Problem Solving and Programming

Loops

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Loops

There are three loops in C programming:

1. for loop

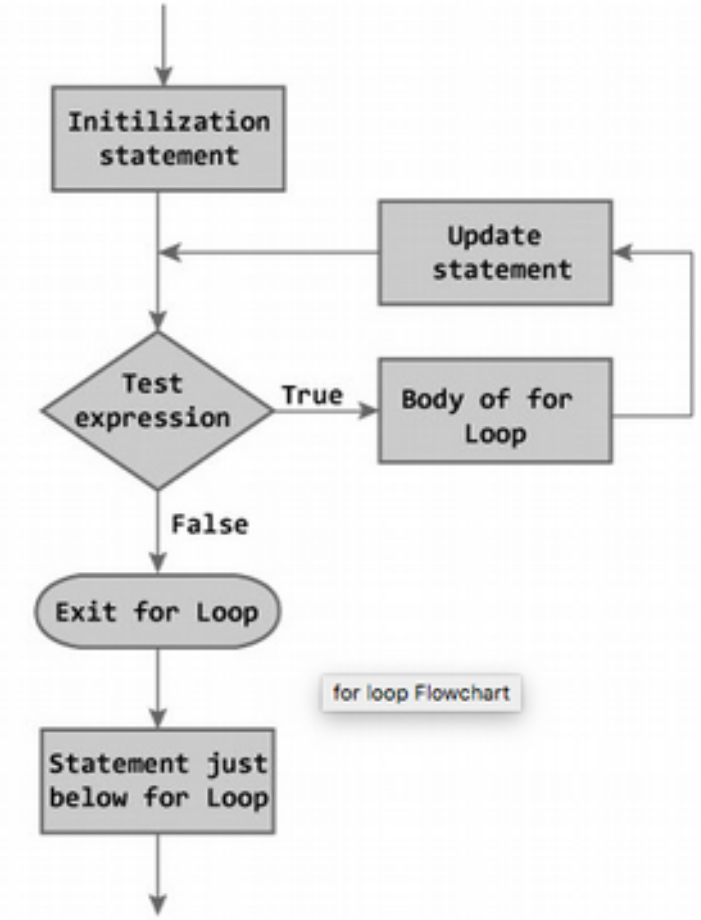
2. while loop

3. do...while loop

Loops are used in programming to repeat a specific block of code.

for Loop

```
for (initializationStatement; testExpression; updateStatement)
{
        // codes
}
```



How for loop works?

The initialization statement is executed only once.

