

Structured Programming Language (CSE-1271)

Course Instructor: Mohammed Mamun Hossain Assistant Professor, Dept. of CSE, BAUST

Outline

- 1. Control Statements
- 2. For loop
- 3. While loop
- 4. Do-while loop
- 5. Loop using goto statement

```
#include<stdio.h>
int main()
    int i, myVariable;
     scanf ("%d", &myVariable);
    printf("\nValue of my variable is %d\n\n", myVariable);
    if (myVariable %2 == 0)
                                              "D:\VU\Book\C\ME\Slide\Control Statements\sequence.exe"
         printf("This is even\n\n");
                                              Value of my variable is 7
    else
                                              This is odd
         printf("This is odd\n\n");
                                              Line 1 - You entered 7
                                              Line 2 - You entered 7
                                              Line 3 - You entered 7
                                              Line 4 - You entered 7
                                              Line 5 - You entered 7
    i=1;
                                              Line 6 - You entered 7
                                              Line 7 - You entered 7
    while (i<=myVariable)
         printf ("Line %d - You entered %d\n", i, myVariable);
         i=i+1;
    return 0;
```

```
#include<stdio.h>
int main()
    int i, myVariable;
                                                             Sequential statements
    scanf ("%d", &myVariable);
    printf("\nValue of my variable is %d\n\n", myVariable)
    if (myVariable %2 == 0)
        printf("This is even\n\n");
                                                             Selection statements
    else
        printf("This is odd\n\n");
    i=1;
    while (i <= my Variable)
                                                            Loop statements
        printf("Line %d - You entered %d\n",i,myVariable);
        i=i+1;
    return 0;
```

Control the flow of execution in a program or function.

There are three kinds of execution flow:

- **Sequence**: The execution of the program is sequential.
- **Selection**: A control structure which chooses alternative to execute.
- * Repetition: A control structure which repeats a group of statements.

- 1. Write a C program that will print numbers from 1 through 10 on screen.
- 2. Write a C program that will print all numbers from 1 through n, where 1<=n<=1000.
- 3. Write a C program that will print "Welcome to our CSE family" 1000 times on screen.
- 4. Write a C program that will print all even numbers between 1 and 100.
- 5. Write a C program that will print the value of s where,
 - a) s = 1+2+3+....+n
 - b) s = 2+4+8+.... up to n^{th} term.
 - c) s = 1+....+n+(n+2)+(n+4)+...+u, where $1 \le n \le u$
 - d) s = 5+11/2+6+13/2+... up to n^{th} term.
- 6. Write a C program that will print all prime numbers between 1 and 100.

```
int main()
                         #include<stdio.h>
                                                 #include<stdio.h>
    int n;
                         int main()
                                                 int main()
    n=1;
    printf("%d ",n);
                             printf("1 ");
                                                     printf("1 2 3 4 5 6 7 8 9 10\n");
   n=n+1;
                             printf("2 ");
    printf("%d ",n);
                             printf("3 ");
                                                     return 0;
    n=n+1;
                             printf("4 ");
    printf("%d ",n);
                             printf("5 ");
                             printf("6 ");
    n=n+1:
                             printf("7 ");
   printf("%d ",n);
                             printf("8 ");
    n=n+1;
                             printf("9 ");
    printf("%d ",n);
                             printf("10\n");
    n=n+1;
    printf("%d ",n);
                             return 0;
    n=n+1;
    printf("%d ",n);
                                 "D:\VU\Book\C\ME\Slide\Control Statements\situation1.exe"
    n=n+1:
   printf("%d ",n);
                                2 3 4 5 6 7 8 9 10
    n=n+1;
    printf("%d ",n);
                              Process returned 0 (0x0)
                                                           execution time: 3.187 s
    n=n+1;
                              Press any key to continue.
    printf("%d\n",n);
    return 0;
```

```
int main()
                                  #include<stdio.h>
                                  int main()
    int n;
    n=1;
                                       int n;
    printf("%d ",n);
                                       n=1;
    n=n+1;
    printf("%d ",n);
                                       again:
    n=n+1;
    printf("%d ",n);
                                       printf("%d ",n);
    n=n+1;
    printf("%d ",n);
                                       n=n+1;
    n=n+1;
    printf("%d ",n);
                                       goto again;
    n=n+1;
    printf("%d ",n);
                                       return 0;
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
                                     "D:\VU\Book\C\ME\Slide\Control Statements\situation1.exe"
    printf("%d ",n);
                                    2 3 4 5 6 7 8 9 10
    n=n+1;
                                                        execution time : 3.187 s
                                   Process returned 0 (0x0)
    printf("%d\n",n);
                                   Press any key to continue.
    return 0;
```

