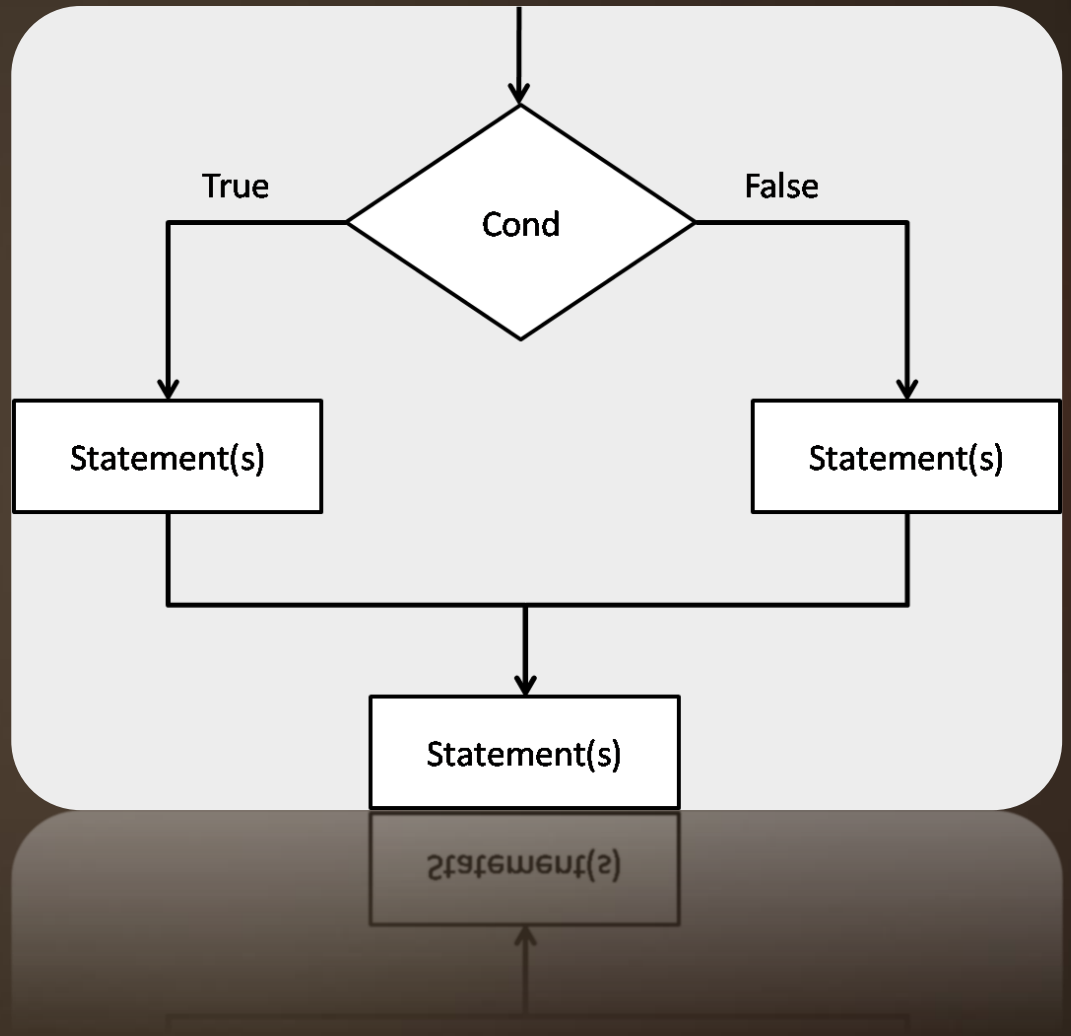
Chapter 5

Control Statements

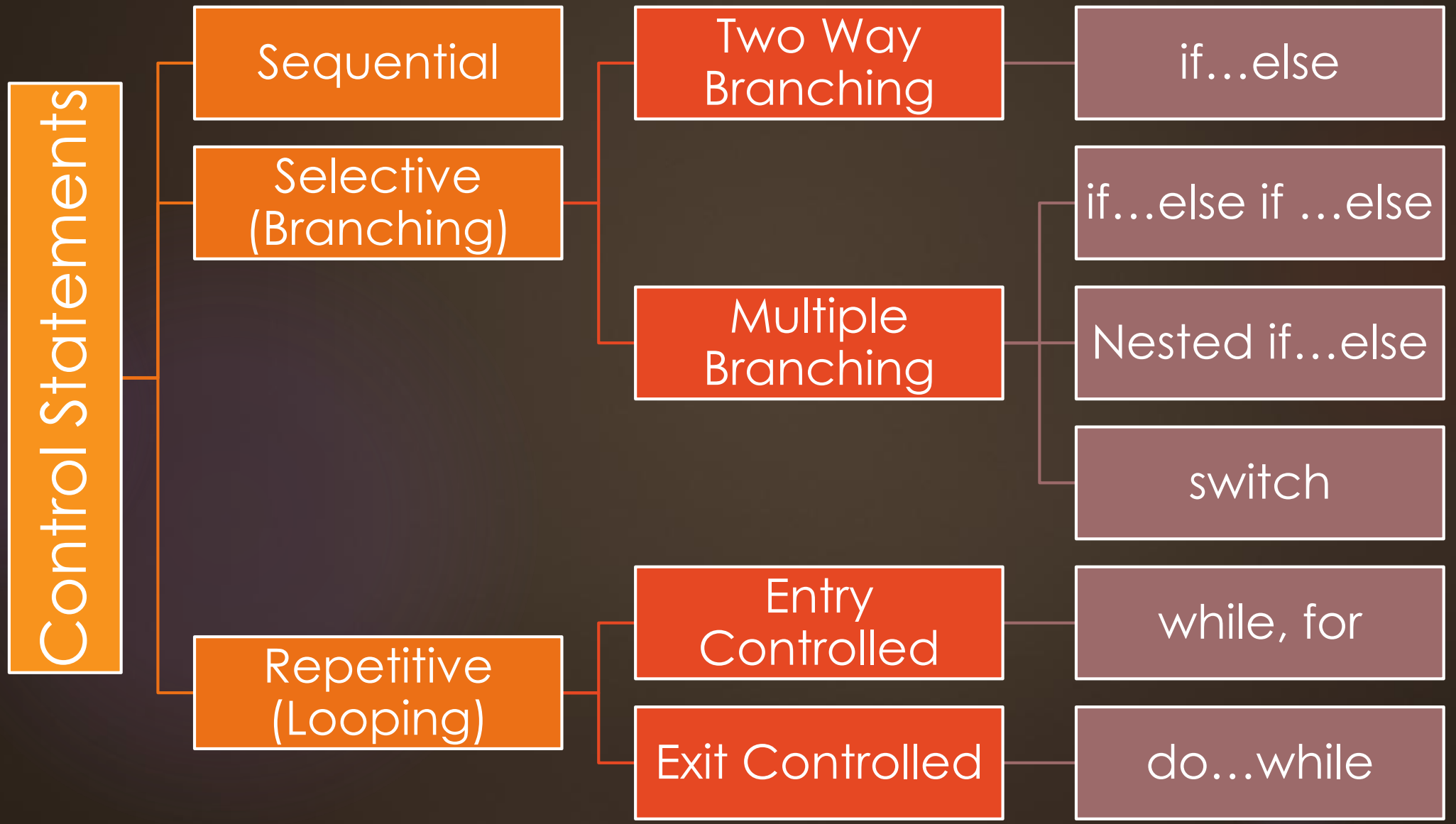
Er. Shiva K. Shrestha (HoD)