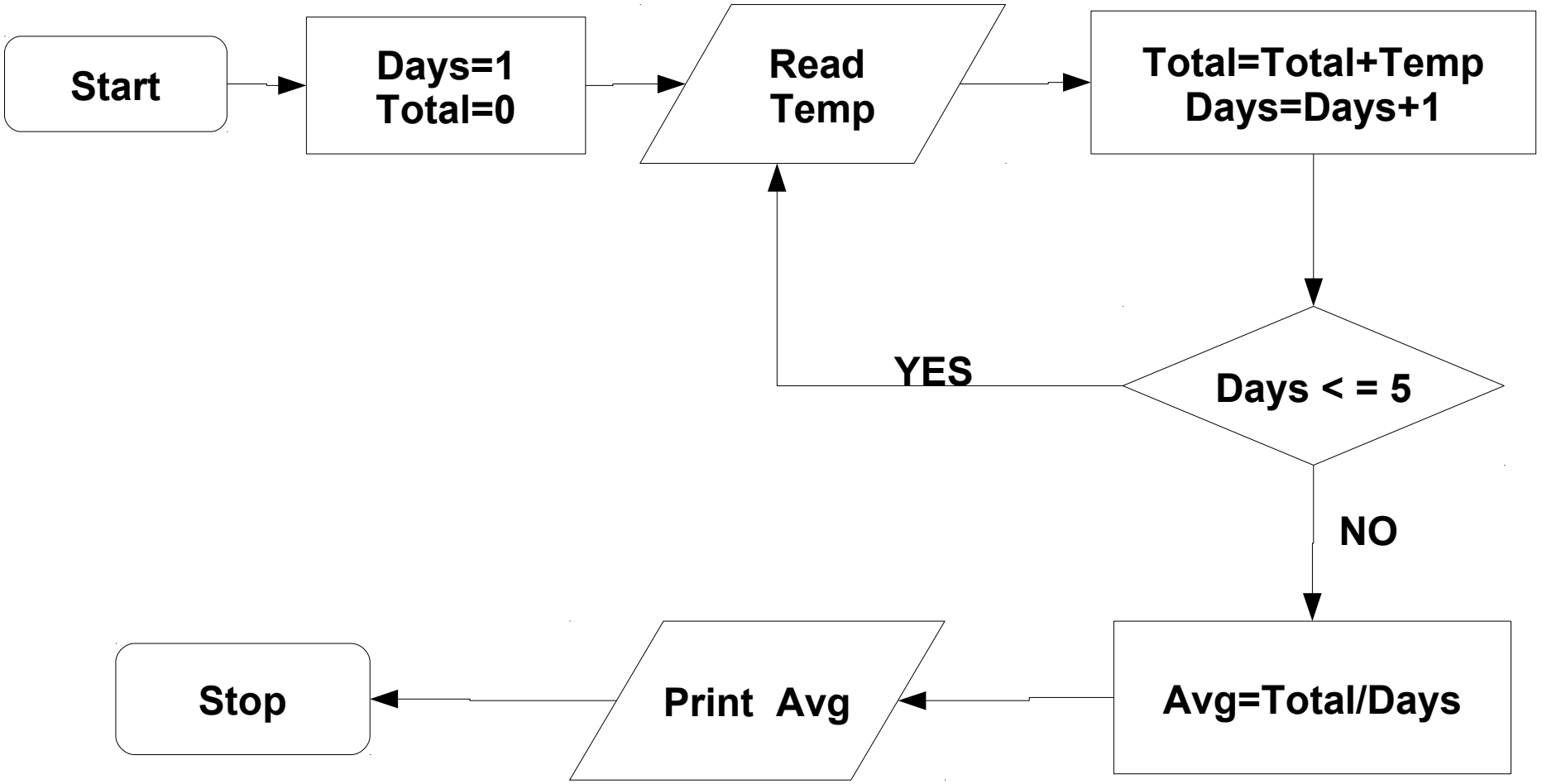
Then, the test expression is evaluated. If the test expression is false (0), for loop is terminated.

But if the test expression is true (nonzero), codes inside the body of for loop is executed and t expression is updated.

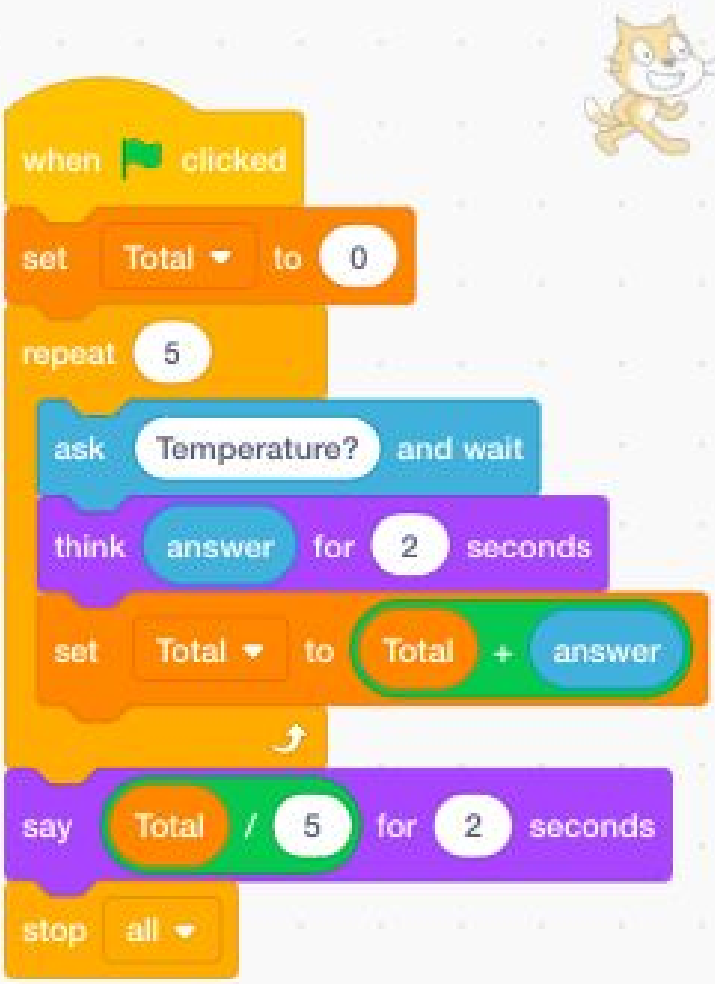
This process repeats until the test expression is false.