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
   int n;
    n=1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

```
#include<stdio.h>
int main()
   int n;
    n=1;
    again:
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
    int n;
   n=1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
   n=1;
    again:
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output

```
int main()
                              #include<stdio.h>
                              int main()
    int n;
    n=1;
                                  int n;
   printf("%d ",n);
                                  n=1;
    n=n+1;
    printf("%d ",n);
                                  again:
    n=n+1;
   printf("%d ",n);
                                 printf("%d ",n);
    n=n+1;
   printf("%d ",n);
                                  n=n+1;
    n=n+1;
    printf("%d ",n);
                                  goto again;
    n=n+1;
   printf("%d ",n);
                                  return 0;
    n=n+1;
    printf("%d ",n);
    n=n+1;
   printf("%d ",n);
                                         Output
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
    int n;
    n=1;
    printf("%d ",n);
   n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

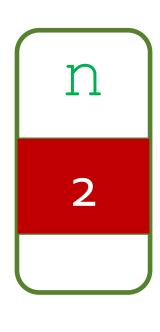
```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
    int n;
    n=1;
    printf("%d ",n);
    n=n+1;
  printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```



Output

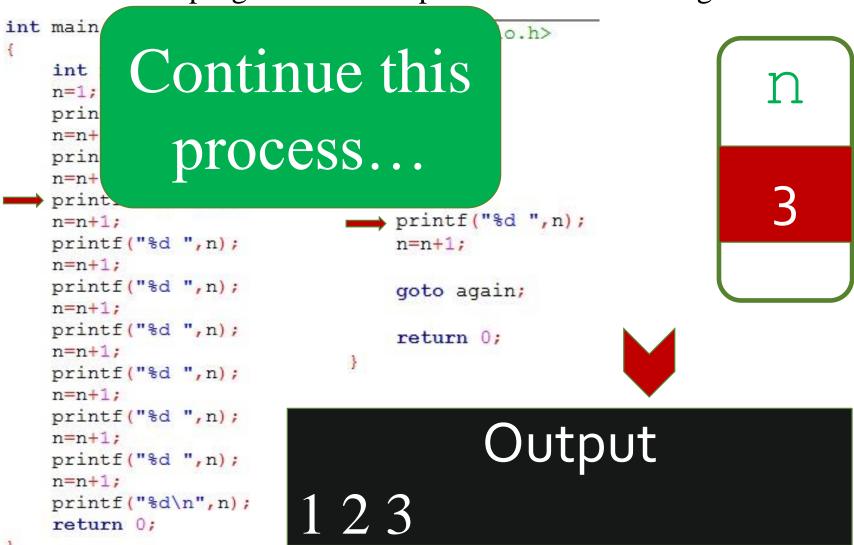
```
int main()
                              #include<stdio.h>
                              int main()
    int n;
    n=1;
                                  int n;
   printf("%d ",n);
                                  n=1;
    n=n+1;
  printf("%d ",n);
                                  again:
    n=n+1;
   printf("%d ",n);
                                 printf("%d ",n);
    n=n+1;
   printf("%d ",n);
                                  n=n+1;
   n=n+1;
    printf("%d ",n);
                                  goto again;
    n=n+1;
   printf("%d ",n);
                                  return 0;
    n=n+1;
    printf("%d ",n);
    n=n+1;
   printf("%d ",n);
                                         Output
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
    int n;
    n=1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
   n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output 1 2



