

Topic 3B

Making Comparisons & Choices

(More If /else, Logical Operator
(And/Or/Not))

Part II

Topics

Objectives:

- ❑ Understand the use of if/else Control structure for decision making
- ❑ Be able to use If-else to make decisions with more than one conditions using logical operators (AND and OR)

Quick Review

- ❑ In last lesson, we learnt about Relational operators that can be use to compare numerical values, strings or char
- ❑ Compare operators return either True or False

<	Less than
>	Greater than
==	Equal to
<=	Less than or equal to
>=	Greater than or equal to
!=	Not Equal to

- ❑ Relational operators can be used to compare numerical values, strings or char

Quick Review

- ❑ The if/else control enables the computer to do different actions depending on certain Test Conditions.
- ❑ The key control structure is:

```
if ( test is true )  
{  
    perform these statements  
}  
else // if test is false  
{  
    perform these statements  
    if test is false;  
}
```

- ❑ We will now look at if / else in more detail.

Making decisions using Nested if/else

- ❑ Very often, real life problems require us to select from more than 2 choices.
- ❑ Example:

```
if (marks >= 80)
1  lblResult.Text = "Grade is A";
else if (marks >= 70 )
2  lblResult.Text = "Grade is B";
else if (marks >= 60 )
3  lblResult.Text = "Grade is C";
else if (marks >= 50)
4  lblResult.Text ="Grade is D";
else
5  lblResult.Text ="Grade is F";
```

**Assume
marks = 85**
(85 > 80) is
TRUE
Grade is A

**Single IF/ELSE
block**

- ❑ It depends on **marks value**, finally Only **ONE path** will be executed
- ❑ It can be 1 or 2 or 3 or 4 or 5

Making decisions using Nested if/else

- ❑ Very often, real life problems require us to select from more than 2 choices.
- ❑ Example:

```
if (marks >= 80)
    lblResult.Text = "Grade is A";
else if (marks >= 70 )
    lblResult.Text = "Grade is B";
else if (marks >= 60 )
    lblResult.Text = "Grade is C";
else if (marks >= 50)
    lblResult.Text ="Grade is D";
else
    lblResult.Text ="Grade is F";
```

**Assume
marks = 65**
(65 > 80) is
FALSE

(65 > 70) is
FALSE

(65 > 60) is
TRUE

Grade is C

Making decisions using Nested if/else

- ❑ Very often, real life problems require us to select from more than 2 choices.
- ❑ Example:

```
if (marks >= 80)
    lblResult.Text = "Grade is A";
else if (marks >= 70 )
    lblResult.Text = "Grade is B";
else if (marks >= 60 )
    lblResult.Text = "Grade is C";
else if (marks >= 50)
    lblResult.Text ="Grade is D";
else
    lblResult.Text ="Grade is F";
```

**Assume
marks = 45**
(45 > 80) is
FALSE

(45 > 70) is
FALSE

(45 > 60) is
FALSE

(45 > 50) is
FALSE

Grade is F

Example 1: Grade Computation

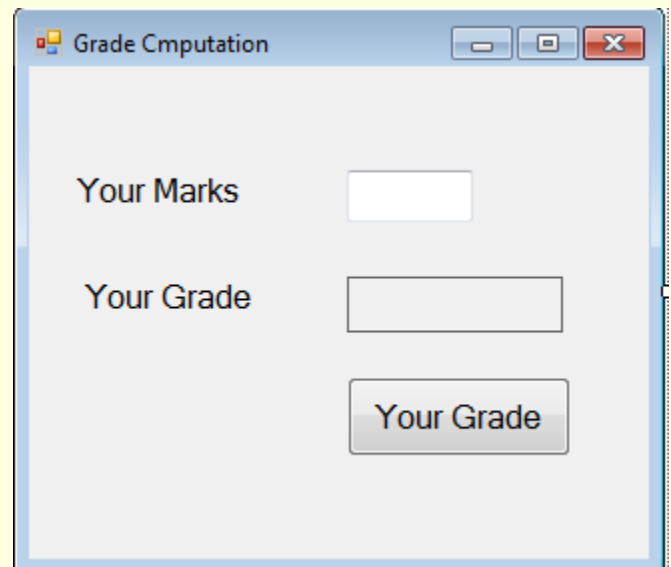
- ❑ **Problem Statement:** Create a Form to allow the user to enter marks of a student. The Grade will be computed based on following criterion:

