        printf ( "%d", i);
}
```

init — Condition — update



Write a program to print 'hello' 3 times.

```
for (int i=0; i<3; i++) {
    printf("Hello");
}
```

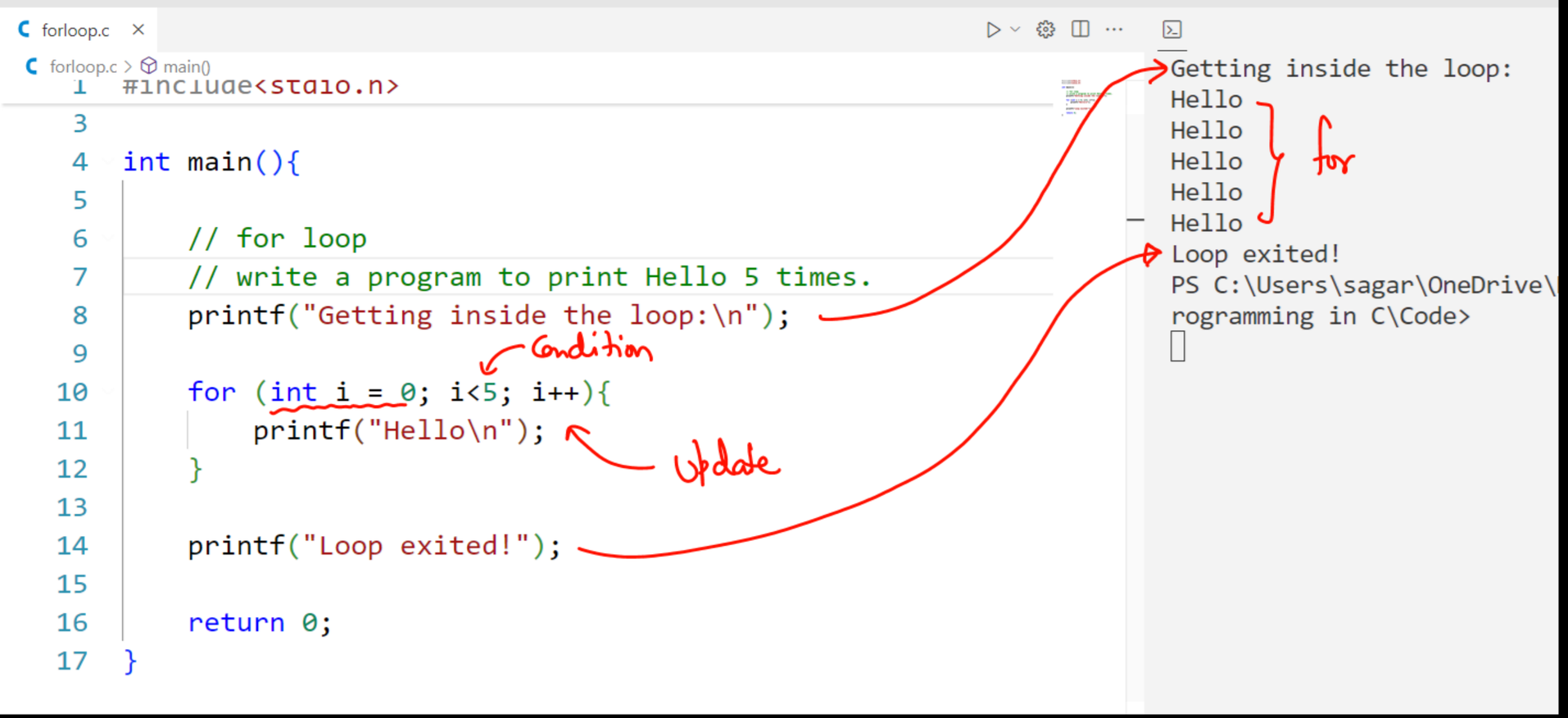
Start = 0
(i)

Condition ⇒ $i < 3$ — True
↳ Entry

Updation = i++

$i = 0 \not\rightarrow \not< 3$

Case		Output
(1)	$i = 0$, $i < 3$ (True) $0 < 3$ (True)	Hello
	i++ ⇒ $i = 1$	
(2)	$i = 1$, $i < 3$ (True)	Hello
	i++, $i = 2$	
(3)	$i = 2$, $i < 3$ (True)	Hello
	i++ ⇒ $i = 3$	
(4)	$i = 3$, $i < 3$ $3 < 3$ (False)	Terminate the loop


forloop.c
forloop.c > main()
#include<stdio.h>
int main(){
// for loop
// write a program to print Hello 5 times.
printf("Getting inside the loop:\n");
Condition
for (int i = 0; i<5; i++){
printf("Hello\n");
Update
}
printf("Loop exited!");
return 0;
}
Getting inside the loop:
Hello
Hello
Hello
Hello
Hello
for
Loop exited!
PS C:\Users\sagar\OneDrive\
rogramming in C\Code>

Write a program to print the multiplication table using 'for' loop :

num → int

loop → i = 1, i < 11

→ num X i

Common

iteration

12 x 1 = 12 ← result [n * i]

12 x 2 = 24

⋮

input (n) → 12 x 10 = 120

i = 1, i < 11;

forloop.c | multiplicationtableusingforloop.c

multiplicationtableusingforloop.c > main()