1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
    int n;
    n=1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1:
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
   n=n+1;
    printf("%d\n",n);
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
                                   10
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output 1 2 3 4 5 6 7 8 9

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
    int n;
    n=1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1:
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
   printf("%d\n",n);
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
                                   10
   printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output 1 2 3 4 5 6 7 8 9 10

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
{
    int n;
    n=1;
    printf("%d ",n);
    n=n+1;
```

Terminate this program

```
printf("%d ",n);
n=n+1;
printf("%d ",n);
n=n+1;
printf("%d ",n);
n=n+1;
printf("%d ",n);
n=n+1;
printf("%d\n",n);
return 0;
```

```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
                                   10
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output 1 2 3 4 5 6 7 8 9 10

1. Write a C program that will print numbers 1 through 10 on screen.

```
int main()
{
    int n;
    n=1;
    printf("%d ",n);
    n=n+1;
```

Terminate this program

```
printf("%d ",n);
n=n+1;
printf("%d ",n);
n=n+1;
printf("%d ",n);
n=n+1;
printf("%d ",n);
n=n+1;
printf("%d\n",n);
return 0;
```

```
#include<stdio.h>
int main()
    int n;
    n=1;
    again:
                                    11
    printf("%d ",n);
    n=n+1;
    goto again;
    return 0;
```

Output 1 2 3 4 5 6 7 8 9 10

```
int main()
   int n;
                          Continue...
   n=1;
   printf("%d ",n);
   n=n+1;
                           again:
                                                     11
  Terminate
                           printf("%d ",n);
                           n=n+1;
this program
                           goto again;
   printf("%d ",n);
                           return 0;
   n=n+1;
   printf("%d ",n);
   n=n+1:
   printf("%d ",n);
                                  Output
   n=n+1;
   printf("%d ",n);
   n=n+1;
                    1234567891011
   printf("%d\n",n);
   return 0;
```

```
int main()
                         #include<stdio.h>
                                                #include<stdio.h>
                                                int main()
                         int main()
    int n;
    n=1;
                                                     int n;
                             int n;
    printf("%d ",n);
                                                     n=1;
                             n=1;
    n=n+1;
                                                     again:
    printf("%d ",n);
                             again:
    n=n+1;
                                                     printf("%d ",n);
    printf("%d ",n);
                                                     n=n+1;
                             printf("%d ",n);
    n=n+1;
    printf("%d ",n);
                             n=n+1;
                                                     if(n <= 10)
    n=n+1;
                                                       goto again;
    printf("%d ",n);
                             goto again;
    n=n+1;
                                                     printf("\n");
    printf("%d ",n);
                                                     return 0;
                             return 0;
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d\n",n);
    return 0;
```

```
int main()
                            #include<stdio.h>
                                                     #include<stdio.h>
                                                     int main()
                            int main()
    int n;
    n=1;
                                                          int n;
                                int n;
    printf("%d ",n);
                                                          n=1;
                                n=1;
    n=n+1;
                                                          again:
    printf("%d ",n);
                                again:
    n=n+1;
                                                          printf("%d ",n);
    printf("%d ",n);
                                                          n=n+1;
                                printf("%d ",n);
    n=n+1:
    printf("%d ",n);
                                n=n+1;
                                                          if(n <= 10)
    n=n+1;
                                                            goto again;
    printf("%d ",n);
                                goto again;
    n=n+1;
                                                          printf("\n");
    printf("%d ",n);
                                                          return 0;
                                return 0;
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
                                    "D:\VU\Book\C\ME\Slide\Control Statements\situation1.exe"
    printf("%d ",n);
                                   2 3 4 5 6 7 8 9 10
    n=n+1;
                                  Process returned 0 (0x0)
                                                       execution time : 3.187 s
    printf("%d\n",n);
                                  Press any key to continue.
    return 0;
```

```
int main()
                                                     #include<stdio.h>
                          #include<stdio.h>
                          int main()
                                                     int main()
    int n;
    n=1;
                              int n;
    printf("%d ",n);
                              n=1;
                                                           int n;
    n=n+1;
    printf("%d ",n);
                              again:
                                                           for(n=1; n<=10; n++)
    n=n+1;
                              printf("%d ",n);
    printf("%d ",n);
                              n=n+1;
    n=n+1:
                                                                 printf("%d ",n);
    printf("%d ",n);
                              if(n \le 10)
    n=n+1;
                                 goto again;
    printf("%d ",n);
    n=n+1;
                              printf("\n");
    printf("%d ",n);
                              return 0;
                                                           return 0;
    n=n+1;
    printf("%d ",n);
    n=n+1;
    printf("%d ",n);
    n=n+1;
                                  "D:\VU\Book\C\ME\Slide\Control Statements\situation1.exe"
    printf("%d ",n);
                                 2 3 4 5 6 7 8 9 10
    n=n+1;
                                                    execution time : 3.187 s
                                Process returned 0 (0x0)
    printf("%d\n",n);
                                Press any key to continue.
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
    for (n=1; n<=10; n++)
        printf("%d ",n);
    return 0;
```

```
#include<stdio.h>
       int main()
       1
                                     Increment/
             int
                   Start
                            Check?
                                     Decrement
                   (Step-0)
                             (Step-1)
                                        (Step-3)
             for (n=1; n<=10;
                   printf("%d ",n);
True(step-1)
   (Step-2)
   If check
False(step-1)
             return 0;
```

```
#include<stdio.h>
                                               #include<stdio.h>
       int main()
                                               int main()
                                    Increment/
                                                     int n;
             int
                   Start
                           Check?
                                    Decrement
                   (Step-0)
                            (Step-1)
                                      (Step-3)
            for (n=1; | n<=10;
                                                     for (n=1; n<=10; n++)
                  printf("%d ",n);
True(step-1)
                                                           printf("%d ",n);
   (Step-2)
                                                   If step-1 False, loop terminate
   If check
                                                      and execute next statement
False(step-1)
            return 0;
                                                     return 0;
```