The for loop is commonly used when the number of iterations is known.

Problem-5: Read temperature for 5 days and print average



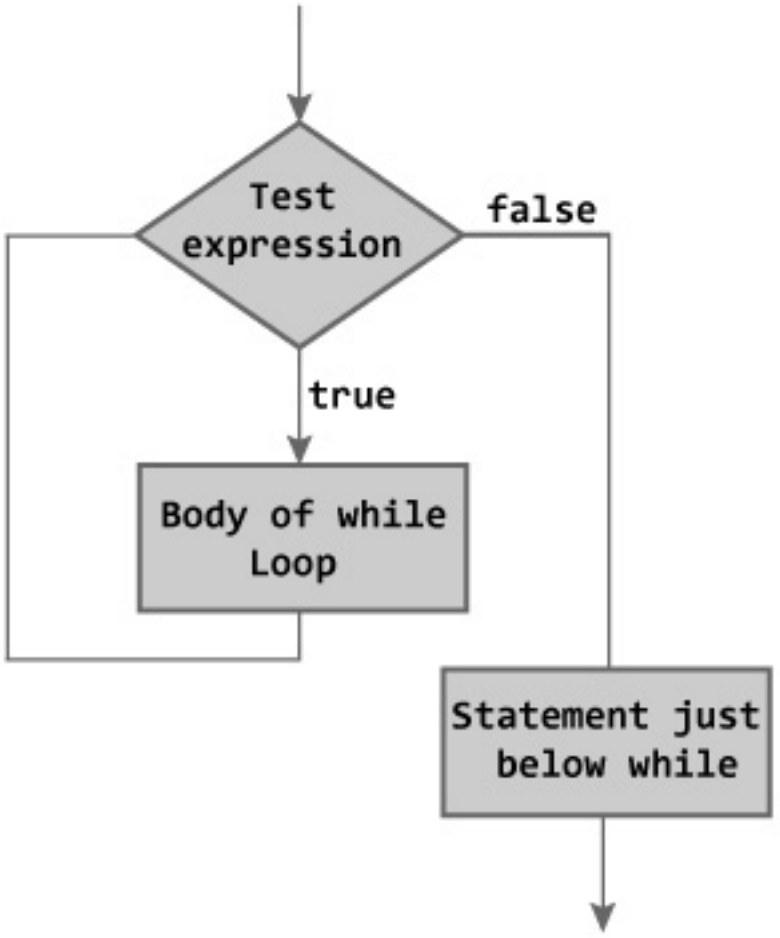
Program-5




```
#include <stdio.h>

int main(){
    int tmp=0,days=0,total=0;


for(days=0;days<5;days=days+1){
    printf("Enter tmp >");
    scanf("%d",&tmp);
    total=total+tmp;
}
printf("Average %.2f\n",
        (float)total/days);

return 0;
}
```

While loop


```
while (testExpression)
{
     //codes
}
```



How while loop works?

