CL-1002 Programming Fundamentals

LAB – 06

Nested Decision Structure & Ternary Operators

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Nested If-else Statement

Placing the block of if else statemennt inside an existing if or else block statemeent is called nested If else statement. Each block of nested if ellse, logically perform same as simple if elsee statements. Whenever a user wants to check more than onee condition at a time, the appropriate wayy is to use nested if-else statements. Following is the structure of nested if else statement.

```
IF (logical-expression) THEN
   statements
   IF (logical-expression) THEN
      statements
   ELSE
      statements
   END IF
   statements
ELSE
   statements
   IF (logical-expression) THEN
      statements
   END IF
   statements
END IF
```

Example Nested If-else statement

Problem

From the given three values, find the largest value. Algorithm

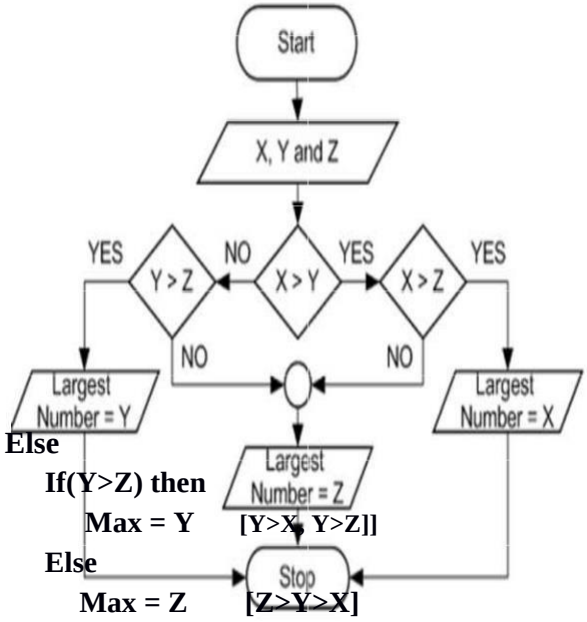
Flowchhar t

Step 1: Input X,Y,Z Step 2:
if(X>Y) then
If(X>Z) then
Max= X [X>Y, X>Z]
Else
Max= Z [Z>X>Y]
Endif

Else
If(Y>Z) then
Max = Y [Y>X, Y>Z]]
Else
Max = Z [Z>Y>X]

Endif Endif

Step 3: Print "The largest number is ",Max



C-Implementation

```
#include<stdio.h>
main(){
	intx,y,z;

	printf("Enter value of X");
	scanf("%d",&x);
	printf("Enter value of Y");
	scanf("%d",&y);
	printf("Enter value of Z");
	scanf("%d",&z);
	if(x>y){

		if(x>z){
			printf("The largest value is of x = %d",x);
		}
		else{
			printf("The largest value is of z =%d", z);
		}
	}
	else{
		if(y>z){
			printf("The largest value is of y= %d",y);
		}
		else{
			printf("The largest value is of z= %d",z);
		}
	}
}
```

Nested Switch-Case Statement

Placing the simple switch case statements inside an existing case statementis called nested switch-case statement. Each block of nested switch case statement, logically performs the same as simple switch case statement. Following is the syntax of nested switch case statement.

```
Switch(controlling
expression){ Label set 1:
        Statement 1;
         Break;
Label set 2:
        Statement 2;
Switch(controlling
expression){ Label set 1:
        Statement 1;
        Break;
Label set 2:
        Statement 2;
        Break;
Default:
         Statement d;
}
       Break;
Default:
      Statement d;
}
```

Example Nested switch-case statement

Problem

Ayesha is interested in knowing the names of different countries. She wants a list of countries by just giving an starting and ending letter.