1. Write a C program that will print numbers 1 through 10 on screen.

Step-1 will be true or false.

❖ True: When n is 1 to 10

❖ False: When n is 11

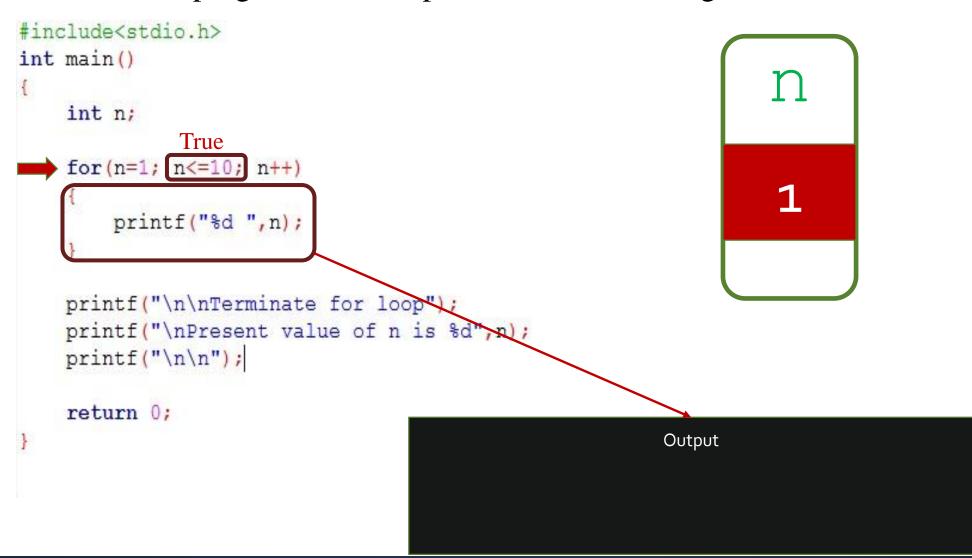
```
#include<stdio.h>
int main()
     int n;
     for (n=1; n<=10; n++)
          printf("%d ",n);
   If step-1 False, loop terminate
      and execute next statement
     return 0;
```