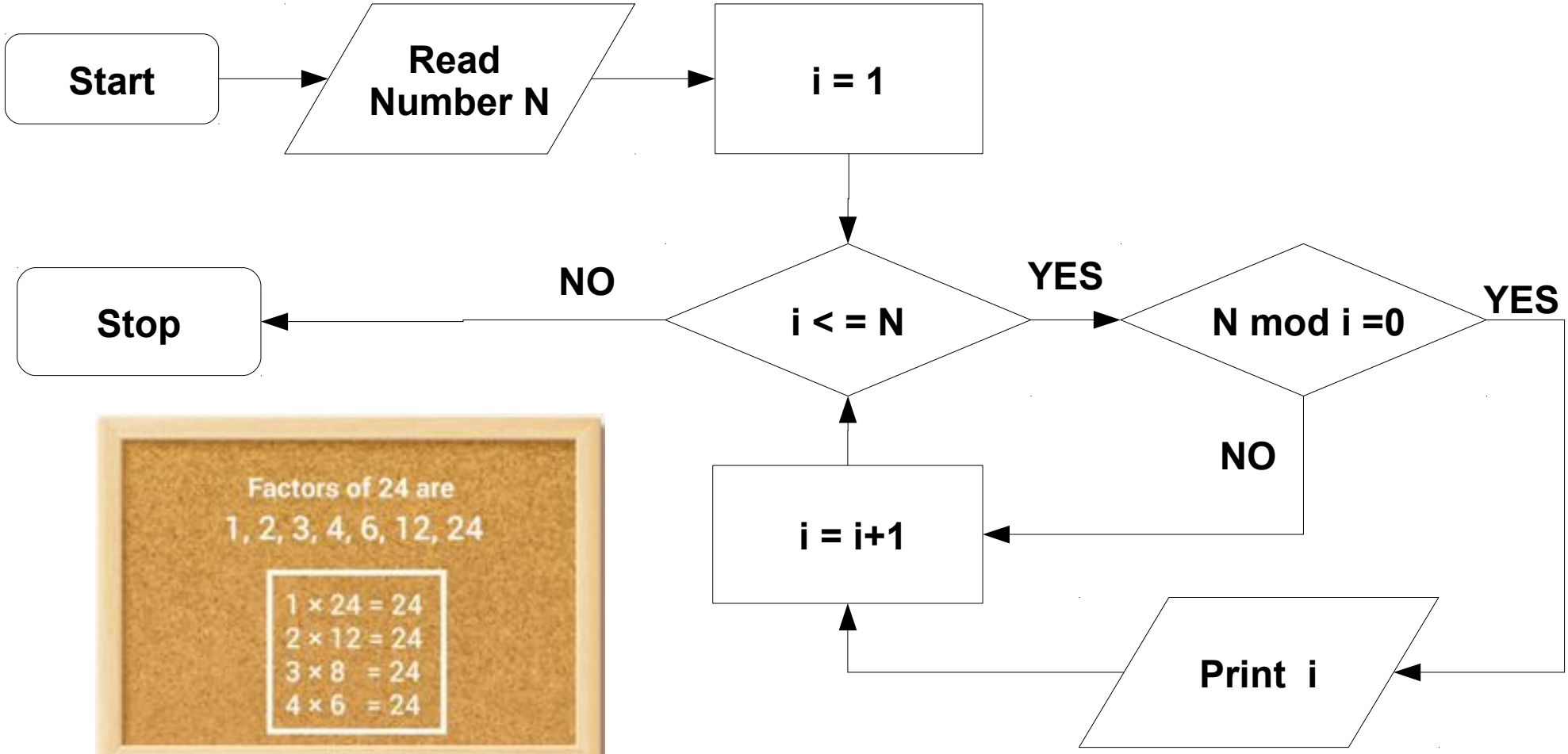
The while loop evaluates the test expression.

If the test expression is true (nonzero), codes inside the body of while loop are executed

The test expression is evaluated again. The process goes on until the test expression is false.

When the test expression is false, the while loop is terminated.

Problem: Write a C program to find factors of a given number



Factors – while loop

```
#include <stdio.h>
int main() {
   int number, i;
   printf("Enter a positive integer: ");
   scanf("%d",&number);
   printf("Factors of %d are: ", number);

   i=1;
   while(i<=number){
      if (number%i == 0) printf("%d ",i);
      i++;
   }

   printf("\n");
   return 0;
}
```

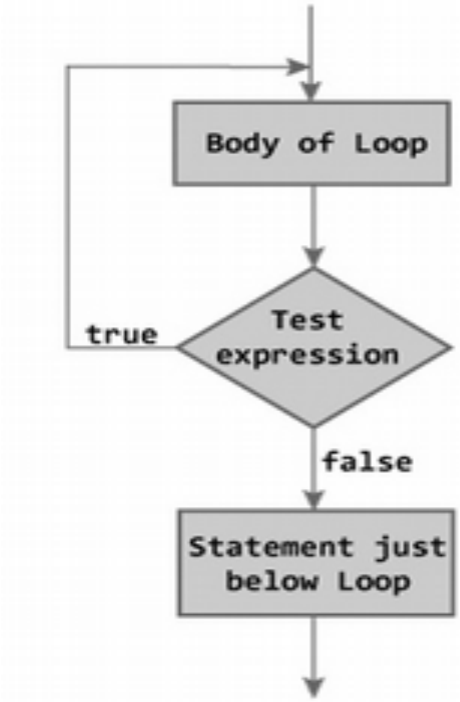
Factors – for loop

```
#include <stdio.h>
int main() {
  int number, i;
  printf("Enter a positive integer: ");
  scanf("%d",&number);
  printf("Factors of %d are: ", number);

  for(i=1; i <= number ; i++) {
    if (number%i == 0) printf("%d ",i);
   }

  printf("\n");
  return 0;
}
```

