AMBITION GURU

Computer Concept and Programming

I semester, BSc. CSIT

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Syllabus

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Practical Works

Credit hours : 3

Unit 3

(6 hrs.)

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Control Structures

- Introduction,
- Decision Making Statements,
- Looping Statements,
- Branching Statements,
- Common Pitfalls: Infinite loops, Misplacement of Conditionals.

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Unit 3: Part 1

Introduction, Decision Making Statements

Control Structure

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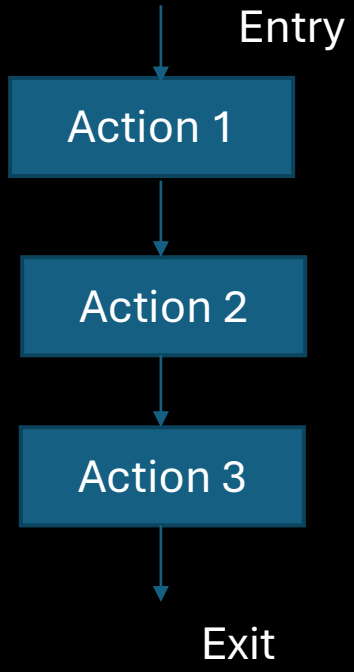
- Control structure enables, us to specify the order in which the various instructions in a program are to be executed by the computer.
- In other words control instructions determine the “flow of control” in a program.

- There are 3 types of control instructions in C. They are:

1. Sequential Control instruction
2. Selection or decision control instruction
3. Repetition or looping control instruction

Control Structure : Sequential Control Structure

- Instructions are executed in the same order in which they appear
- Each instruction is executed exactly once.
- No any condition is evaluated.



Control Structure : Sequential Control Structure

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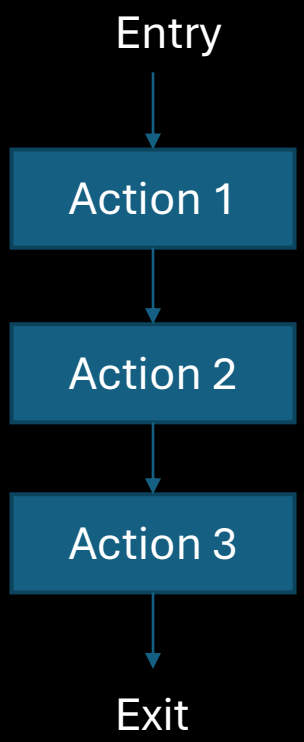
Example:

Program to find the sum of two numbers.

```
#include<stdio.h>
#include<conio.h>
int main()
{
int num1,num2,sum;
printf("Enter the two numbers");
scanf("%d%d",&num1,&num2);
sum=num1+num2;
printf("Sum of two numbers is %d",sum);
getch();
return 0
}
```



Selection/Branching/Decision Control instructions

Selection/Branching/Decision Control instructions

- They are used when we have a number of situations where we may need to change the order of execution of statements based on certain conditions.

I. simple if statement

II. if else statement

III. nested if else statement

IV. else if ladder

Selection/Branching/Decision Control instructions : **if statement**

Selection/Branching/Decision Control instructions : if statement

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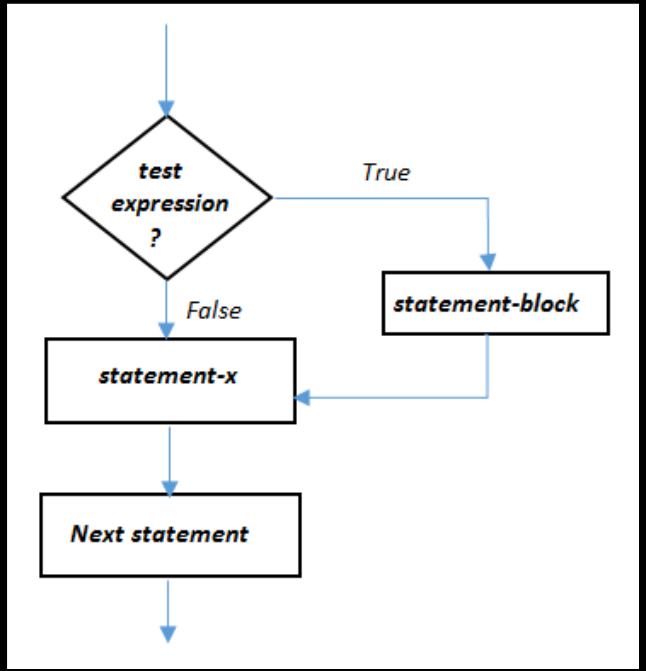
Evaluates the expression first then do the following:

- If the value of expression is true , it executes the statement within the block
- Otherwise it skips the statements within its block and continues from the first statement outside the block

Syntax:

```
if(test expression)
{
        statement-block;
}
statement-x;
```



if statement example

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WAP that reads an integer from the user and checks if the number is positive.

```
#include <stdio.h>

int main() {
    int number;
    printf("Enter an integer: ");
    scanf("%d", &number);
    if (number > 0) {
        printf("The number is positive.\n");
    }
    return 0;
}
```

if statement example

WAP to input the average marks of a student and add 10% bonus marks if his/her average marks is greater than or equal to 65.

```
#include<stdio.h>
#include<conio.h>
int main()
{
float marks;
printf("Enter the marks\n") ;
scanf("%f",&marks);
if(marks>=65)
{
     marks=marks+marks*0.1;
}
printf("Final marks=%f",marks);
getch();
return 0;
}
```

Selection/Branching/Decision Control instructions : if-else statement

Selection/Branching/Decision Control instructions : **if-else statement**

Extension of simple if statement

- If test expression is true,

➢ then true block statement(s) *(immediately following the if statements are executed)*

- otherwise false block statements are executed

Selection/Branching/Decision Control instructions : **if-else statement**

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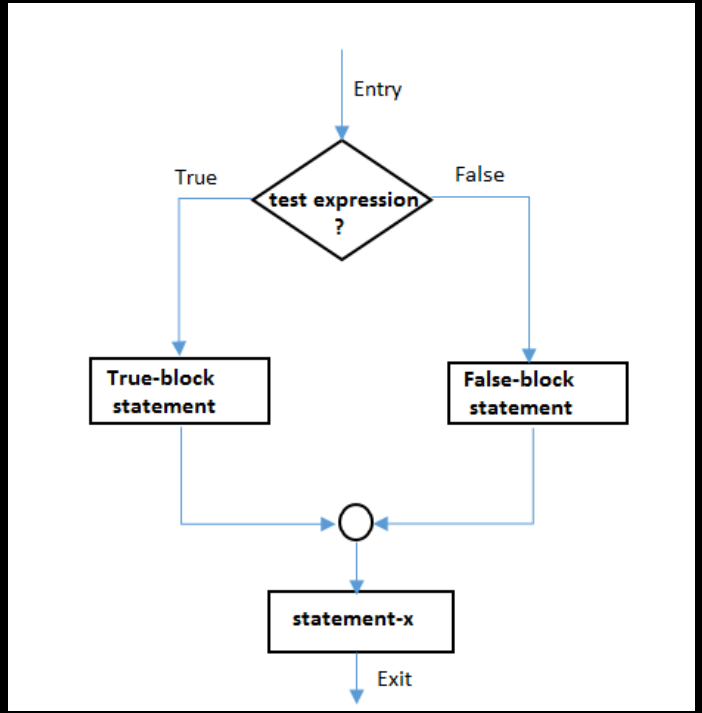
Syntax:

```
if(test_expression)
{
      true-block statements
}
else
{
     false-block statements
}
statement-x;
```



Question

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Write a C program that reads the age of a person and checks if they are eligible to vote. A person is eligible to vote if they are 18 years or older. If they are eligible, display a message indicating that they can vote; otherwise, display a message indicating that they are not eligible.