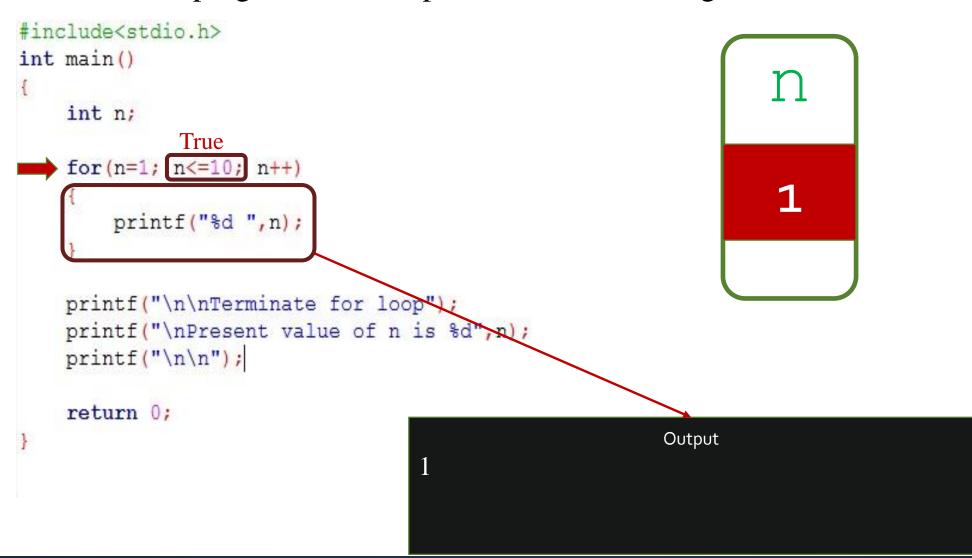
```
#include<stdio.h>
int main()
    int n;
    for(n=1; n<=10; n++)
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
                                                       Output
```

```
#include<stdio.h>
int main()
    int n;
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
                                                       Output
```

```
#include<stdio.h>
int main()
    int n;
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
                                                       Output
```

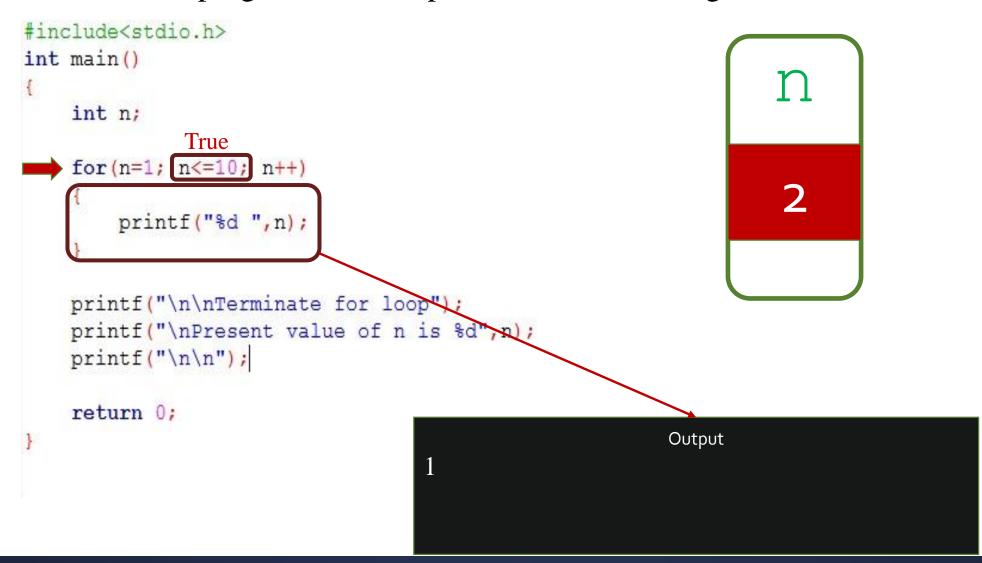
```
#include<stdio.h>
int main()
    int n;
              True
    for (n=1; n<=10; n++)
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
                                                        Output
```

