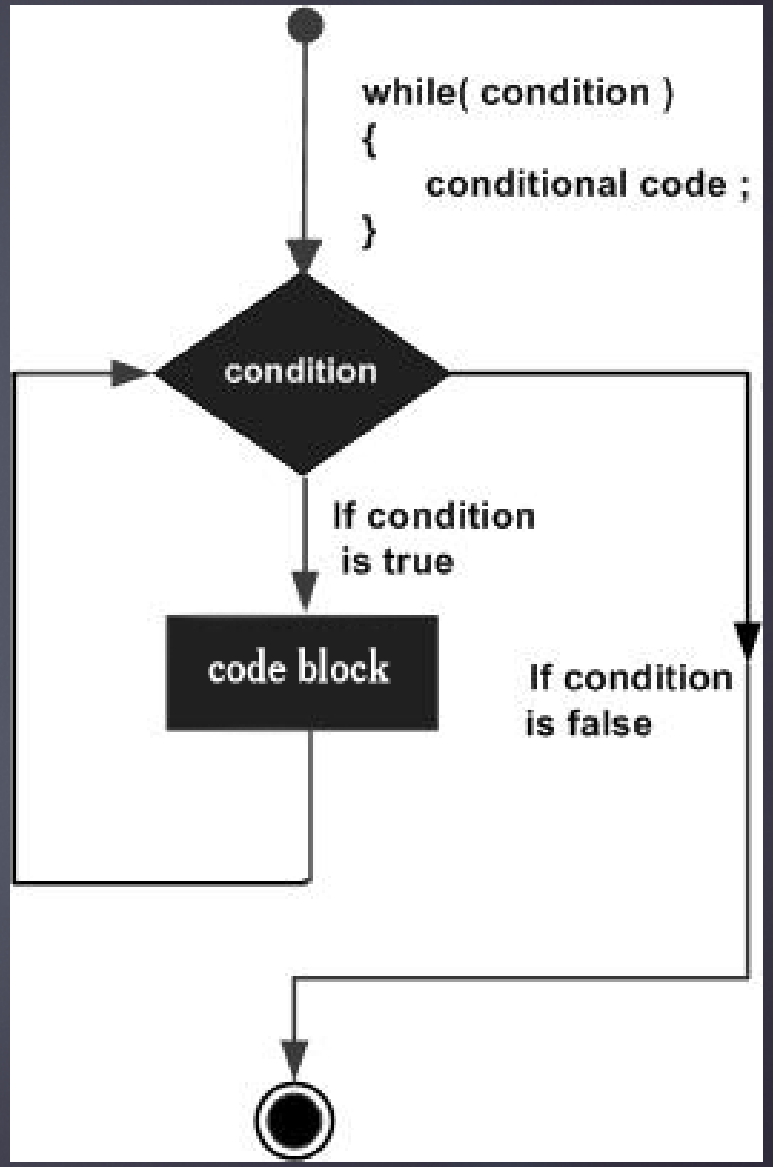
LOOPS

LECTURER: NADIA BINTE ASIF

While Loop

- The loop iterates while the condition is true.
- Condition expression is compulsory.
- While → without a body is possible.
- Initialization before loop
- Update statement → Inside loop body

```
while(condition) {
   statement(s);
}
```



```c
#include<stdio.h>

int main () {
/* local variable definition */
int a = 10;
/* while loop execution */
   while( a < 20 ) {
         printf("value of a: %d\n", a);
         a++;
    }
 return 0;
}
```

a=?	a<20?	Inside Loop Body	Update
10	True	value of a: 10	a = a+1= 10+1 =11
11	True	value of a: 11	a = 11+1 = 12
12	True	value of a: 12	a = 12+1 = 13
13	True	value of a: 13	a = 13+1 = 14
14	True	value of a: 14	a = 14+1 = 15
15	True	value of a: 15	a = 15+1 = 16
16	True	value of a: 16	a = 16+1 = 17
17	True	value of a: 17	a = 17+1 = 18
18	True	value of a: 18	a = 18+1 = 19
19	True	value of a: 19	a = 19+1 = 20
20	False		

```
#include<stdio.h>

int main(){
int i=1,number=0,b=9;
printf("Enter a number: ");
scanf("%d",&number);
while(i<=10){
    printf("%d \n",(number*i));
    i++;
}
return 0;
}
```