Question

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```c
#include <stdio.h>

int main() {
    int age;
    printf("Enter your age: ");
    scanf("%d", &age);

    if (age >= 18) {
        printf("You are eligible to vote.\n");
    } else {
        printf("You are not eligible to vote.\n");
    }

   return 0;
}
```

Selection/Branching/Decision Control instructions : **Nested if-else statement**

Selection/Branching/Decision Control instructions : **Nested if-else statement**

- When a series of decisions are involved, we may have to use more than one if. . . . else statement in nested form as shown below:

Syntax:

```
if(test condition-1)
{
                    if(test condtion-2)
                    {
                    Statement -1;
                    }
                    else
                    {
                    Statement-2;
                    }
}
else
      {
      Statement-3;
      }
}
Statement x;
```

Selection/Branching/Decision Control instructions : **Nested if-else statement**

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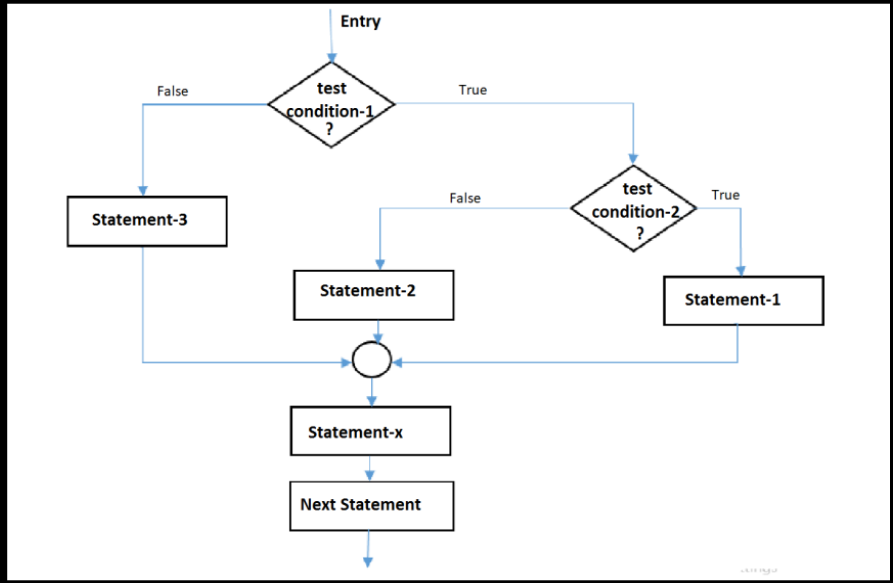
Syntax:

```
if(test condition-1)
{
                    if(test condtion-2)
                    {
                    Statement -1;
                    }
                    else
                    {
                    Statement-2;
                    }
}
else
      {
      Statement-3;
      }
}
Statement x;
```



Nested if-else example

- WAP to find the largest number among three numbers

```
#include<stdio.h>
#include<conio.h>
int main()
{
int a,b,c;
printf("Enter three number\n");
scanf("%d%d%d",&a,&b,&c);
if(a>b)
{
      if(a>c)
      {
      printf("The largest number is %d",a);
      }
      else
      {
      printf("The largest number is %d",c);
      }
}
```

Nested if-else example

- WAP to find the largest number among three numbers

```
else
{
      if(b>c)
      {
      printf("Largest number is %d",b);
      }
      else
      {
      printf("largest number is %d",c);
      }
}
```

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Nested if-else example

- WAP to find the largest number among three numbers