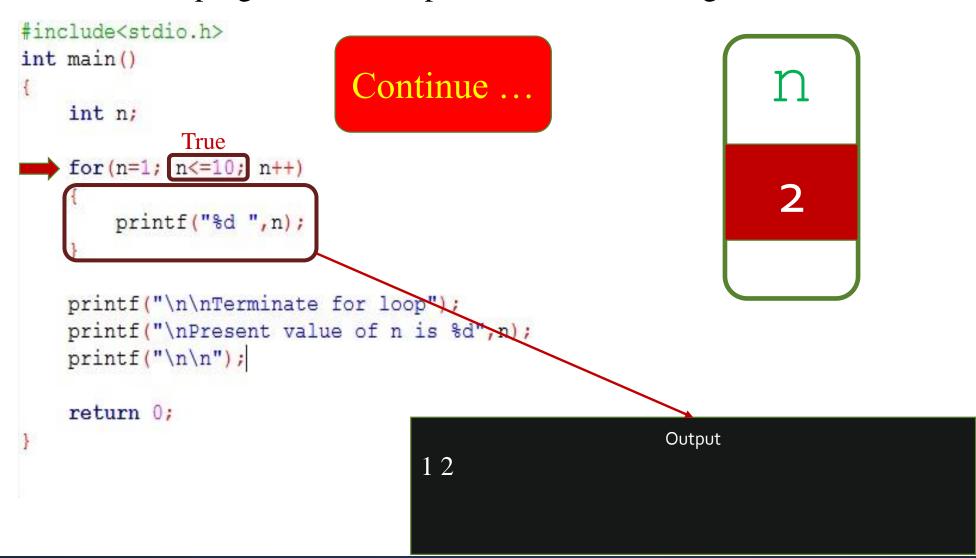


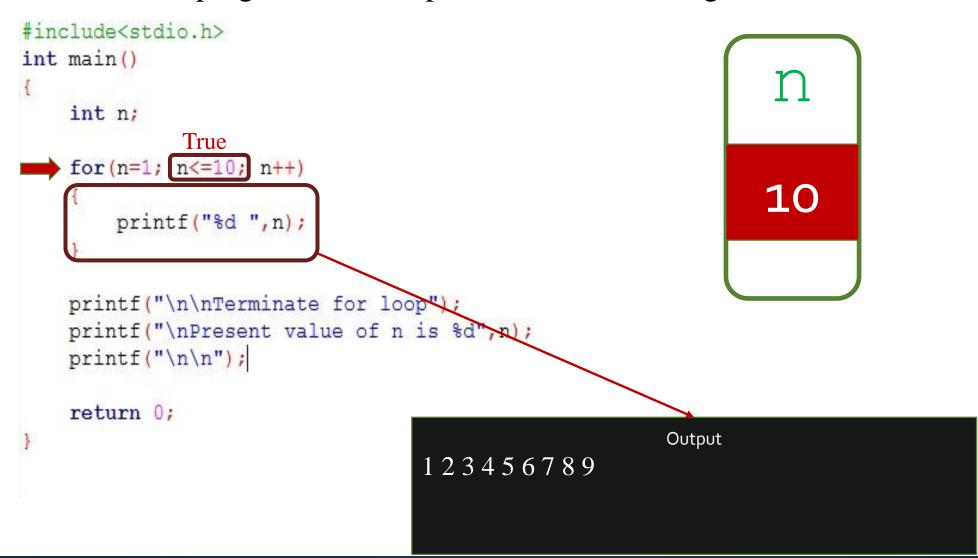


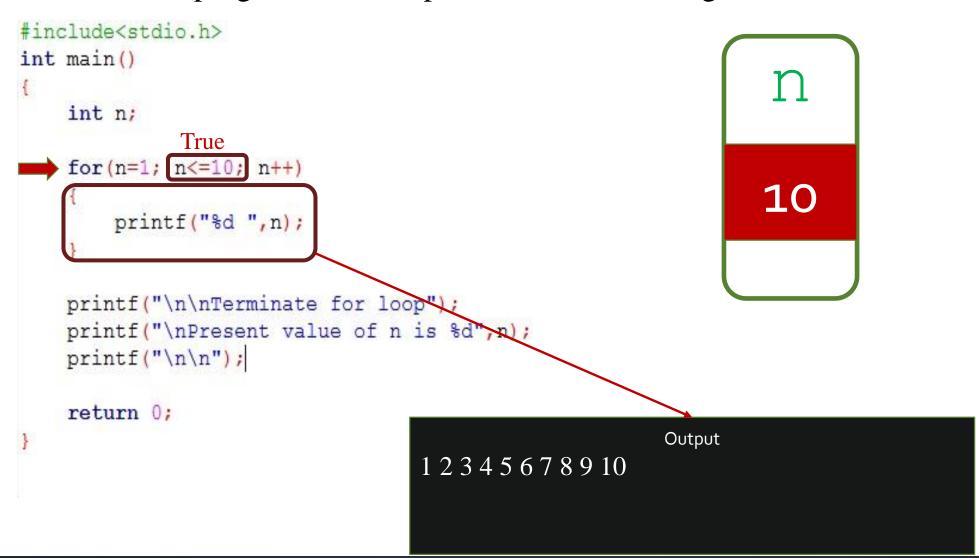
```
#include<stdio.h>
int main()
    int n;
    for(n=1; n<=10; n++
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
                                                       Output
```

```
#include<stdio.h>
int main()
    int n;
    for(n=1; n<=10; n++
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
                                                       Output
```









```
#include<stdio.h>
int main()
   int n;
   for(n=1; n<=10; n++
                                                             10
       printf("%d ",n);
   printf("\n\nTerminate for loop");
   printf("\nPresent value of n is %d",n);
   printf("\n\n");
   return 0;
                                                     Output
                                 12345678910
```

```
#include<stdio.h>
int main()
   int n;
   for(n=1; n<=10; n++
                                                             11
       printf("%d ",n);
   printf("\n\nTerminate for loop");
   printf("\nPresent value of n is %d",n);
   printf("\n\n");
   return 0;
                                                     Output
                                 12345678910
```

```
#include<stdio.h>
int main()
                            Terminate
                               loop
   int n;
             False
   for (n=1; n<=10; n++)
                                                             11
       printf("%d ",n);
   printf("\n\nTerminate for loop");
   printf("\nPresent value of n is %d",n);
   printf("\n\n");
   return 0;
                                                    Output
                                 12345678910
```

```
#include<stdio.h>
int main()
   int n;
   for(n=1; n<=10; n++)
                                                             11
       printf("%d ",n);
   printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
   printf("\n\n");
                                                     Output
                                 12345678910
   return 0;
```

```
#include<stdio.h>
int main()
   int n;
   for(n=1; n<=10; n++)
                                                              11
       printf("%d ",n);
   printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
                                                      Output
                                 12345678910
   return 0;
                                 Terminate for loop
```

```
#include<stdio.h>
int main()
   int n;
   for(n=1; n<=10; n++)
                                                              11
       printf("%d ",n);
   printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
                                                      Output
                                 12345678910
   return 0
                                 Terminate for loop
```

```
#include<stdio.h>
int main()
    int n;
    for(n=1; n<=10; n++)
                                                               11
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
                                                       Output
                                  12345678910
    return 0
                                  Terminate for loop
                                  Present value of n is 11
```