Department of Computer Engineering,

Khwopa College of Engineering



Basic Control Statements



Control Statements

Decision Making Statements

- if statement
- If…else statement
- if…else if statement
- Nested if…else statement
- switch statement

Loop Statements or Repetitive Constructs

- for loop
- while loop
- do…while loop

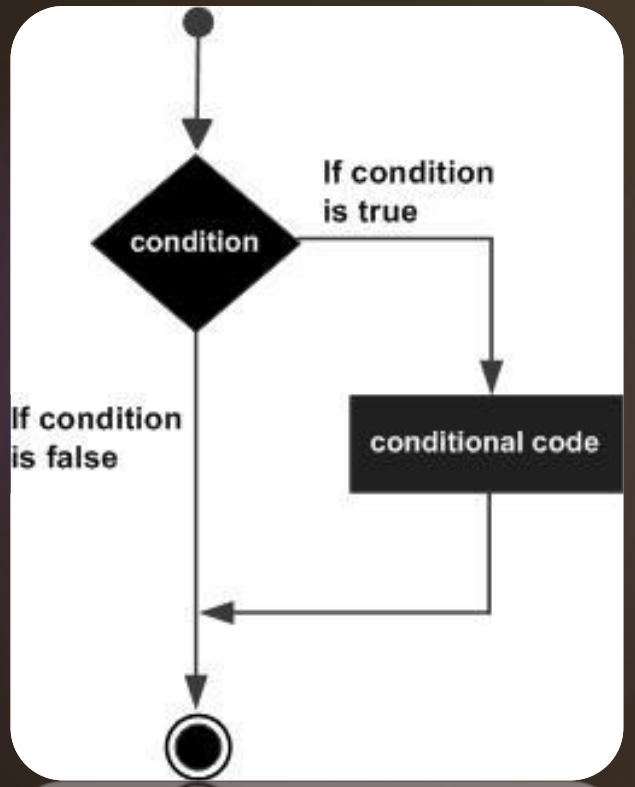
Er. Shiva K. Shrestha (HoD, Computer Department)

Decision Making Statements

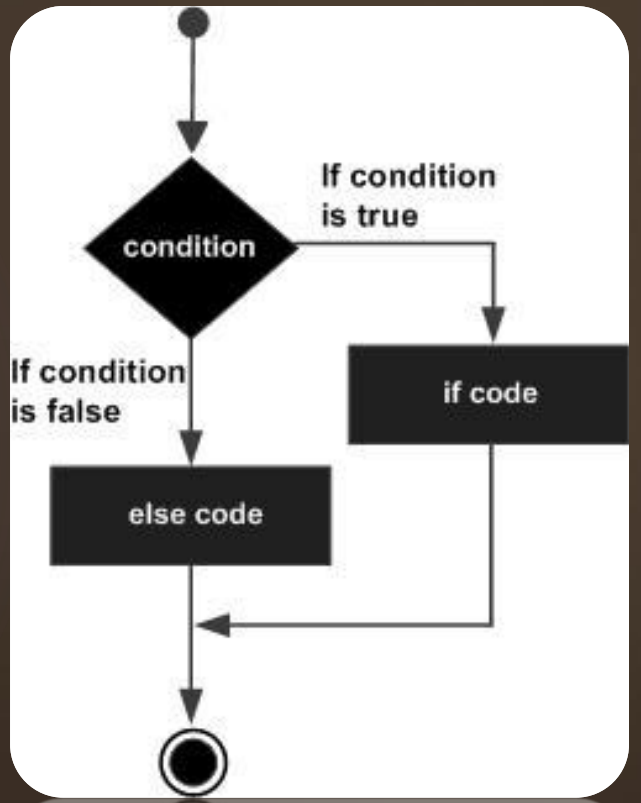
- Ladder if?
- Nested if?