do...while loop

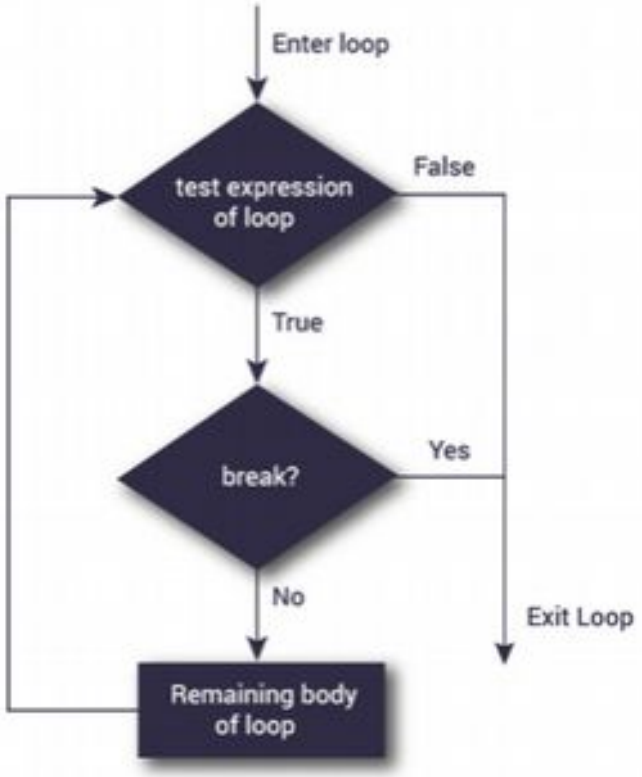
The do..while loop is similar to the while loop with one important difference. The body of do...while loop is executed once, before checking the test expression. Hence, the do...while loop is executed at least once.

```
do
{
    // codes
}
while (testExpression);
```



break Statement

The break statement terminates the loop (for, while and do...while loop) immediately when it is encountered. The break statement is used with decision making statement such as if...else.

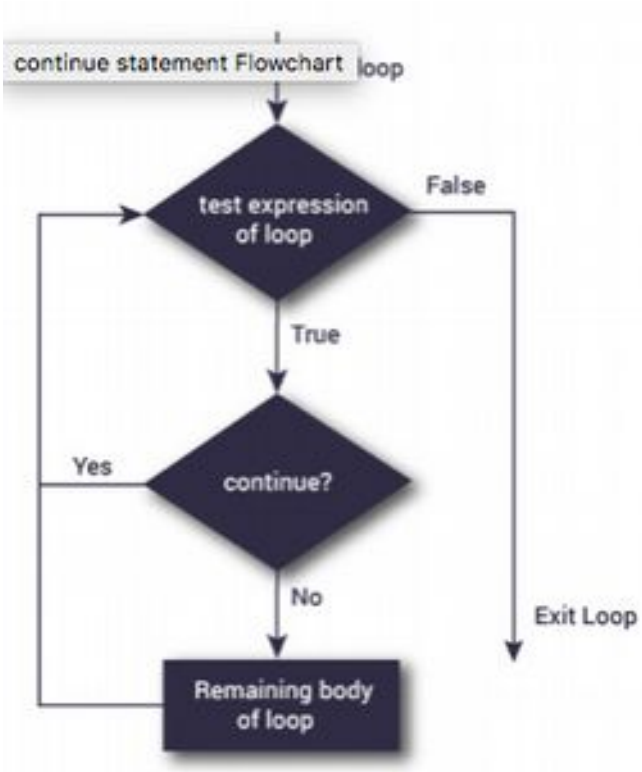



```
while (test Expression)
{
    // codes
    if (condition for break)
    {
        break;
    }
    // codes
}
```

```
for (init, condition, update)
{
    // codes
    if (condition for break)
    {
        break;
    }
    // codes
}
```