```
else
{
      if(b>c)
      {
      printf("Largest number is %d",b);
      }
      else
      {
      printf("largest number is %d",c);
      }
}
```

Selection/Branching/Decision Control instructions : else-if ladder statement

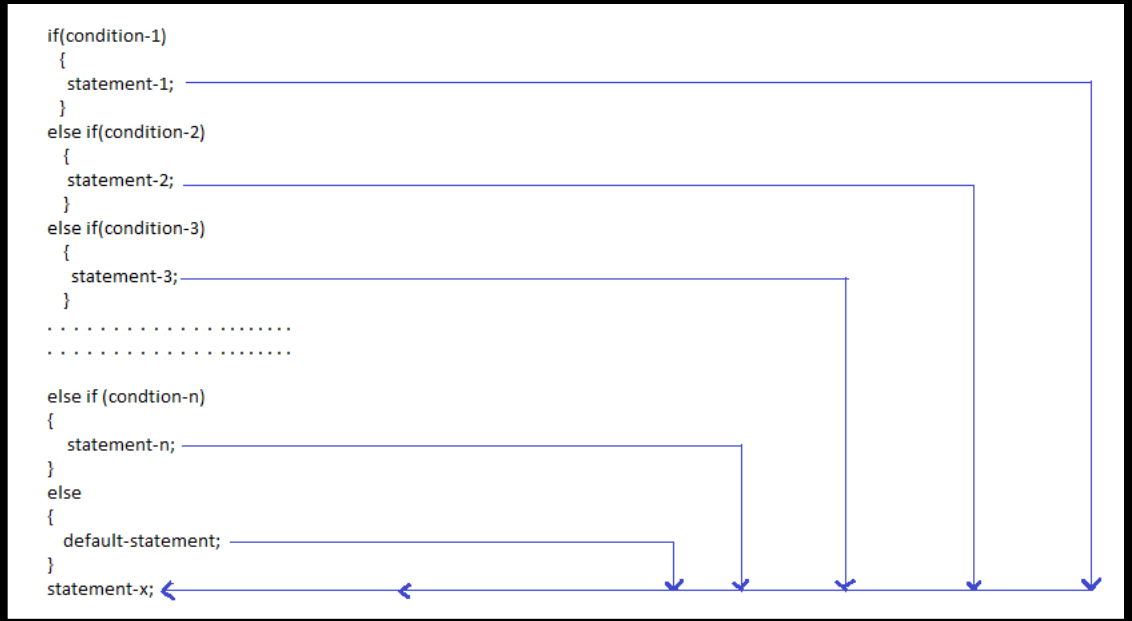
else-if ladder statement

- It is used when multiple decisions are involved. Here, the condition expression is evaluated in order.

✓ If any of these expression is true, the statement associated with it is executed and this terminates the whole chain.

✓ If none of the expression is true then statement associated with final else is executed.

Syntax:



else-if ladder statement

- Write a C program to read a person's marks and determine their grade using an **else-if ladder**. The grading criteria are as follows:
  - Marks >= 90: Grade A
  - Marks >= 80: Grade B
  - Marks >= 70: Grade C
  - Marks >= 60: Grade D
  - Marks < 60: Fail

```c
#include <stdio.h>
int main() {
    int marks;
    printf("Enter your marks: ");
    scanf("%d", &marks);
    if (marks >= 90) {
        printf("Grade: A\n");
    } else if (marks >= 80) {
        printf("Grade: B\n");
    } else if (marks >= 70) {
        printf("Grade: C\n");
    } else if (marks >= 60) {
        printf("Grade: D\n");
    } else {
        printf("Grade: Fail\n");
    }
    return 0;
}
```

switch case statement

switch case statement

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- The control statement that allows us to make a decision from number of choices is called switch case statement.
- The switch case statement successively test the value of a given variables (an expression) with a list of case value (integer or character constants)
- When match is found, the statement associated with that case is executed.
- If none of the case value matches the expression then default statement is executed.

General form:

```
switch(expression)
{
case value-1:
block-1;
break;

case value-2:
block-2;
break;
. . . . . .

default:
default-block;

}
statement-x;
```

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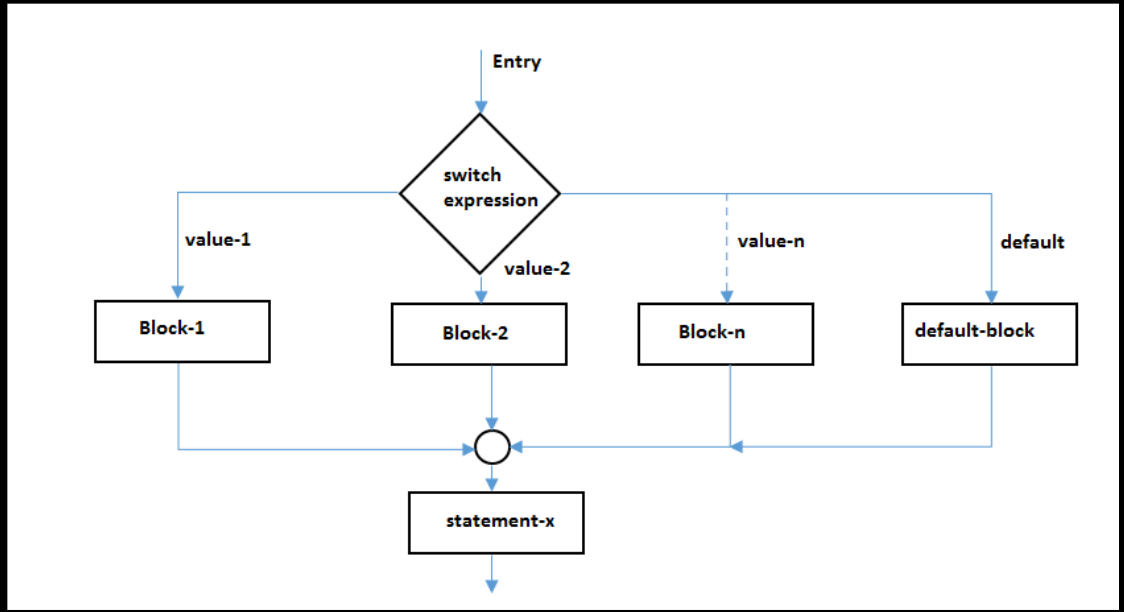
switch case statement



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switch statement example:

WAP to display the corresponding days of a week according to the numbers entered.