Greater than or equal to 80	A
Between 70 to 79 (both inclusive)	B
Between 60 to 69 (both inclusive)	C
Between 50 to 59 (both inclusive)	D
Below 50	F

- ❑ **Form Design:**

Algorithm:

Read mark.
Compute grade
(see above)
Display grade



Example 1: Grade Computation

■ Code:

```
private void btnGrade_Click(object sender
{
    int marks;

    marks = int.Parse(txtMarks.Text);
    if (marks >= 80)
        lblResult.Text = "Grade is A";
    else if (marks >= 70)
        lblResult.Text = "Grade is B";
    else if (marks >= 60)
        lblResult.Text = "Grade is C";
    else if (marks >= 50)
        lblResult.Text = "Grade is D";
    else
        lblResult.Text = "Grade is F";
}
```

Example 1: Grade Computation

■ Sample Output:

Grade Cmputation

Your Marks 65

Your Grade Grade is C

Your Grade

Using Logical Operators

- ❑ So far the IF statements are used for single condition
- ❑ Combinations of Conditions
 - ❑ An IF statement can have multiple conditions combined, each connected with logical operators **AND** or **OR**.
 - ❑ In C#, the operators used are
 - ❑ **&&** for AND
 - ❑ **||** for OR

Logical Operator	In C#	Meaning
AND	&&	ALL conditions tested in the IF statement must be true
OR		ONE condition tested in the IF statement must be true

AND –

Making decisions using if/else

□ Examples:

If it is raining **AND** it is wet, bring along an umbrella

```
char rain = 'Y';
```

```
char wet = 'Y';
```

```
If ( (rain == 'Y') && (wet == 'Y'))
```

```
{
```

```
    lblMessage.Text = "Bring umbrella  
as wet, rainy weather expected today.";
```

```
}
```



Message will only be displayed when both conditions

1 **2**

are met

OR – Making decisions using if/else

□ Examples:

If you have a fever **OR** a headache,
take panadol

```
char fever = 'Y';  
char headache = 'Y';  
if ( (fever == 'Y') || (headache == 'Y') )  
{  
    1                      2  
    lblMessage.Text = "Take panadol";  
}
```



Message will only be displayed when
ONE of the conditions 1 2 is met

Making decisions using if/else

- Condition 1 **AND** Condition 2
 - **BOTH** Condition 1 and Condition 2 **MUST** be **TRUE** for the combined condition to be **TRUE**

Condition1	Condition2	1 AND 2
True	True	True
False	True	False
True	False	False
False	False	False

Making decisions using if/else

■ Examine the following C# code:

```
int age, discount=0;
char working;
.....
.....
If ((age >= 55) && (working == 'N' ))
    discount = 20;
```

age	Age > 55	working	working == 'N'	Result	discount
50	False	'N'	True	False	0
50	False	'Y'	False	False	0
60	True	'N'	True	True	20
60	True	'Y'	False	False	0

Making decisions using if/else

- Condition 1 OR Condition 2
 - **ONLY** Condition 1 OR Condition 2 **MUST** be **TRUE** for the combined condition to be TRUE

Condition1	Condition2	1 OR 2
True	True	True
False	True	True
True	False	True
False	False	False

Making decisions using if/else

- Examine the following C# code:

```
int discount = 0;  
  
if ((age < 55) || (working != 'N'))  
{  
    discount = 10;  
}
```

age	Age < 55	working	working != 'N'	Result	discount
50	True	'N'	False	True	10
50	True	'Y'	True	True	10
60	False	'N'	False	False	0
60	False	'Y'	True	True	10

Example 2: Compute Discounted Cost

- Let's run the following application to experience the OR and AND logical operators.
- **Problem Statement:**
 - Create a Form to accept age and working status. User clicks on Compute Discount button to get the discount information.

■ GUI Form Design


The screenshot shows a Windows-style application window titled "FormDiscount". Inside the window, there is a label "Age:" followed by a text input field. Below this is a label "Working:" followed by two radio buttons, "Yes" and "No". At the bottom of the form is a button labeled "Compute Discount". Below the button is a large empty text box. Arrows point from external labels to these components: "txtAge" points to the age input field, "radioButtonWorkY" points to the "Yes" radio button, "btnDisc" points to the "Compute Discount" button, and "textBox1" points to the large empty text box at the bottom.