continue Statement

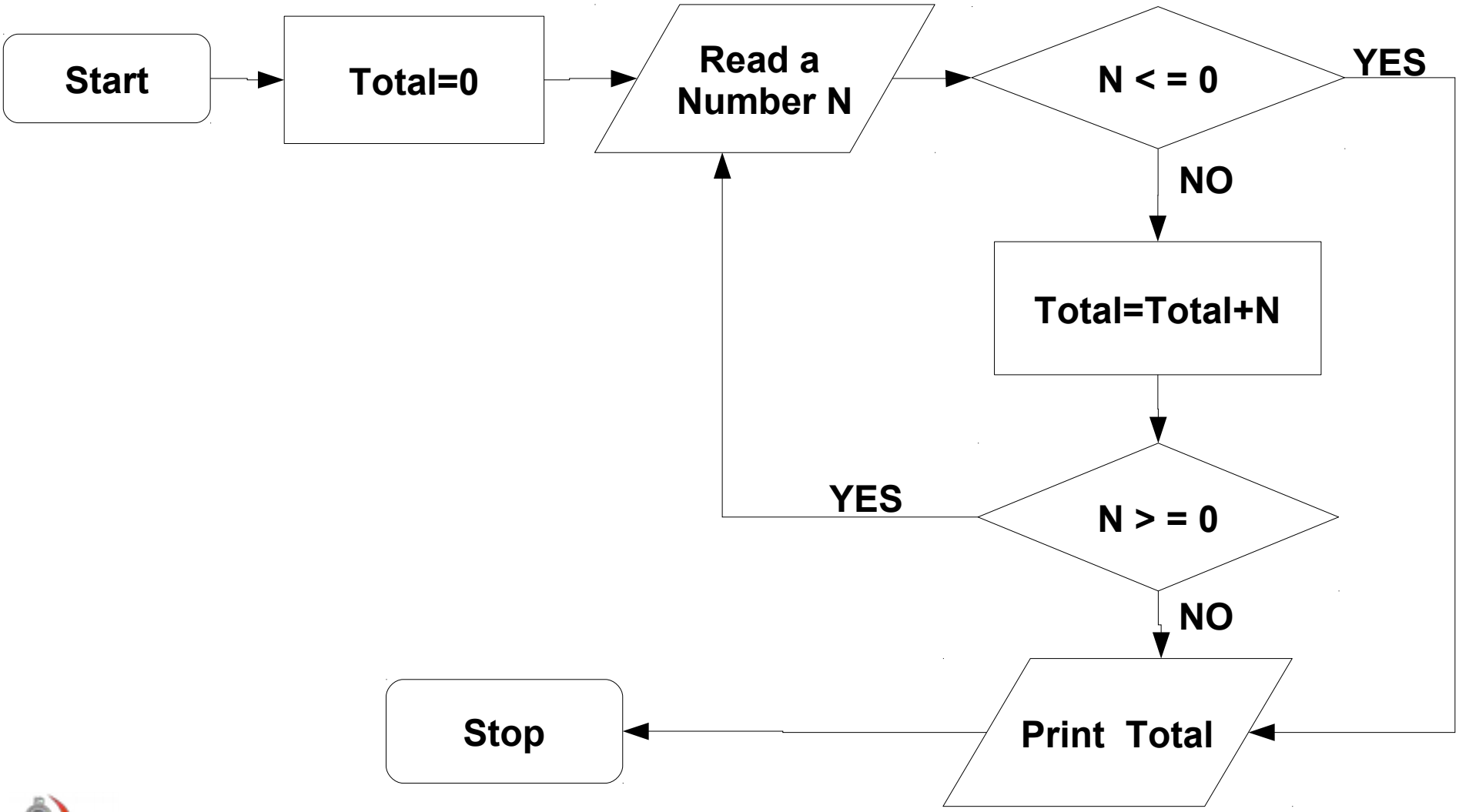
The continue statement skips some statements inside the loop. The continue statement is used with decision making statement such as if...else.




```
while (test Expression)
{
    // codes
    if (condition for continue)
    {
        continue;
    }
    // codes
}
```

```
for (init, condition, update)
{
    // codes
    if (condition for continue)
    {
        continue;
    }
    // codes
}
```

Problem: Write a program to calculate the sum of all given positive integers until we enter the 0 or a negative value.