C-Implementation

```
#include <stdio.h>
main()
{

char start,e;
printf("Please say starting letter of country");
scanf("%c",&start);
switch(start)
```

```
{
case 'A':
case 'a':
  printf("Please say ending letter\n");
  scanf("\n%c",&e);
   switch(e)
   {
      case 'A':
      case 'a':
            printf("\n Alasca \n Albania \n Algeria");
            break;
      default:
            printf("\n No such country");
   }
   break;
case 'B':
case 'b':
  printf("Please say ending letter\n");
  scanf("\n%c",&e);
   switch(e)
   {
     case 'A':
     case 'a':
          printf("\n Bulgeria \n Bolivia \n Botswana");
           break;
     default:
          printf(" No such country");
```

```
        }
        break;
    default:
            printf("Please type correct letter");
    }
}
```

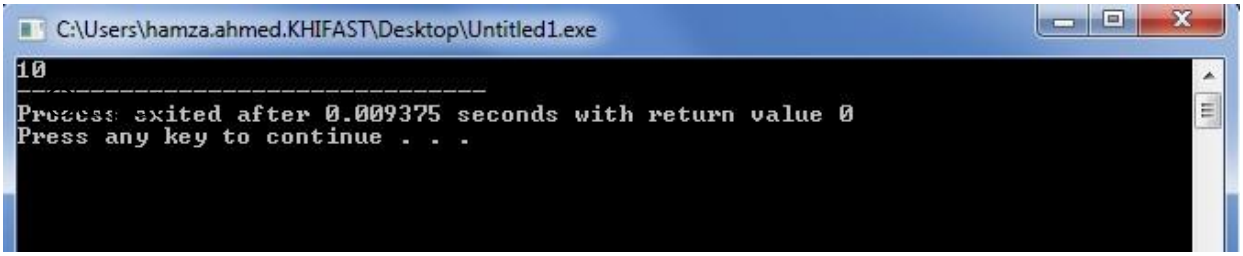
Output

Ternary Operator (?:) in C

[*] Untitled1

```c
#include<stdio.h>

int main()
{
    int a = 10, b = 20, c;
    c = (a < b) ? a : b;
    printf("%d", c);
}
```



[*] Untitled1

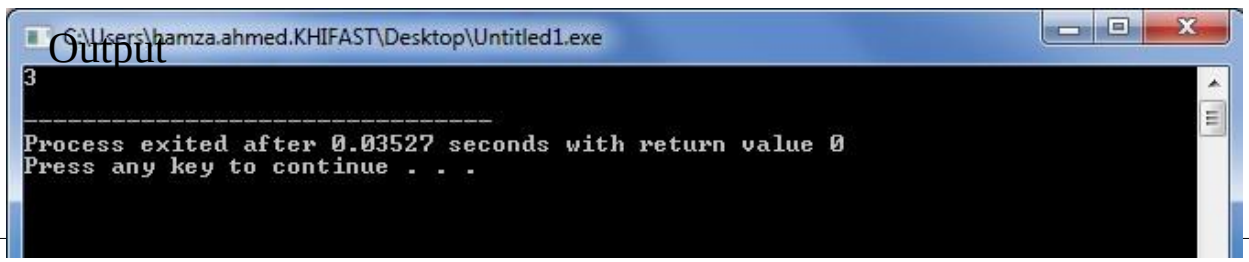
```c
#include<stdio.h>

int main()
{
    int a = 1, b = 2, ans;

    //Nested Ternary operator

    ans = (a == 1 ? (b == 2 ? 3 : 5) : 0);
    printf ("%d\n", ans);
}
```

Output



LAB TASK

Task 01
Find out the given number is even or not using Ternary Operator in C.

Task 02
Write a program to find the greatest number among three numbers using nested if else.