Example 2: Compute Discounted Cost

■ Code using **&&** and **||**

```
private void btnDisc_Click(object sender, EventArgs e)
{
    int age;
    bool working = false;

    //read in age and working status
    age = int.Parse(txtAge.Text);
    working = radioButtonWorkY.Checked; // true or false

    // if age is greater than or equal to 55 and is NOT working
    1  if ((age >= 55) && (working == false))
    {
        textBox1.Text = "Discount is 20%";
    }

    // if age is less than 55 OR is working
    2  if ((age < 55) || (working == true))
    {
        textBox1.Text = "Discount is 10%";
    }
}
```

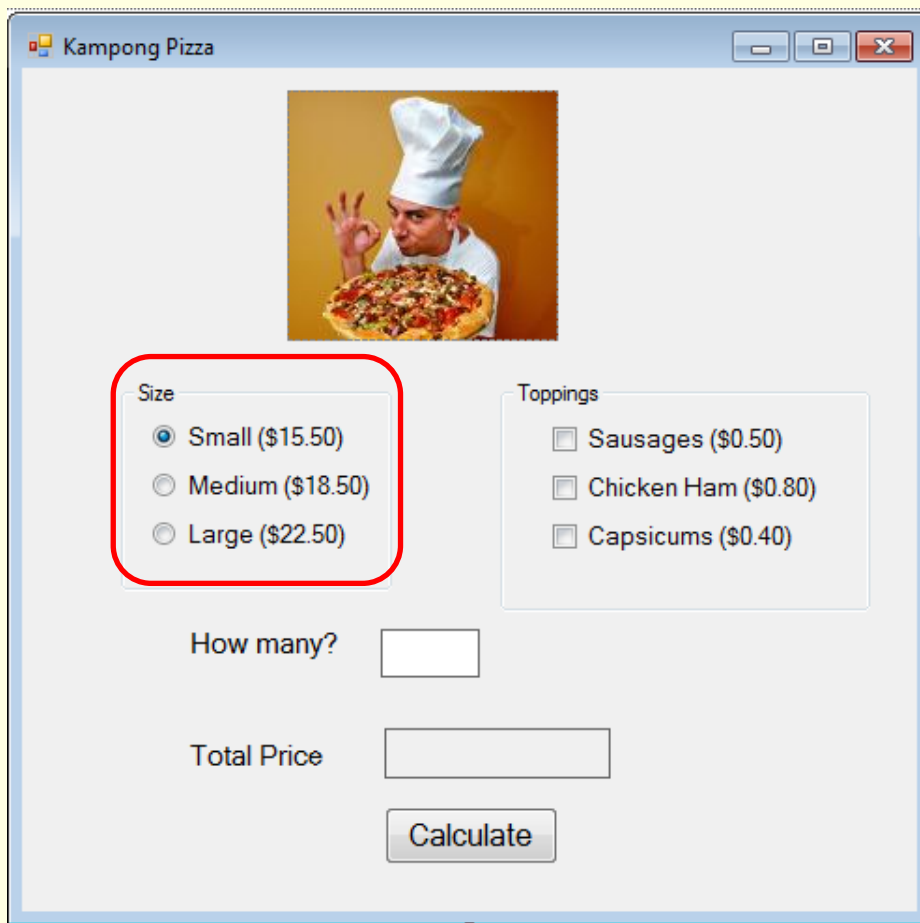
■ Run the program and see the logic work in



■ State the difference.


Example 3: Pizza Ordering System

- Let us apply nested if/else to the Pizza Ordering System in the last lesson. We will modify the application to allow the user to choose different sizes of pizza using radio buttons as shown:



The screenshot shows a window titled "Kampong Pizza" with a chef holding a pizza. Below the image, there are two main sections: "Size" and "Toppings". The "Size" section has three radio buttons: "Small (\$15.50)", "Medium (\$18.50)", and "Large (\$22.50)". The "Toppings" section has three checkboxes: "Sausages (\$0.50)", "Chicken Ham (\$0.80)", and "Capsicums (\$0.40)". Below these sections, there is a "How many?" label with a text input field, a "Total Price" label with a text input field, and a "Calculate" button.