Er. Shiva K. Shrestha (HoD, Computer Department)
10/3/2018

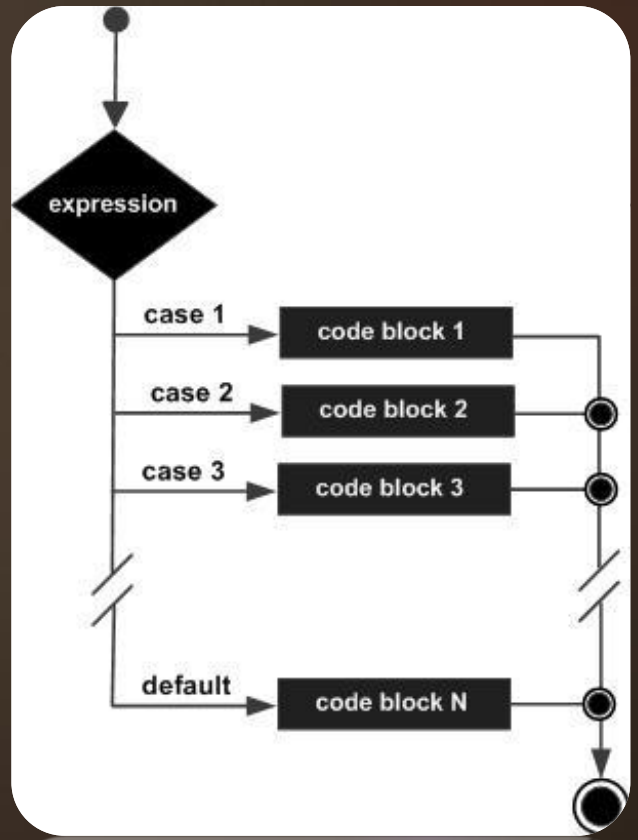
if



if…else



switch

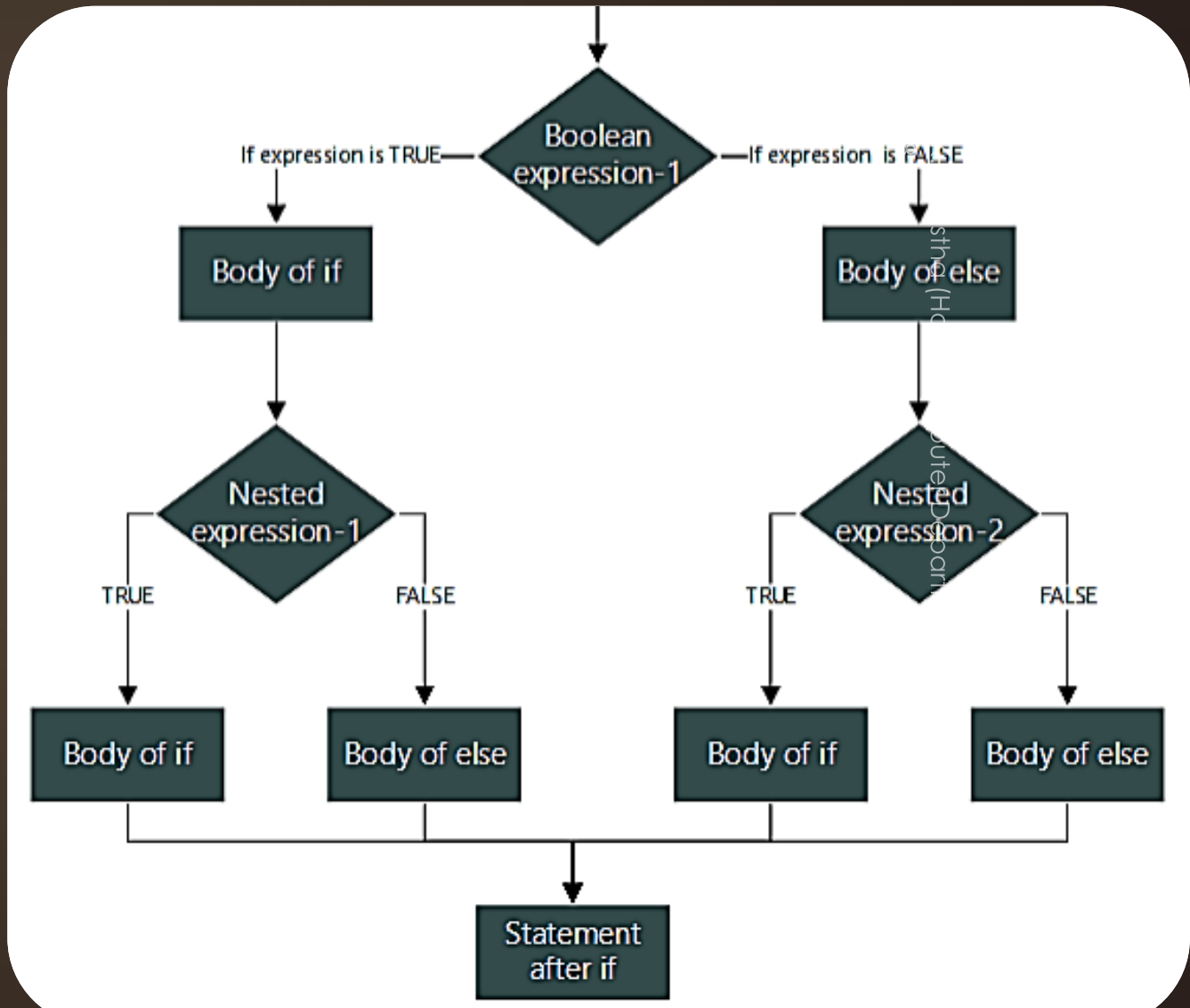


Class Work

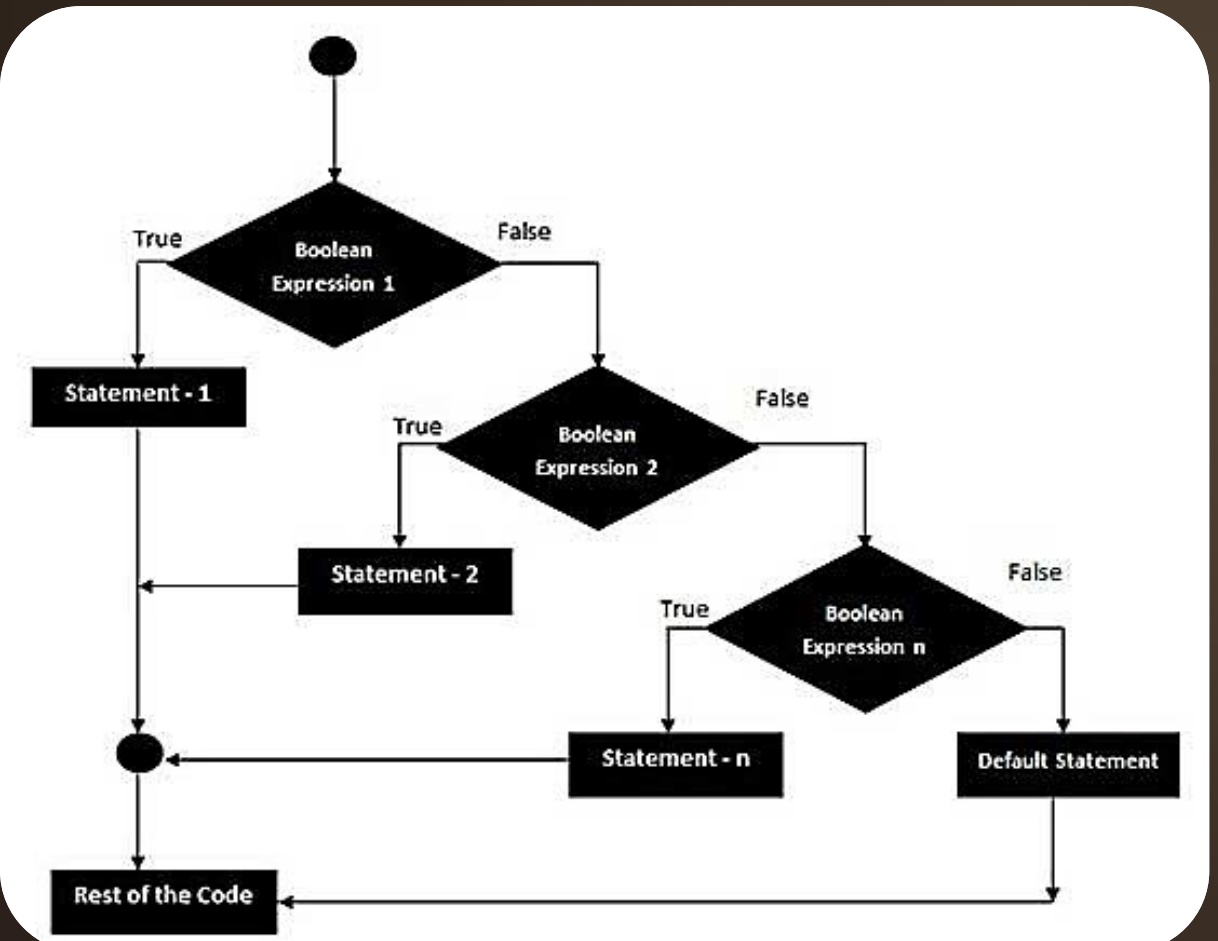
- WAP to display fail if student obtained mark less than 40.
- WAP to display fail if student obtained mark less than 40 otherwise pass.