Task 03
Rewrite the following program segment using the if-else statements instead of the ternary operator.
String grade = (mark >= 90) ? “A” : (mark >= 80) ? “B” : “C”;

Task 04
A restaurant named SandwichesTown makes sandwiches. You order a sandwich and you're asked what kind of sandwich you would like: chicken, beef or vegetarian. You select vegetarian and you're asked to select from a choice of three vegetarian combinations:

- Tomato and mozzarella
- Eggplant and parmesan
- Cucumber and Swiss cheese

In this case when you choose chicken or beef you have no more choices to make. But when you choose vegetarian, you'd then have to choose what kind of vegetarian sandwich you like. Write a program to implement these procedures.

Task 05
A leap year is a year that has 366 days, instead of 365 days. It has one day extra in the month of February. Leap years occur once in 4 years, so any year that is completely divisible by four should be a leap year. But this is not always true. If there is some year and it is divisible by hundred, it will be a leap year only if it is also divisible by four hundred. Given a year, check if it a leap year or not using nested if else statement.

Task 06
Check whether the triangle is equilateral, scalene, or isosceles.

- Isosceles triangle: In geometry, an isosceles triangle is a triangle that has two sides of equal length.
- Equilateral triangle: In geometry, an equilateral triangle is a triangle in which all three sides are equal.
- Scalene triangle: A scalene triangle is a triangle that has three unequal sides.

QUESTION#7
Write a program to control a coffee machine. Allow the user to input the type of coffee as B for Black and W for White. Ask the user if the cup size is double and if the coffee is manual. The following table details the time chart for the machine for each coffee type. Display a statement for each step. If the coffee size is double, increase the baking time by 50 percent. Use functions to display instructions to the user and to compute the coffee time.

Operation	White Coffee	Black Coffee
Put Water	15 mins	20 mins
Sugar	15 mins	20 mins
Mix Well	20 mins	25 mins
Add Coffee	2 mins	15 mins
Add Milk	4 mins	-
Mix Well	20mins	25 mins

Note: Use switch structure to solve this problem.

Task 08

You are searching for a department in a university and you're asked to select a school from a choice of three schools namely:

- School of Computer Science
- School of Business
- School of Engineering

Having selected a school you are again provided with a list of departments that fall under the department namely:

- School of Computer Science
  - Department of Informatics
  - Department of Machine Learning
- School of Business
  - Department of Commerce
  - Department of purchasing
- School of Engineering
  - Department of Mechanical Engineering
  - Department of Mechatronics Engineering

After selecting the department, it shows the list of courses taught in each particular department.

- School of Computer Science
  - Department of Informatics
    - Course A
    - Course B
    - Course C
    - Course D
  - Department of Machine Learning
    - Course E
    - Course F
    - Course G
    - Course H
    - Course I
- School of Business
  - Department of Commerce
    - Course X
    - Course Y
    - Course Z
  - Department of purchasing
    - Course M
    - Course N
    - Course O
    - Course P
- School of Engineering
  - Department of Mechanical Engineering
    - Course R
    - Course S
  - Department of Mechatronics Engineering
    - Course J
    - Course K
    - Course L

Write a program to make the above logic implementable.

Task 09

Mortgage Calculator) Develop a C program to calculate the interest accrued on a bank customers mortgage. For each customer, the following facts are available:

a) the account number
b) the mortgage amount
c) the mortgage term
d) the interest rate

The program should input each fact, calculate the total interest payable (= mortgage amount × interest rate × mortgage term), and add it to the mortgage amount to get the total amount payable. It should calculate the required monthly payment by dividing the total amount payable by the number of months in the mortgage term. The program should display the required monthly payment rounded off to the nearest dollar. The program should process each customer's account at a time. Here is a sample input/ output dialog:

Enter account number (-1 to end): 100
Enter mortgage amount (in dollars): 6500
Enter mortgage term (in years): 3
Enter interest rate (as a decimal): 0.075
The monthly payable interest $ 221

Enter account number (-1 to end): 200
Enter mortgage amount (in dollars): 12000
Enter mortgage term (in years): 10
Enter interest rate (as a decimal): 0.045
The monthly payable interest is: $ 145

Enter account number (-1 to end): -1