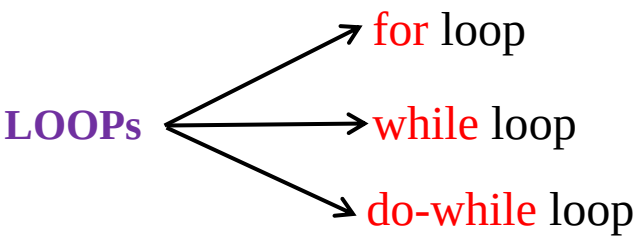
while Loop in C

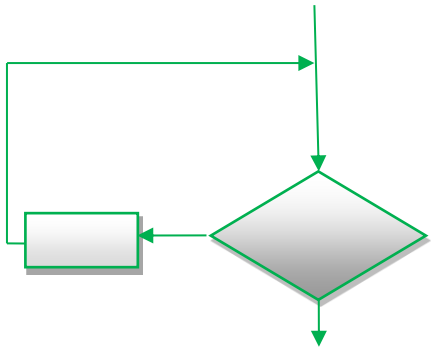
Loops programming construct is used to execute one or more instructions repeatedly until some condition is satisfied.

3 types of loops exist:



while LOOP

while loop also known as **Iteration.** Iteration logic is used when one or more instructions may be executed several times depending on some condition.



Iteration Flowchart

ITERATION

- Iteration comes from the word "reiterate", which means to repeat
- Iteration is a looping construct
- Iteration is a combination of decision and sequence and can repeat steps
- Iteration can be thought of as "while something is true, do this, otherwise stop"

while loop syntax

```
initialization;
while (condition)
{
.........
.........
.........
.          <-------------------  program statements
.
.
.
.........
increment or decrement;
}
```

The statements inside while loop gets executed until the condition become FALSE.

For loop also known as **iterative** statement. To iterate means to repeat. If we want to repeat execution of some action or statements several times, we use LOOPs.

Practice Programs

(i)

```
#include<stdio.h>
void main()
{
        system("color fc");

        int x;

        x = 0;
        while(x<5)
        {
          printf("Stephen Hawking \n");
         x++;
        }
}
```

(ii)

```
#include<stdio.h>
void main()
{
        int x, y;

        x=1;
        while(y = 5)
        {
           printf("Stephen Hawking \n");
           x++;
        }
}
```

(iii)

```
#include<stdio.h>
void main()
{
        int x, y = 10;

        x=2;
        while(y == 10)
        {
          printf("Stephen Hawking \n");
          x++;
        }
}
```

(iv)

```
#include<stdio.h>
void main()
{
        int i, x, y;
        x = 2;
        y = 3;

        i=2;
        while(x+y)
        {
          printf("Stephen Hawking \n");
          i++;
        }
}
```

(v)

```
#include<stdio.h>
void main()
{
        int i, x, y;
        x = 2;
        y = 3;

        i=2;
        while((x+y)>0)
        {
          printf("Stephen Hawking \n");
          i++;
        }
}
```

(vi)

```
#include<stdio.h>
void main()
{
        int i, x, y;
        x = 2;
        y = 3;

        i=2;
        while((x+y)<0)
        {
          printf("Stephen Hawking \n");
          i++;
        }
}
```

(vii)

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

        i=2;
        while(i<=5)
        {
          printf("Stephen Hawking \n");
          printf("Galaxy \n");
          i++;
   }
}
```

(viii)

```
#include<stdio.h>
void main()
{
        int i, x, y;


        for(i = 2; i<=5; i++)

          printf("Stephen Hawking \n");
          printf("Cosmologist \n");
          printf("Galaxy \n");
}
```

(ix)

```
#include<stdio.h>
void main()
{
         int i, x, y;

         i=2;
         while(i<=5)
         {
           printf("Stephen Hawking \n");
           printf("Cosmologist \n");
           printf("Galaxy \n");
           i++;
         }
}
```

Program explanations

Program 1

```
#include<stdio.h>

void main()
{
    system("color fc");

    int x;

    x = 0;
    while(x<5)
    {
        printf("Stephen Hawking \n");
        x++;
    }
}
```

```
x = 0;
while(x<5)
    {
        cout<<"Stephen Hawking"<<endl;
        x++;
    }
```

Value of x	Condition x<5	Output
0	0<5 True	Stephen Hawking
1	1<5 True	Stephen Hawking
2	2<5 True	Stephen Hawking
3	3<5 True	Stephen Hawking
4	4<5 True	Stephen Hawking
5	5<5 False	• Loop stops here as conditions becomes false • For loop come out of loop when condition becomes false • As long as condition is true, the statements inside for loop gets executed

Program 2

```
#include<stdio.h>

void main()
{
    int x, y;

    x=1;
    while(y = 5)
    {
        printf("Stephen Hawking \n");
        x++;
    }
}
```

x = 1;
while(y=5)
initial value of x = 1
y = 5 is condition
5 is put into y and 5 is non-zero. So, the condition is always true.
So gives infinite loop

Program 3

```
#include<stdio.h>

void main()
{
    int x, y = 10;

    x=2;
    while(y == 10)
    {
        printf("Stephen Hawking \n");
        x++;
    }
}
```

int x, y=10;
while (y = = 10)

10 = = 10 ⟹ after comparing LHS & RHS, this statement returns TRUE

So, the statement following for loop gets executed infinitely (∞)

Program 4

```c
#include<stdio.h>

void main()
{
    int i, x, y;
    x = 2;
    y = 3;

    i=2;
    while(x+y)
    {
        printf("Stephen Hawking \n");
        i++;
    }
}
```

x = 2;
y = 3;
i=2;
while(x+y)

condition x+y = 2+3 =5 is always true
So, this is infinite loop

Program 5

```c
#include<stdio.h>

void main()
{
    int i, x, y;
    x = 2;
    y = 3;

    i=2;
    while((x+y)>0)
    {
        printf("Stephen Hawking \n");
        i++;
    }
}
```

i=2;
while((x+y)>0)

Condition (x+y) > 0
(2+3) > 0 ⟹ 5 > 0 is always true.
So, this is also example of infinite (∞) loop

Program 6

```c
#include<stdio.h>

void main()
{
    int i, x, y;
    x = 2;
    y = 3;

    i=2;
    while((x+y)<0)
    {
        printf("Stephen Hawking \n");
        i++;
    }
}
```

i=2;
while((x+y) < 0))

Condition (x+y) > 0
(2+3) < 0 ⟹ 5 < 0 is FALSE.
So, there is no output

Program 7

```c
#include<stdio.h>

void main()
{
    int i;

    i=2;
    while(i<=5)
    {
       printf("Stephen Hawking \n");
       printf("Galaxy \n");
       i++;
    }
}
```

```
i=2;
while(i<=5)
      {
        cout<<"Stephen Hawking"<<endl;
        cout<<"Galaxy"<<endl;
        i++;
      }
```

Value of i	Condition i<=5	Output
2	2<=5 True	Stephen Hawking Galaxy
3	3<=5 True	Stephen Hawking Galaxy
4	4<=5 True	Stephen Hawking Galaxy
5	5<=5 True	Stephen Hawking Galaxy
6	6<=5 False	• Loop stops here as conditions becomes false • for comes out of loop when condition becomes false • As long as condition is true, the statements inside for loop gets executed