```c
#include<stdio.h>
#include<conio.h>
int main(){
    int num;
    printf("Enter the number to print table:\n");
    scanf("%d", &num);
    for (int i = 1; i<11; i++){
        printf("%d X %d = %d \n",num,i, num*i);
    }
    return 0;
}
```

```
Enter the number to print table:
12
12 X 1 = 12
12 X 2 = 24
12 X 3 = 36
12 X 4 = 48
12 X 5 = 60
12 X 6 = 72
12 X 7 = 84
12 X 8 = 96
12 X 9 = 108
12 X 10 = 120
PS C:\Users\sagar\OneDrive\Desktop
nd\Programming in C\Code>
```

Write a program to print first 'n' positive even number. → 2, 4, 6, 8, 10, 12, 14 .... n

n = integer input

```
for (int i=2; i<=n; i+=2){
    printf ("%d ", i);
}
```

Dry Run

i = 2, n = 10

Output

(a) i=2, i<=10 → 2

i+=2 ← i=i+2

i = 2+2 = (4)

(b) i=4, i<=10, (True) → 4

↳ i+=2, i=6

(c) i=6, i<=10 (True) → 6

↳ i+=2, i=i+2 ⇒ 8

(d) i=8, i<=10 (True) → 8

↳ i+=2, i=10

(e) i=10 i<=10 (True) → 10

↳ i+=2, i=12

(f) i=12 i<10 (False) → Terminate

final o/p

2
4
6
8
10

Even Number

forloop.c | multiplicationtableusingforloop.c | npositive.c

npositive.c > main()

```c
#include<stdio.h>
int main(){
    int num;
    printf("Enter the number you want to print the
    even list: ");
    scanf("%d", &num);
    int i=0;
    for (i; i<=num; i+=2){
        printf("%d \n", i);
    }
    return 0;
}
```

```
Enter the number you want to print the even list: 20
0
2
4
6
8
10
12
14
16
18
20
PS C:\Users\sagar\OneDrive\Desktop\Daily Notes\Aditi
hand\Programming in C\Code>
```

Odd Number

oddnumseries.c > main()

```c
#include<stdio.h>

int main(){
    int num;
    printf("Enter the number you want to print the
    odd series: ");
    scanf("%d", &num);
    for (int i = 1; i<=num; i+=2){
        printf("%d ", i); // odd + even = odd (1 + 2
        = 3, 3+2 = 5, 5+2 = 7 ... )
    }
    printf("\nSuccessful");
    return 0;
}
```

```
Enter the number you want to print the odd series:20
1 3 5 7 9 11 13 15 17 19
Successful
PS C:\Users\sagar\OneDrive\Desktop\Daily Notes\Aditi
and\Programming in C\Code>
```

Q WAP to print the A.P. till 'n' terms. where the value of 'a1', d and 'n' taken from user.

$AP = a_1, \; a+d, \; a+2d, \; a+3d \ldots \; \underbrace{a+(n-1)d}_{n^{th}\text{ term}}$

a_1 → first

Common difference = d

$a_{50} = (a+49d)$

$a_{49} = (a+48d)$

$(a + 49d)$

a → Common

49 → (n) ← Change

d ← Common

input = n (int), a (int), d (int)

```
for ( int i=0, i<n; i++){
    printf("%d ", a + (i*d));
```

⇒ $\sum_{i=1}^{n} AP \Rightarrow a + (\Delta i \times d)$ ← linear change (unidirectional Change)

Δi ← loop

File Edit Selection View Go Run Terminal Help

Code

forloop.c | multiplicationtableusingforloop.c | npositive.c | oddnumseries.c | printingAP.c

printingAP.c > main()

```c
#include<stdio.h>

int main(){
    int a, d, n; // (assuming that the progression is integeral)
    printf("Enter First term: \n");
    scanf("%d", &a);
    printf("Enter common difference: \n");
    scanf("%d", &d);
    printf("Enter the number of terms you want to print: \n");
    scanf("%d", &n);
    int i = 0;
    for (i; i<n; i++){
        int f = a + (i*d);
        printf("%d ",f);
    }
    printf("\nnumber of terms are: %d", i);
    return 0;
}
```

```
Enter First term:
2
Enter common difference:
5
Enter the number of terms you want to print:
10
2 7 12 17 22 27 32 37 42 47
number of terms are: 10
PS C:\Users\sagar\OneDrive\Desktop\Daily Notes\Aditi Chand\Programming in C\Code>
```

Code

0 0 Connect

Ln 10, Col 21 Spaces: 4 UTF-8 CRLF { } C Win32 Prettier

Live ENG 8:47 PM 9/29/2024