for loop vs while loop

```
#include<stdio.h>
#include<stdio.h>
                                                 int main()
int main()
                                                     int n;
    int n;
    for (n=1; n<=10; n++
                                                     while (n<=10)
        printf("%d ",n);
                                 They are same
                                                         printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
                                                     printf("\n\nTerminate for loop");
    printf("\n\n");
                                                     printf("\nPresent value of n is %d",n);
                                                     printf("\n\n");
    return 0;
                                                     return 0;
```

for loop vs while loop vs do while loop

```
#include(stdio.h>
int main()
   int n;
   for n=1; n<=10; n++
       printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
    return 0;
```

```
#include<stdio.h>
int main()
    int n;
    while n<=10
        printf("%d ",n);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
```

```
#include<stdio.h>
int main()
    int n;
    do
        printf("%d ",n);
    while (n<=10)
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
```

while loop vs do while loop

```
#include<stdio.h>
                           They produce same result
int main()
    int n;
                 But they are different in some situation
    n=1;
                                                     n=1;
    while (n<=10)
                                                     do
                                                         printf("%d ",n);
        printf("%d ",n);
                                                         n++;
        n++;
                                                      while (n \le 10);
    printf("
                                                                        te for loop");
                  "D:\VU\Book\C\ME\Slide\Control Statements\for_vs_while_vs_dowhile.exe"
    printf("
                                                                        ralue of n is %d",n);
                      5678910
    printf("
              Terminate for loop
Present value of n is 11
    return 0;
```

while loop vs do while loop

```
#include<stdio.h>
int main()
    int n;
            False
    while (n<=10
         printf("%d ",n);
         n++;
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
   "D:\VU\Book\C\ME\Slide\Control Statements\differentdowhile,
Terminate for loop
Present value of n is 11
```

```
#include<stdio.h>
int main()
    int n;
    n=11;
         printf("%d ",n);
         n++;
      while (n \le 10);
    printf("\n\nTerminate for loop");
    printf("\nPresent value of n is %d",n);
    printf("\n\n");
"D:\VU\Book\C\ME\Slide\Control Statements\differentdowhile.exe"
11
Terminate for loop
Present value of n is 12
```

Nested loop

Run these code and try to understand the output

```
int i, j;
for(i=1; i<=10; i++)
    printf("i=%d - ",i);
    for(j=1; j<=5; j++)
        printf("j=%d ",j);
    printf("\n");
```

```
int i, j, lowerBound, upperBound;
scanf ("%d%d", &lowerBound, &upperBound);
for (i=lowerBound; i <= upperBound; i++)
    printf("i=%d, i*i=%d\n",i,i*i);
    printf("lowerBound=%d, upperBound=%d\n\n", lowerBound, upperBound);
printf("\n\n\n");
for (i=1; i <= lowerBound; i++)
    printf("i=%d - ",i);
    for(j=1; j<=5; j++)
        printf("j=%d ",j);
    printf("\n");
```

Rewrite various nesting loop and analyze the output

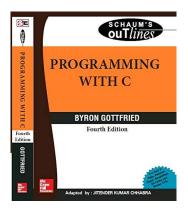
Thank You.

Questions and Answer

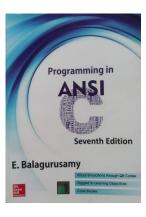
References

Books:

- 1. Programming With C. By Byron Gottfried
- 2. The Complete Reference C. *By Herbert Shield*
- 3. Programming in ANSI C By E. Balagurusamy
- 4. Teach yourself C. By Herbert Shield







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1. www.wikbooks.org and other slide, books and web search.