```
#include<stdio.h>
#include<conio.h>
int main()
{
int day;
printf("Enter the numeric day of week\n");
scanf("%d",&day);
switch (day)
{
case 1:
printf("Day is Sunday") ;
break;
case 2:
printf("Day is Monday");
break;
case 3:
printf("Day is Tuesday");
break;
case 4:
printf("Day is Wednesday");
break;
```

switch statement example:

WAP to display the corresponding days of a week according to the numbers entered.

```
case 5:
printf("Day is Thursday");
break;
case 6:
printf("Day is Friday");
break;
case 7:
printf("Day is Saturday");
break;
default:
printf("Invalid choice!");
}
getch();
return 0;
}
```

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Question 1:

WAP in C that reads a grade character (A, B, C, D, F) from the user and display corresponding message using a switch-case statement where:

A – Excellent

B – Very Good

C – Good

D – Average

F - Fail

```c
#include <stdio.h>

int main() {
    char grade;

    printf("Enter grade (A, B, C, D, F): ");
    scanf("%c", &grade);

    switch(grade) {
        case 'A':
            printf("Excellent!\n");
            break;

        case 'B':
            printf("Very Good!\n");
            break;

        case 'C':
            printf("Good!\n");
            break;

        case 'D':
            printf("Average\n");
            break;

        case 'F':
            printf("Fail\n");
            break;

        default:
            printf("Invalid grade entered!\n");
    }

    return 0;
}
```

Question 2:

Write a C program to input an integer and check whether it is even or odd using if-else.

```
#include <stdio.h>

int main() {
    int num;

    printf("Enter an integer: ");
    scanf("%d", &num);

    if (num % 2 == 0)
      {
        printf("%d is Even.\n", num);
      }
    else
    {
        printf("%d is Odd.\n", num);
    }

    return 0;
}
```

Question 3:

Write a C program that inputs the salary of an employee and calculates bonus as follows using nested if:

If salary >= 20000, bonus = 20%

Else

If salary >= 10000, bonus = 10%

Else bonus = 5%

Display bonus and final salary.

```
#include <stdio.h>

int main() {
    float salary, bonus, finalSalary;

    printf("Enter employee salary: ");
    scanf("%f", &salary);

    if (salary >= 20000)
      {
        bonus = salary * 0.20;
      }
      else {
        if (salary >= 10000)
            {
            bonus = salary * 0.10;
            }
        else
            {
            bonus = salary * 0.05;
        }
    }

    finalSalary = salary + bonus;
    printf("Bonus Amount: %.2f\n", bonus);
    printf("Final Salary: %.2f\n", finalSalary);
    return 0;
}
```

Questions

1. How does sequential control structure differ from decision control structure.
2. Write a C program that reads the age of a person and checks if they are eligible to get citizenship. A person is eligible to get citizenship if they are 16 years or older. If they are eligible, display a message indicating that they can get citizenship; otherwise, display a message indicating that they are not eligible.
3. Write syntax and draw flowchart : if statement, if…else statement, nested if else statement, else if ladder, switch statement
4. Write a C program to input an integer and check whether it is even or odd using if-else.
5. WAP to display the corresponding month of a year according to the numbers entered. (1 – Jan, 2-Feb, etc.)
6. WAP to input three numbers and find the largest number using nested if else statement.
7. WAP to input a number and check whether it is positive, negative or zero.
8. Make a comparison between nested if else statement and else if ladder statement with their syntax, flowchart and example for each.

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THANK YOU
Any Queries ?