Decision Making Statements (2)

Nested if



Ladder if



Class Work

- WAP program to display grade as per mark obtained by student using ladder if:
  - A+ - 95 or Above
  - A - 90 or Above
  - B+ - 85 or Above
  - B - 80 or Above
  - C+ - 70 or Above
  - C - 60 or Above
  - D+ - 40 or Above
  - D - 35 or Above
  - E - Below 35

Eg#1: Picking Largest of three numbers

C5_1.C

```c
#include<stdio.h>
#include<conio.h>
void main(){
    int a, b, c; clrscr();
    printf("Enter the value of a, b, and c: ");
    scanf("%d%d%d", &a, &b, &c);
    printf("\na = %d, b = %d, c = %d\n", a, b, c);
    if(a>b){
        if(a>c)
            printf("a = %d \n", a);
        else
            printf("c = %d \n", c);
    }
    else{
        if(b>c)
            printf("b = %d \n", b);
        else
            printf("c = %d \n", c);
    }
    getch();
}
```

Possible Tests

- 1 2 3
- 3 2 1
- 1 3 2
- 5 5 4
- 4 6 6
- 7 7 7
- 5 8 5
- -1 9 4

Er. Shiva K. Shrestha (HoD, Computer Department)
10/3/2018

Alternative method to pick the largest of three numbers


```
#include<stdio.h>
#include<conio.h>
void main(){
 int a, b, c, big;
 printf(" enter the value of a, b, and c");   scanf(" %d %d %d ", &a, &b, &c);
 big = a;
 if (b>big)
       big = b;
 if (c>big)
     big = c;
 printf(" \n the largest number is %4d ", big); getch();
}
```

Assignment

- Pick smallest no. among entered five numbers.

Largest of four numbers using nested if-else

C5_3.c

```c
/* Largest of four numbers using nested if-else */
#include<stdio.h>
#include<conio.h>
void main(){
    int a,b,c,d;  printf("Enter four numbers:");
    scanf("%d%d%d%d",&a,&b,&c,&d);
    if(a>b){
        if(a>c){
            if(a>d)
                printf("Maximum is %d", a);
            else
                printf("Maximum is %d",d);
        }else{
            if(c>d)
                printf("Maximum is %d",c);
            else
                printf("Maximum is %d",d);
        }
    }
    else{
        if(b>c)
        {
            if(b>d)
                printf("Maximum is %d",b);
            else
                printf("Maximum is %d",d);
        }
        else
            if(c>d)
                printf("Maximum is %d",c);
            else
                printf("Maximum is %d",d);
        }
    getch();
}
```

Largest of four numbers using if-else and && operator

C5_4.c

```c
/* Largest of four numbers
using if-else and && operator */
#include<stdio.h>
#include<conio.h>
void main(){
    int a,b,c,d;
    scanf("%d%d%d%d",&a,&b,&c,&d);
    if(a>b && a>c && a>d)
        printf("Maximum is %d",a);
    else if(b>a && b>c && b>d)
        printf("Maximum is %d",b);
    else if(c>a && c>b && c>d)
        printf("Maximum is %d",c);
    else
        printf("Maximum is %d",d);
    getch();
}
```

if statements

Syntax:

```
if (expression){
    Statement;
}
```

if-else statements

The *general form* of if statement is

```
if (expression){
    Statement;
}else{
    Statement;
}
```

if-else if statements

Syntax:

```
if (expression){
    Statement;
} else if (expression){
 Statement;
}else{
    Statement;
}
```

nested if statements

Syntax:

```
if (logical expression){
    if (logical expression){
      Statement;
    }else{
      Statement;
    }
}else{
     Statement;
}
```

Program to calculate the number of days in the months

- " 30 days has September, April, June, and November"
- " All the rest have 31 days except February alone"
- " February have 29 days in Leap year and 28 in other years"
- The program will ask the user to enter month and year and the rest of the calculations are performed using if-else condition.

Er. Shiva K. Shrestha (HoD, Computer Departr
10/3/2018

C5_5.c

```c
/* Program to calculate the number of days in the months */
#include<stdio.h>
#include<conio.h>
void main(){
    int m, y, d;
    clrscr();
    printf("Enter Month: ");
    scanf("%d", &m);
    printf("\nEnter Year: ");
    scanf("%d", &y);
    clrscr();
    if (m == 2){
        if((y%400 == 0) || (year%4 == 0 && year%100 != 0))
            d = 29;
        else
            d = 28;
    }
    if(m != 2){
        if((m == 4) || (m == 6) || (m == 9) || (m == 11))
            d = 30;
        else
            d = 31;
    }
    printf("No. of days in the %d year and %d month is : %d", y, m, d);
    getch();
}
```

switch Statement

Syntax:

```
switch(expression){
    case constant_1:
            Statements;
            break;
    case constant_2:
            Statements;
            break;
    default:
            Statements;
}
```

Program displaying day using the switch statement depending upon the number entered

Er. Shiva K. Shrestha (HoD, (
10/3/2018

C5_6.c

```c
/* Displaying day using the switch statement
depending upon the number entered */
#include <stdio.h>
#include <conio.h>
main(){
    int choice;
    printf("Enter the number of day:");
    scanf("%d",&choice);
    switch(choice){
        case 1: printf("Sunday");
                break;
        case 2: printf("Monday");
                break;
        case 3: printf("Tuesday");
                break;
        case 4: printf("Wednesday");
                break;
        case 5: printf("Thursday");
                break;
        case 6: printf("Friday");
                break;
        case 7: printf("Saturday");
                break;
        default:printf("Invalid option given");
    }
    getch();
}
```

Loop/Iteration/Repeating Construct

Loop Type & Description

while loop

- Repeats a statement or group of statements while a given condition is true. It tests the condition before executing the loop body.

do...while loop

- It is more like a while statement, except that it tests the condition at the end of the loop body.

for loop

- Executes a sequence of statements multiple times and abbreviates the code that manages the loop variable.