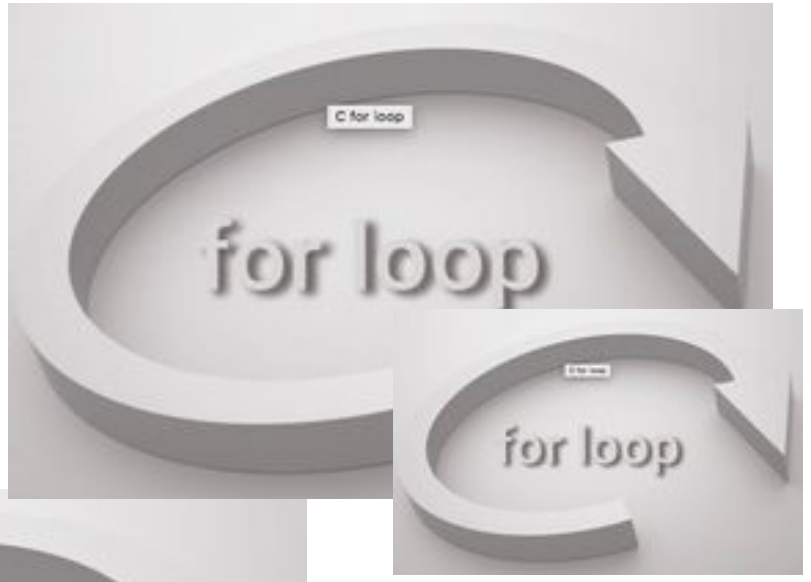
Total – do while loop

```
#include <stdio.h>

int main(){
int total=0,number=0;

do{
   printf("Enter a Number >");
   scanf("%d",&number);
   if (number<=0) break;
   total+=number;
}while(number>0);

printf("Total %d \n",total);
return 0;
}
```

Total – while loop

```
#include <stdio.h>

int main(){
int total=0,number=0;

printf("Enter a Number >");
scanf("%d",&number);

while(number>0){
  total+=number;
  printf("Enter a Number >");
  scanf("%d",&number);
}

printf("Total %d \n",total);
return 0;
}
```