Kampong Pizza



Size

- ☒ Small (\$15.50)
- ☐ Medium (\$18.50)
- ☐ Large (\$22.50)

Toppings

- ☐ Sausages (\$0.50)
- ☐ Chicken Ham (\$0.80)
- ☐ Capsicums (\$0.40)

How many?

Total Price

Example 3: Pizza Ordering System

❑ Code:

```
private void btnCalculate_Click(object sender, EventArgs e)
{
    float totalPrice = 0.0f;
    float basicPrice = 0f;
    int quantity;

    if (radSmall.Checked == true)
        basicPrice = 15.50f;
    else if (radMedium.Checked == true)
        basicPrice = 18.50f;
    else
        basicPrice = 22.50f;

    // Get qty ordered
    quantity = int.Parse(txtQuantity.Text);
    totalPrice = basicPrice * quantity;
}
```

To do: Explain code

Example 3: Pizza Ordering System

❑ Code:

- ❑ The remaining code remains unchanged.

```
if (chkSausages.Checked == true)
    totalPrice = totalPrice + 0.50f;

if (chkChickenHam.Checked == true)
    totalPrice = totalPrice + 0.80f;

if (chkCapsicums.Checked == true)
    totalPrice = totalPrice + 0.40f;

lblTotalPrice.Text = totalPrice.ToString("C");
}
```

Example 3: Pizza Ordering System

Sample output:

Kamong Pizza



Size

☐ Small (\$15.50)

☐ Medium (\$18.50)

☒ Large (\$22.50)

Toppings

☒ Sausages (\$0.50)

☒ Chicken Ham (\$0.80)

☐ Capsicums (\$0.40)

How many?

Total Price **\$23.80**

Summary

- ❑ The if/else control enables the computer to do different actions depending on certain Test Conditions.
- ❑ The key control structure is:

```

if ( test is true )
{
    // perform these statements
}
else if (test is true )
{
    // perform these statements
}
else
{
    // perform these statements only if      // rest
    are all not true
}

```

- ❑ Logical Operators:

Logical Operator	In C#	Meaning
AND	&&	ALL conditions tested in the IF statement must be true
OR		ONE condition tested in the IF statement must be true

Practical 3B

- ❑ There are 3 questions in Practical 3B
- ❑ There is no startup file provided.
- ❑ You need to create a new project file in Visual Studio
- ❑ Develop the complete solution with form, user control and code the logic
- ❑ Some samples of code are provided to help you
- ❑ Good Luck 😊



Practical 3B

Question 1: Number Guessing Game

❑ **Task:** Create a Form to accept the following:

- ❑ Name of Person
- ❑ A number

The program should allow user to attempt maximum of 3 tries to guess a number from 1 to 10. It should also allow user to restart a new game.

❑ **Form Design:**

The screenshot shows a Windows-style application window titled "Guess a number between 1 to 10. You have 3 tries". The form contains the following elements:

- Your Name:** A text label followed by a text input field. A red arrow points from the label `txtName` to this field.
- Enter Number :** A text label followed by a text input field. A red arrow points from the label `txtNum` to this field.
- Result :** A text label followed by a text area. A red arrow points from the label `txtResult` to this area.
- Guess** and **Restart** buttons. A red arrow points from the label `btnGuess` to the "Guess" button, and another red arrow points from the label `btnRestart` to the "Restart" button.

Practical 3B

Question 1: Number Guessing Game

- ❑ Think of the Algorithm (solution) and the pseudo code first.

- ❑ **Code:**

```
public partial class Form1 : Form
{
    // class variables
    int tries = 0; // track how many tries made
    int secret = 8; // secret number
    string name; // store user name
}
```

TO DO : Explain code

Practical 3B

Question 1: Number Guessing Game

Code:

```
private void btnGuess_Click(object sender, EventArgs e)
{
    name = txtName.Text;
    int guessNumber = int.Parse(txtNum.Text);
    bool isCorrect = false; // set to true if guess correct

    1 if (guessNumber == secret)
    {
        txtResult.Text = "Congratulations, " + txtName.Text + "!";
        isCorrect = true;
    }

    2 else if (guessNumber > secret)
    {
        txtResult.Text = "The secret number is smaller";
        txtNum.Clear();
        txtNum.Focus();
    }

    3 else
    {
        txtResult.Text = "The secret number is larger";
        txtNum.Clear();
        txtNum.Focus();
    }
}
```