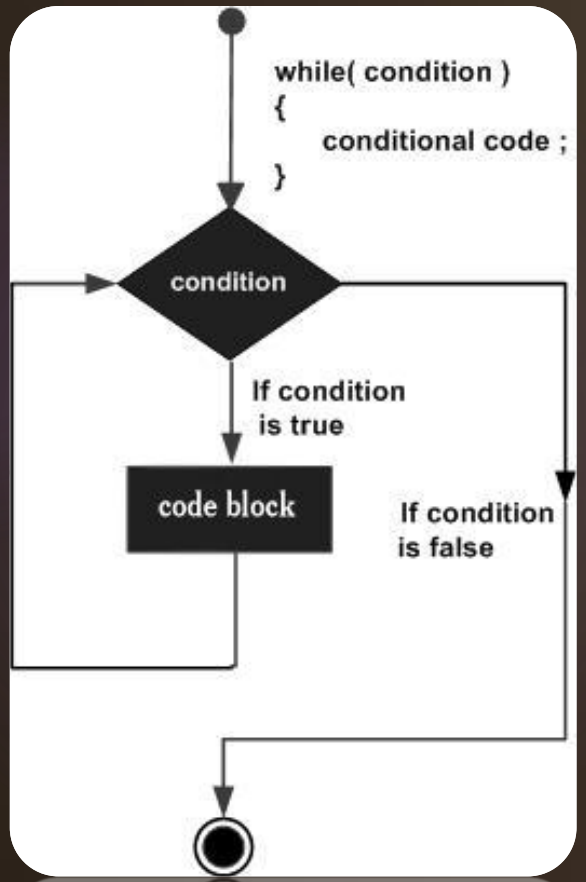
nested loops

- You can use one or more loops inside any other while, for, or do..while loop.

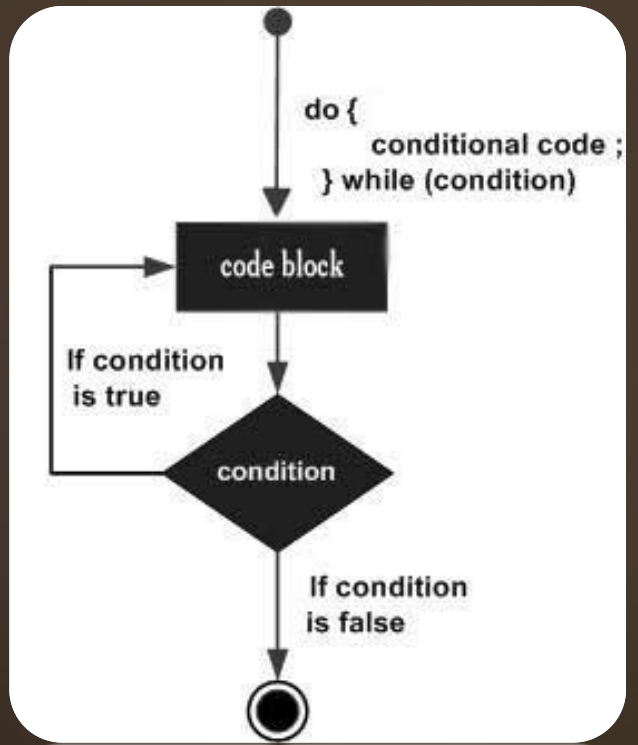
Loop Types

Er. Shiva K. Shrestha (HoD, Computer Department)

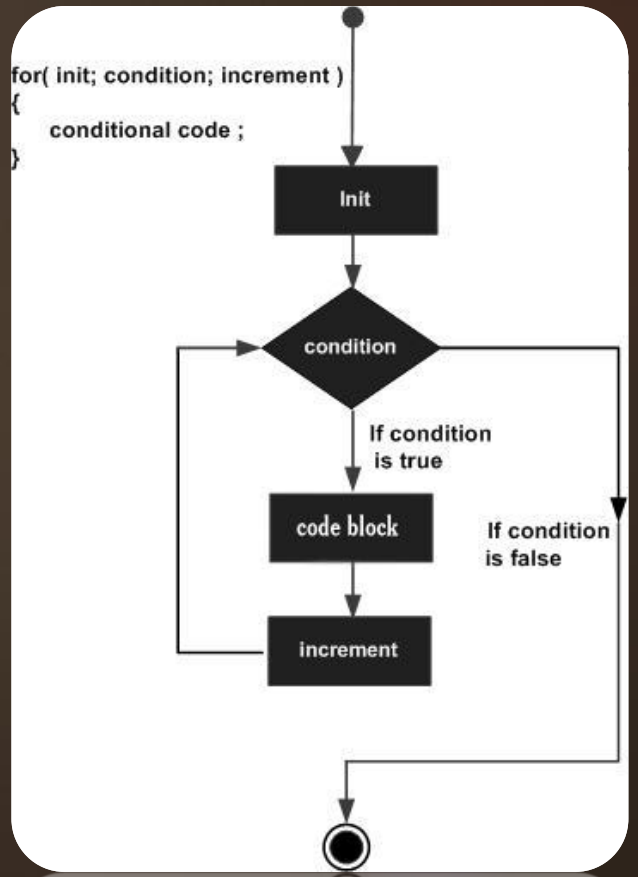
while



do…while



for



while Loop

Syntax:

```
while(condition){
    statement1;
    statement2;
}
```


Er. Shiva K. Shrestha (HoD, Computer Department)

do-while Loop

Syntax:

```
do{
    statement1;
    statement2;
}while(condition);
```

for Loop

Syntax:

```
for ( initialization; condition; update ) {
   statement(s);
}
```

Program to print numbers from 1-10


```
#include<stdio.h>
#include<conio.h>
main(){
    int number=1;
    while(number<=10){
        printf("%d",number);
        number++;
    }
    getch();
}
```

Calculate factorial of a given no.

C5_7.c

```c
/* Calculates factorial of a given number */
#include<stdio.h>
#include<conio.h>
void main(){
    int a = 1, n;
    long float fact = 1;
    printf("Enter the value for n:");
    scanf("%d",&n);
    while(a<n){
        a++;
        fact *= a;
    }
    printf("Factorial of given no. is: %ld",fact);
    getch();
}
```

Er. Shiva K. Shrestha (HoD, Computer Department)

Program to find the sum of odd numbers using do...while loop

C5_8.c

```c
/* Program to find the sum of odd numbers using do...while loop */
#include <stdio.h>
#include<conio.h>
void main(){
    int n, sum=0, i=1;
    printf("Enter the value of n:");
    scanf("%d", &n);
    do{
        sum+=i;
        i+=2;
    }while(i<=n);
    printf("The sum of odd number is %d",sum); getch();
}
```