Loop inside Loop

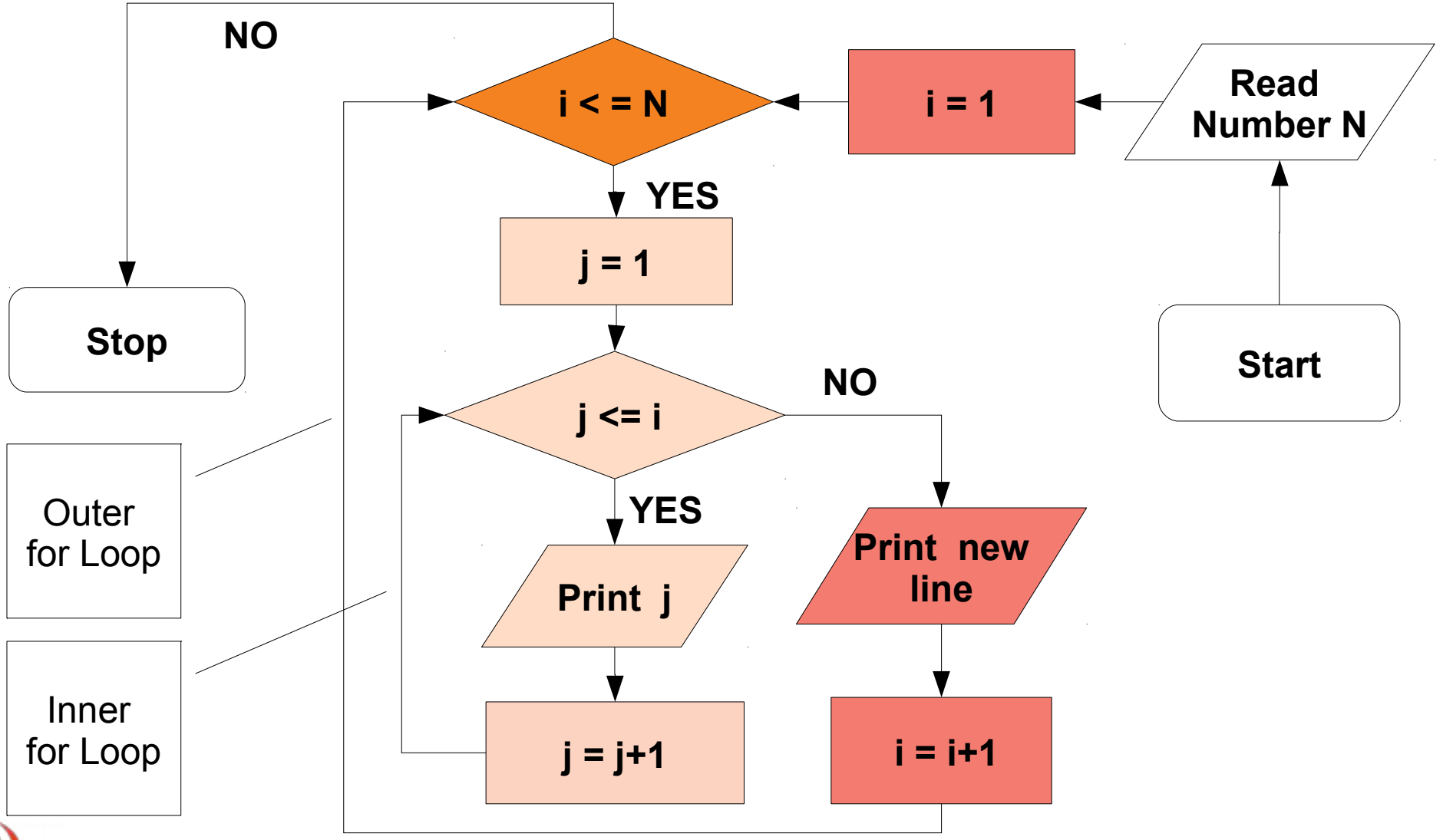


Problem

Write a program to print a number triangle after given the hight. For example when we enter number 5 the program should print the following number triangle.

1
12
123
1234
12345

Problem: Write a C program to print a number triangle



Problem: Write a C program to print a number triangle

```
#include <stdio.h>

int main(){
 int n=0;
 printf("Enter a number : ");
 scanf("%d",&n);

 for(int i=1;i<=n;i++){
  for(int j=1;j<=i;j++){
   printf("%d",j);
  }
  printf("\n");
 }

}
```

Problems?

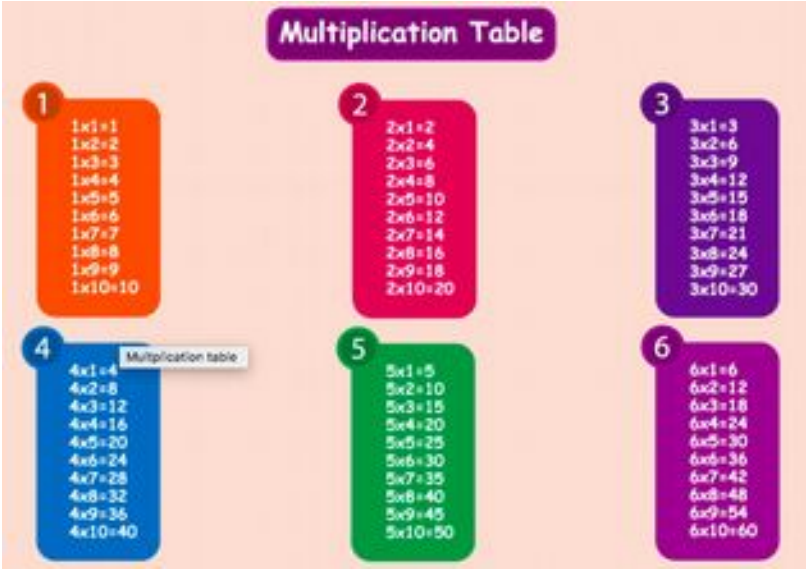
1) Write a program to calculate the sum of all given positive integers until we enter the 0 or a negative value.

2) Write a program to determine the given number is a prime number

3) Write a C Program to Reverse a Number

4) Write a C program to find factors of a given number

5) Write a C Program to print multiplication tables from 1 to n



Discussion