i = ?	i<=10 ?	Number =50 Loop Body	Update
1	True	Number*i = 50 * 1 = 50	i = i+1 = 2
2	True	50 * 2 = 100	2+1 =3
3	True	50 * 3 = 150	3+1 =4
4	True	50 * 4 = 200	4+1 = 5
5	True	50 * 5 = 250	5+1 = 6
6	True	50 * 6 = 300	6+1 = 7
7	True	50 * 8 = 400	7+1 = 8
8	True	50 * 9 = 450	8+1 = 9
9	True	50 * 10 = 500	9+1 =10
10	True	50 * 11 = 550	10+1 =11
11	False [break]		

```
1.#include<stdio.h>
2.void main ()
3.{
4.    int j = 1;
5.    while(j+=2,j<=10)
6.    {
7.        printf("%d ",j);
8.    }
9.    printf("%d",j);
10.}
```

Output

3 5 7 9 11

```
1.#include<stdio.h>
2.void main ()
3.{
4.    while()
5.    {
6.        printf("hello everyone");

7.    }
```

Output

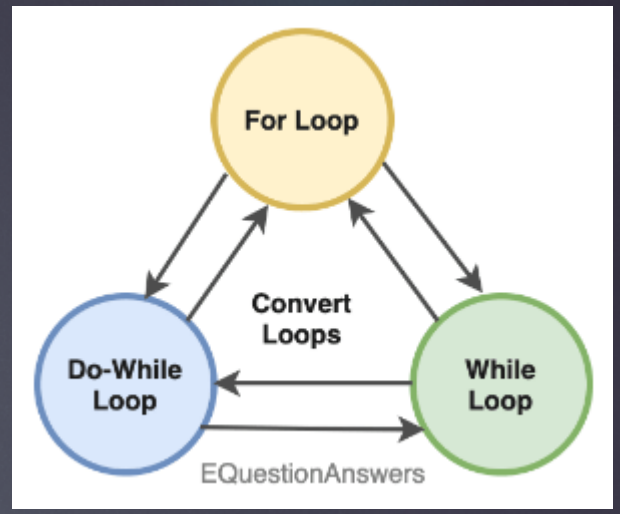
compile time error: while loop can't be empty

```
1.while(1){
2.//statement
3.}
```

If the expression passed in while loop results in any non-zero value then the loop will run the infinite number of times.

LOOP CONVERSIONS

```
/* For loop */
int i;
for(i = 0; i < 10; i++)
{
}
```




```
/* For loop converted to while loop */
int i = 0; /* <<< Initialization */
while(i < 10)
{
  i++;
}
```

Problems

1. C program to find sum of natural numbers from 1 to n
2. Program to count total digits in a given integer using loop
3. Program to find reverse of a number
4. Program to check palindrome number

```c
/**
 * C program to count number of digits in an integer
 */

#include <stdio.h>

int main()
{
    long long num;
    int count = 0;

    /* Input number from user */
    printf("Enter any number: ");
    scanf("%lld", &num);

    /* Run loop till num is greater than 0 */
```

```c
while(num != 0){
        /* Increment digit count */
        count++;

        /* Remove last digit of 'num' */
        num /= 10;
    }
    printf("Total digits: %d", count);

    return 0;
}
```

```c
/**
 * C program to find reverse of a number
 */

#include <stdio.h>

int main()
{
    int num, reverse = 0;

    /* Input a number from user */
    printf("Enter any number to find reverse: ");
    scanf("%d", &num);

    /* Repeat the till 'num' becomes 0 */
    while(num != 0)
    {
        /*
         * Increase place value of reverse and
         * add last digit to reverse
         */
        reverse = (reverse * 10) + (num % 10);

        /* Remove last digit from 'num' */
        num /= 10;
    }

    printf("Reverse = %d", reverse);

    return 0;
}
```

```c
/**
 * C program to check whether a number is palindrome or not
 */

#include <stdio.h>

int main()
{
    int n, num, rev = 0;

    /* Input a number from user */
    printf("Enter any number to check palindrome: ");
    scanf("%d", &n);

    /* Copy original value to 'num' to 'n'*/
    num = n;

    /* Find reverse of n and store in rev */
    while(n != 0)
    {
        rev = (rev * 10) + (n % 10);
        n  /= 10;
    }

    /* Check if reverse is equal to 'num' or not */
    if(rev == num)
    {
        printf("%d is palindrome.", num);
    }
    else
    {
        printf("%d is not palindrome.", num);
    }

    return 0;
}
```