Program to accepts a character and returns its ASCII value

C5_9.c

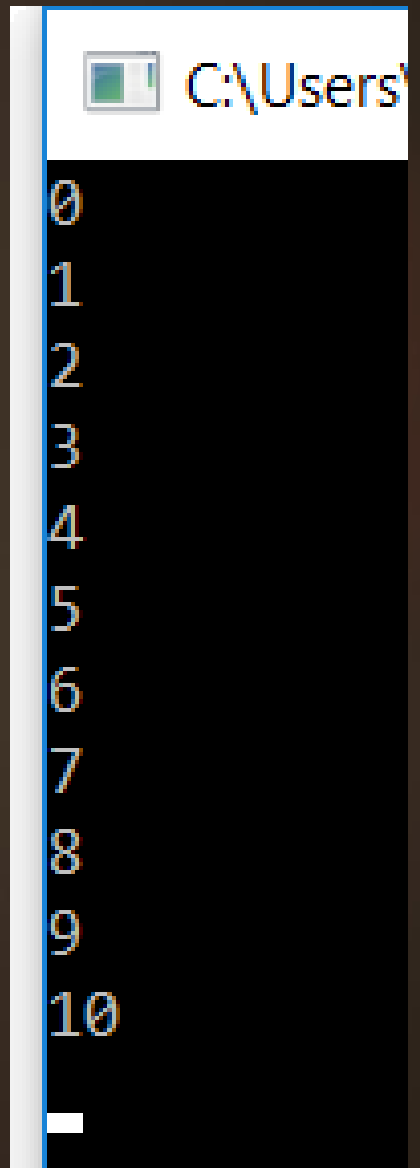
```c
/* Program to accepts a character
and returns its ASCII value */
#include <stdio.h>
#include <conio.h>
void main(){
    char ch, answer;
    do{
        printf("Enter any character:");
        scanf(" %c", &ch);
        printf("\nThe ASCII value of alphabet: %c = %d", ch, ch);
        printf("\nWant to continue?");
        scanf(" %c", &answer);
    }while(answer=='y' || answer=='Y');
    getch( );
}
```

```
C:\Users\ErSKS\Google Drive (c.khwopa@gm
Enter any character:a

The ASCII value of alphabet: a = 97
Want to continue?y
Enter any character:A

The ASCII value of alphabet: A = 65
Want to continue?
```

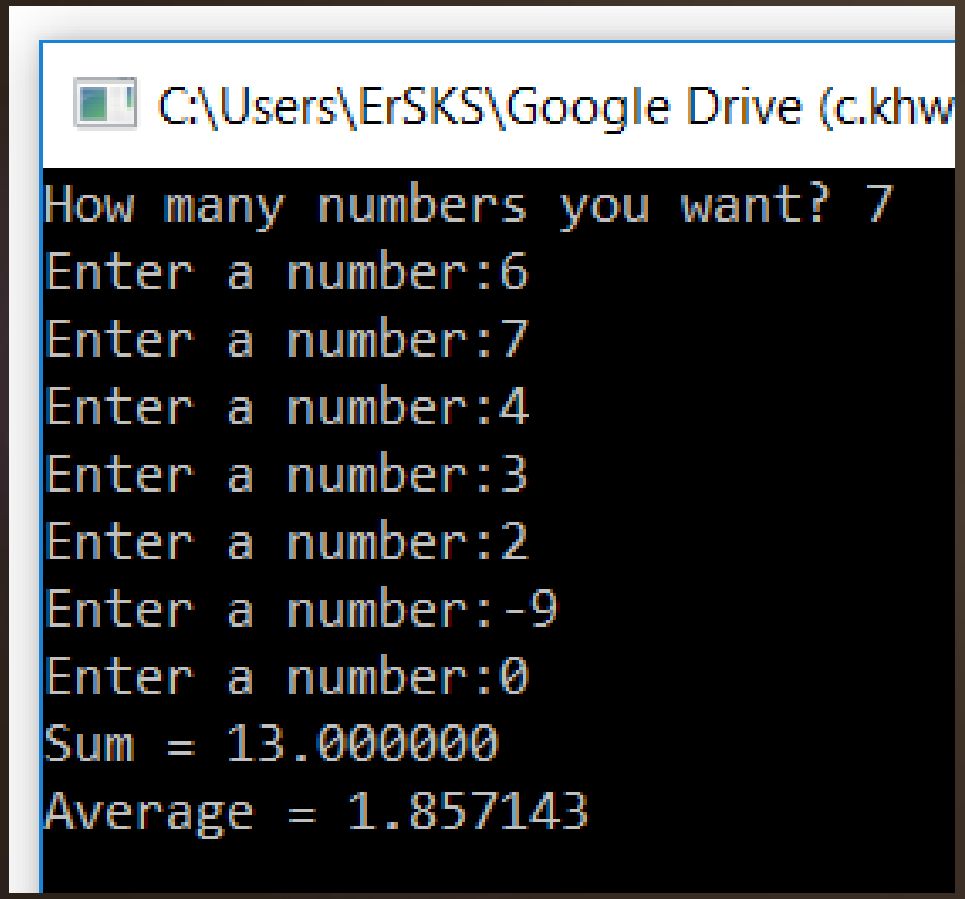
Program to display the numbers from 0 to 10 using for loop

C5_10.c

```c
/* Program to display the numbers
from 0 to 10 using for loop */
#include <stdio.h>
#include<conio.h>
void main(){
    int i;
    for(i=0;i<=10;i++)
        printf("%d\n",i);
    getch();
}
```



Program to find sum & average of given numbers



C5_11.c

```c
/* Program to find the sum and
the average of given numbers */
#include<stdio.h>
#include<conio.h>
void main(){
    int n,i;
    float sum=0.0,a,average;
    printf("How many numbers you want? ");
    scanf("%d",&n);
    for(i=0;i<=n-1;i++){
        printf("Enter a number:");
        scanf("%f", &a);
        sum += a;
    }
    average = sum/n;
    printf("Sum = %f",sum);
    printf("\nAverage = %f",average);
    getch();
}
```

Patterns

Er. Shiva K. Shrestha (HoD, Computer Department)
10/3/2018

Pattern1

```
*****
*****
*****
*****
*****
```

Pattern2

```
*****
****
***
**
*
```

Pattern3

```
    *
   **
  ***
 ****
*****
```

Pattern4

```
*****
 ****
  ***
   **
    *
```

Pattern5

```
    *
   **
  ***
 ****
*****
 ****
  ***
   **
    *
```

Pattern6

```
   *
  * *
 * * *
```

Pattern7

```
   *
  ***
*****
```

Pattern8

```
1
2 3
4 5 6
7 8 9 10
```

Pattern9

```
10
9 8
7 6 5
4 3 2 1
```

C5_12.c

```c
/* Program to generate number in pyramid format */
#include<stdio.h>
#include<conio.h>
void main(){
    int p,q,a,k,l;
    printf("\nEnter the value for pyramid:");
    scanf("%d",&a);
    for(p=1;p<=a;p++)          /*for a row implement*/
    {
        for(q=a;q>p;q--)       /*for the space(s)*/
            printf(" ");
        for(k=1;k<=p;k++)      /*for previously printed number*/
            printf("%d",k);
        for(l=p-1;l>=1;l--)    /*for printing new nos.*/
            printf("%d",l);

        printf("\n");
    }
    getch();
}
```

