NEAR **EAST UNIVERSITY**

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

**C PROGRAMMING LABORATORY**

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LABORATORY N:l

PROCESSING THE SELECTION STRUCTURES BY THE IF-ELSE STATMENT

Objectives:

-to study programming of the selection structures by using If-Else operator.

-to construct If-Then statements to perform a specified task.

-to construct If-Then-Else statements to perform a specified task.

-to debug a program with a selection control structure.

Introduction: The if - else statement is used to carry out a logical test and then take one of two possible actions, depending on the outcome of the test (i.e., whether the outcome is true or false).

lts simplest short form can be written as if (expression) statement

in this form, *expression* is logical expression that can take value true or false (one or zero).

The *statement* will be executed only if the *expression* hasa nonzero value (i.e., if *expression* is true).

The *statement* can be either simple or compound. In practice, it is often a compound statement which may include other control statements.

Examples:

if (x <O) printf(" %f", x);

if ((salary < 1000.) il (status = = 'R'))

printf("%f", salary);

The first statement causes the value of the floatirıg-point va.iable x to be printed (displayed) if its value is negative. The second statement contains a more complex logical expression. The value of salary will be printed out if it Iess than 1000 or its status is R.

The general form of anif statement which includes the else clause is if *(expression) statement* 1 else *statement 2*

If the *expression* is true, then *statement 1* will be executed. Otherwise (i.e., if *expression* is false), *statement* 2 will be executed.

Examples:

if (status = = 'S') tax = 0.20\*pay; else tax = 0.14\*pay;

if (circle)

scanf(" %f", &radius);

area = 3.14159 \* radius \* radius; printf("Area of circle = %f", area);

else {

scanf(" %f %f", &length, &width); area = length • width;

printf(" Area of rectangle = , %f", area); }

In the first example the value of tax is determined in one of two possible ways, depending on the character that has been assigned to the variable status. A more concise way to accomplish the same thing is to use conditional operator ?: . For example

tax = (status = = 'S') ? (0.20\*pay) : (0.14 \* pay); This approach is much more cryptic.

It is possible to nest if - else statements within one another. There are several different forms that nested if - else statements. The most general form of two layer nesting is

*if el if e2 si*

*else s2*

*else if e3 s3*

*\_else s4*

where *e J, e2* and *e3* represent expressions, and *s J, s2, s3* and *s4* represent statements. In this situation, one complete if - else statement will be executed if *el* is nonzero (true), and another complete if - else statement will be executed if *el* is zero (false). It is, of course, possible that *si, s2, s3* and s4 will contain other if - else statements. We would then have multilayer nesting.

Some other forms of two-layer nesting are *if el si*

*else if e2 s2*

*if el si*

*else if e2 s2 else s3*

*ifelife2sl else s2 else s3 ifelife2sl else s2*

in the first three cases the association between the else clauses and their corresponding expressions is straightforward. In the last case, however, it is not clear which expression *(el* or *e2)* is associated with the else clause. The answer is *e2.* The rule is that the else clause is always associated with the closest preceding unmatched (i.e., else-less) if. This is suggested by the indentation, though the indentation itself is not the deciding factor. Thus, the !ast example is equivalent to

if el {

if *e2 si else s2 }*

Example 1. Let us consider the solution of the following equations.

 *.J3x2* +4x x >O

*y=*

 4tan(x) x ~O

#include -cstdio.h»

#include <math.h>

main()

{ float x,y;

printf("Enter the value of x \n"); scanf("%r',&x);

if(x>O) y=sqrt(3\*pow(x,2)+4\*x);

 else y=tan(x); •

printf("The value of y is %r',y); }

Example 2. Let us write a program that find the roots of square equation .. #include -cstdio.h»

main()

{ float xl,x2,d,a,b,c;

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*ı*

printf("Enter the value of coefficients a,b,c \n"); scanf("%f %f %r',&a,&b,&c); d=pow(b,2)-4\*a\*c;

if(d>O) { xl=(b-sqrt(d))/(2\*a); x2=(b-sqrt(d))/(2\*a);

printf("The roots are %f and %r',xl,x2);

*==* } ; else

ü(dfo) { xl=(b-sqrt(d))/(2\*a);

printf("One real root %r',xl); } ; else printf("No real roots");

Exercises:

Write a program for each problem presented below

 5lnx x >O *ı.J~3x\_2\_+\_4\_x*

 1) *y* = ? 2) *y* =

 4cos- *x* x $O 4tan(x)

X>0 x$0

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 15x2 -4x+l3  | x >-1  | 4) *Y* = *ı~3x'* + 4cos(2x)  | x>O  |
| 3) *y* =  |  |  |  |
|  | sin(4x) + *e"*  | x $-1  | 400/(3x4 + 2x)  | x$0  |
|  | l\*os~i ,/s;n *x*  |  |  | r  | x<O  |
|  | x>O  | 6) *y* = x 2 - x  |  |
| 5) *y* =  |  |  |  | O<x $1  |
|  | e2' cos ' *x*  | x$0  | *x2* - sin(n:x2) -1  | in other case  |
|  | rg(6x) x >4  |  | *t' Y' x*+ log(x)  | x > 4, *y* > l  |
| 7) *y* = 5e2' 0.5 < x $ 4  |  | 8) *z=* e..r; +tg(y+x)  | 0.5 < x $ 4,-2 < *y* $ l  |
|  | l/(3x) x $O  |  |  | cos(2x) + sin(y)  | x $O, y $-2  |



1. a) Write a program that find the largest of two floating-poirıt numbers. b) Write a program that finds the smallest of two floating-poirıt numbers.
2. Determine the roots of quadratic equation ax2+bx+c=O

using the formula

- *b* ± *.J b* 2 - *4ac*

*x=------*

*2a*

Test Your program using the following set of data.

|  |  |  |
| --- | --- | --- |
| a  | b  | c  |
| 2  | 6  | 1  |
| 3  | 3  | o  |
| 1  | 3  | 1  |
| o  | 12  | -3  |
| 3  | 6  | 3  |
| 2  | -4  | 3  |

11) Write a program that reads number from the keyboard and calculate its square if number is positive.

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12) Write a program that read number from the keyboard and calculate its cube if number is negative.

13) Write a program that calculate the values of x2/a2+y21b2=1 function in the intervals xe [-1, u.

14) Write a program that calculate the values of sin(x2)+cos(/)=l function in the intervals XE [-n/2, 7t/2].

1. The floatirıg-point numbers x,y,z are given. Find a) max(x+y+z, x\*y\*z)+l3

b.} min(x2+y2, y2+z2)-4

1. The mathematical operations min(x,y) can be represented by the conditional expression (x<y)?x:y

by using similar conditional expression, describe the following mathematical operations

 Min(x,y,z) and max(x,y,z,w)

17) Write a program that fınds the smallest of several integers. Assume that the first value read specifıes the number of values remaining.

18) Write a program that will calculate the value of tax by the formula *ta.x=0.25\*profit* if the company profit more than 10.000$, by *tax=O. l 5\*profit* if the company profit less than 10.000$.

19) The value of x is given. Using graphics shown in fıgures calculate the value of y=f(x) function.

y=4

yesintx)

y=cos(x)

y=-x

]y=-x2

y=-x2

y=x

3

b)

c)

a)

20) Write a program that will calculate the exam grade of students by the formula, *Total\_grade=0.5\*Final\_exam\_grade+0.4\*Midterm\_exam\_grade+O. l \*Attendence* and define their grades AA if Total\_grade>90, BA if 85~ Total\_grade ~89, BB if 80~ Total\_grade ~84, CB if 75~ Total\_grade ~79, CC if 70~ Total\_grade ~74, DC if 65~ Total\_grade ~69, DD if 60~ Total\_grade ~64, FD if 50~ Total\_grade~59,

FF ifTotal\_grade ~49.

2l)Write a program that will examine the value ofa floating-point variable called *temp* and print one of the following messages, depending on the value assigned to *temp.*

1. ICE, if value of *temp* is less than O,
2. WATER, ifthe value of *temp* lies between O and 100
3. STEAM, if the value of *temp* exceeds 100.
4. Write a program that reads negative numbers from the keyboard and get their cube. Program will terminate its working when input number x is positive.

23) Write a program that reads positive numbers from the keyboard and calculate sum of their square. Program will terminate its working when input numlrer x is negative.

24) Write a program that reads negative and positive numbers from the keyboard and calculate the sum of positive numbers and sum of the square of negative numbers. Program will terminate its working when input number x is zero.

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