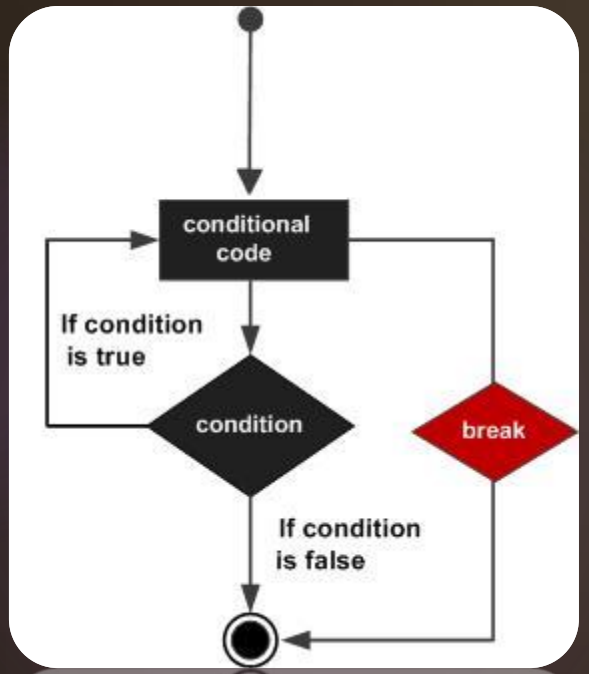
C:\Users\ErSKS\Google Drive (c.khw

```
Enter the value for pyramid:5
    1
   121
  12321
 1234321
123454321
```

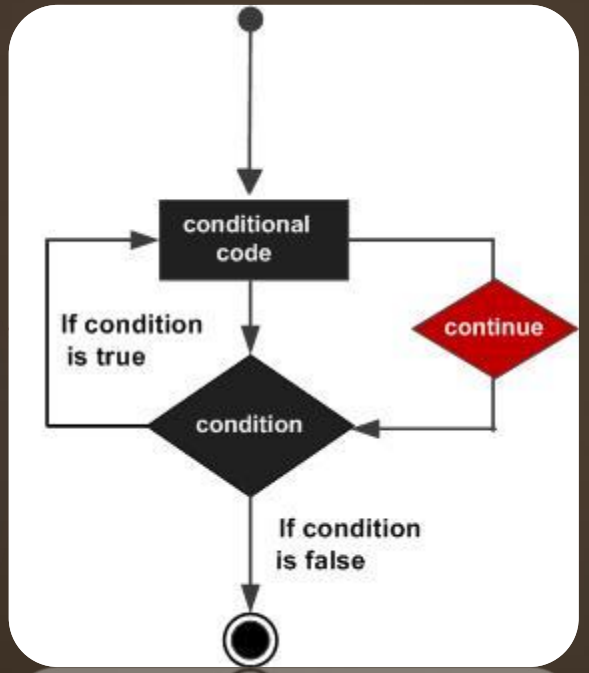
Loop Control Statements

Er. Shiva K. Shrestha (HoD, Computer Department)

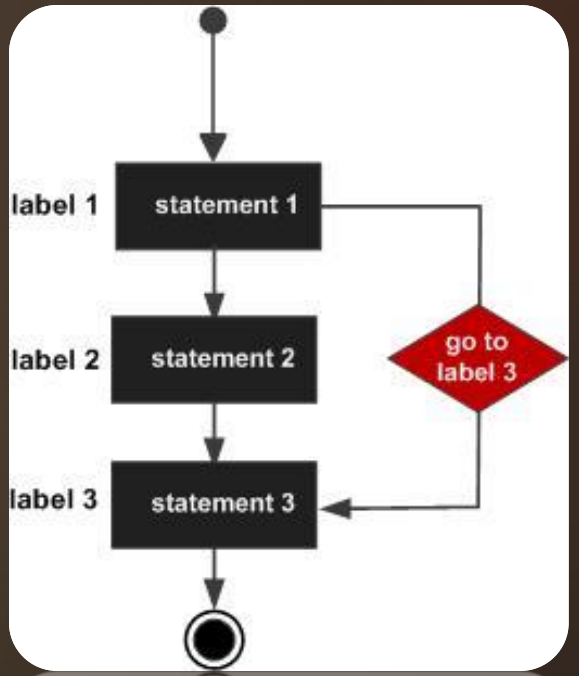
break



continue



goto



break & continue Statement

BREAK.C | CTD.C

```c
#include<stdio.h>
#include<conio.h>
void main( ){
    int i;
    clrscr();
    for(i = 0; i < 5; i++){
        printf("%d. Bhaktapur\n", i);
        if (i==2){
            break;
        }
        printf("- Khwopa\n");
    }
    getch();
}
```

```
DOSBox 0.
0. Bhaktapur
- Khwopa
1. Bhaktapur
- Khwopa
2. Bhaktapur
```

BREAK.C | CTD.C

```c
#include<stdio.h>
#include<conio.h>
void main( ){
    int i;
    clrscr();
    for(i = 0; i < 5; i++){
        printf("%d. Bhaktapur\n", i);
        if (i==2){
            continue;
        }
        printf("- Khwopa\n");
    }
    getch();
}
```

```
DOSBox 0.7
0. Bhaktapur
- Khwopa
1. Bhaktapur
- Khwopa
2. Bhaktapur
3. Bhaktapur
- Khwopa
4. Bhaktapur
- Khwopa
```

Check prime or not?

1	**2**	**3**	4	**5**	6	**7**	8	9	10
11	12	**13**	14	15	16	**17**	18	**19**	20
21	22	**23**	24	25	26	27	28	**29**	30
31	32	33	34	35	36	**37**	38	39	40
41	42	**43**	44	45	46	**47**	48	49	50
51	52	**53**	54	55	56	57	58	**59**	60
61	62	63	64	65	66	**67**	68	69	70
71	72	**73**	74	75	76	77	78	**79**	80
81	82	**83**	84	85	86	87	88	**89**	90
91	92	93	94	95	96	**97**	98	99	100

First 10 Prime Numbers

Notice?

2, 3, 5, 7, 11, 13, 17, 19, 23, 29

```
C:\Users\ErSKS\Google Drive
Enter a number: 15

Not Prime Number
```

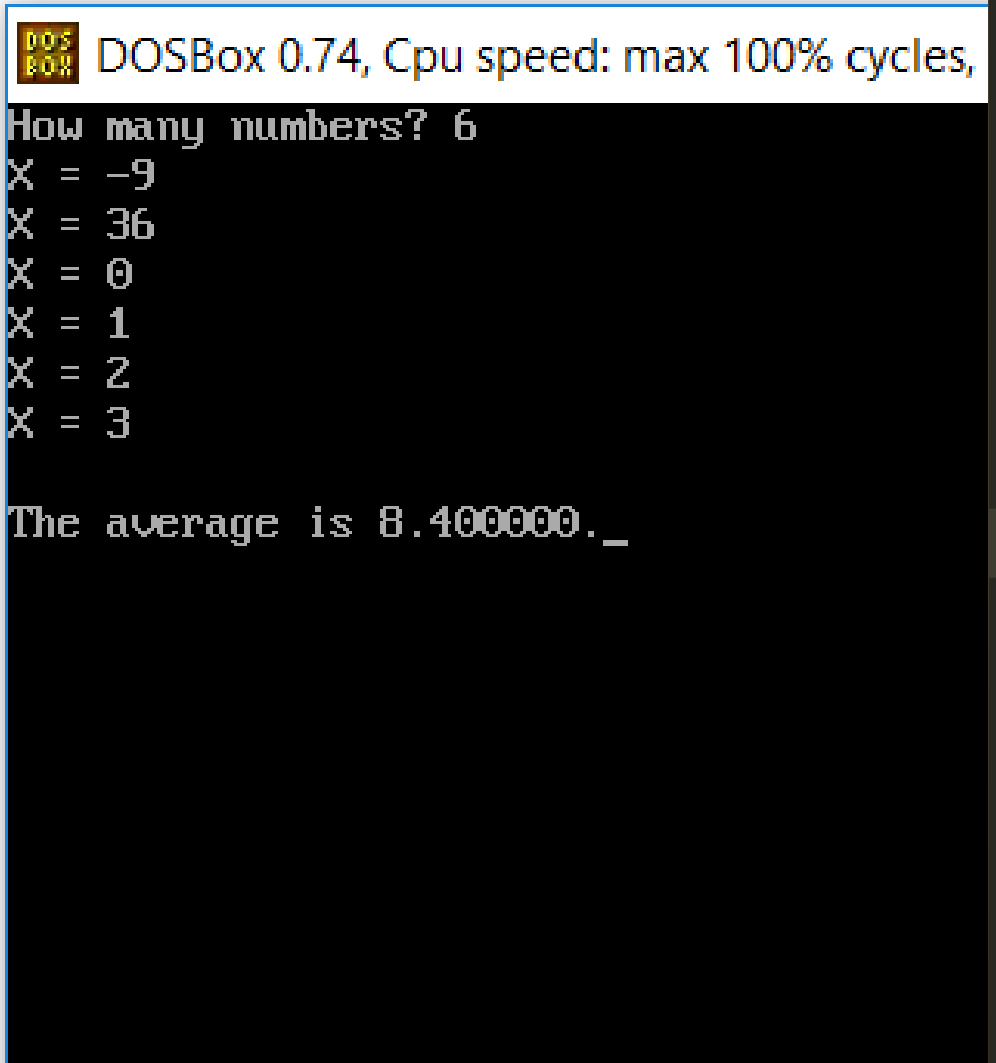
```
C:\Users\ErSKS\Google Drive
Enter a number: 17

Prime Number
```

```
C:\Users\ErSKS\Google
Enter a number: 1

Not Prime Number
```

C5_15.c

```c
/* Check prime or not? */
#include<stdio.h>
#include<conio.h>
void main(){
  int num, i, flag=0;
  printf("Enter a number: ");
  scanf("%d", &num);
  if(num<2){
    flag=1;
  }else{
    for(i=2;i<=num/2;i++){
      if(num% i == 0){
       flag=1;
       break;
      }
    }
  }
  if (flag==0){
    printf("\nPrime Number");
  }else{
   printf("\nNot Prime Number");
  }
getch();
}
```

Calculate the average of the non-negative numbers



C5_16.c

```c
/* Calculate the average of the
non-negative numbers in a list of numbers */
#include<stdio.h>
#include<conio.h>
void main(){
    int n, i, count=0;
    float x, average, sum=0;
    printf("How many numbers? ");
    scanf("%d", &n);
    for(i=1;i<=n;i++){
        printf("X = ");
        scanf(" %f ", &x);
            if(x < 0){continue;}
        sum += x;
        ++count;
    }
    average = sum/count;
    printf("\nThe average is %f.", average);
    getch();
}
```

goto Statement

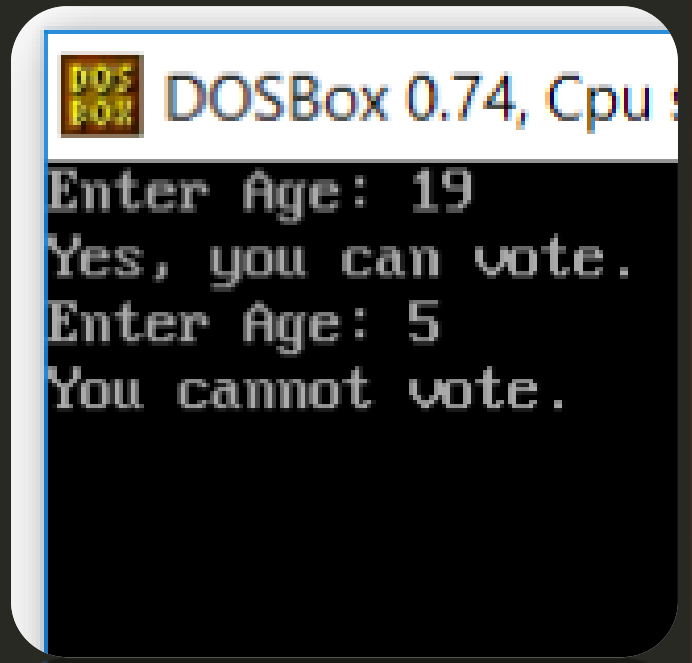
Syntax:

```
goto label;
  …
label:
```

Check whether a person can vote or not?

C5_17.c

```c
/* Check whether a person can vote or not */
#include<stdio.h>
#include<conio.h>
void main(){
    int  age;
    clrscr();
    printf("Enter Age: ");
    scanf("%d", &age);
    if (age<18)
        goto  reject;
    else{
        printf("Yes, you can vote.");
        exit(0);
    }
    reject: printf("You cannot vote.");
    getch();
}
```



Q/A?

Thank You!

Er. Shiva K. Shrestha

computer.khwopa@gmail.com