TO DO : Explain code

Practical 3B

Question 1: Number Guessing Game

Code:

```
// increase 1 try attempt
tries = tries + 1;
// if he has not guess correctly
if (isCorrect == false) 1
{
    // 3 tries reached 2
    if (tries == 3)
    {
        txtResult.Text = "Sorry, " + txtName.Text; 3
        txtResult.Text = txtResult.Text + ".Maximum tries exceeded.";
    }
}
```

TO DO : Explain code

Practical 3B

Question 1: Number Guessing Game

Code:

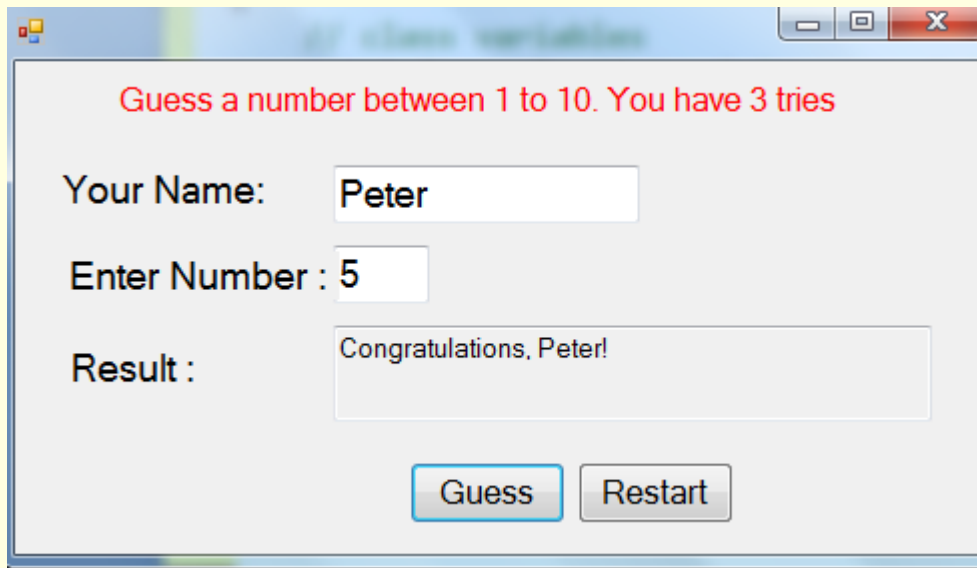
```
private void btnRestart_Click(object sender, EventArgs e)
{
    tries = 0;
    txtNum.Clear();
    txtNum.Focus();
    txtResult.Clear();
}
```

TO DO : Explain code

Practical 3B

Question 1: Number Guessing Game

❑ Sample Output:



Guess a number between 1 to 10. You have 3 tries

Your Name:

Enter Number :

Result :

Practical 3B

Question 1:

Number Guessing Game (Improved)

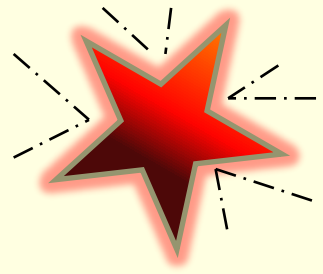
- ❑ Improve the program to generate a secret random number between 1 to 10 instead.

```
private void Form1_Load(object sender, EventArgs e)
{
    // create an object from Random Class
    Random random = new Random();
    // call Next Method to generate number
    // between 1 to 10
    secret = random.Next(1,10);
}

private void btnRestart_Click(object sender, EventArgs e)
{
    tries = 0;
    txtNum.Clear();
    txtNum.Focus();
    txtResult.Clear();
    Random random = new Random();
    secret = random.Next(1, 10);
}
```

TO DO : Explain code

Practical 3B



Question 2:

❑ Task:

Create a window application to read in name, age and mark of a student. The assignment base mark is 20. When user clicks on Show Performance button, it computes the percentage score (upon 100%) and displays the performance.

Percentage Score	Performance
70% and above	Excellent
69% - 60%	Average
59% - 50%	Pass
49% and less	Fail

The application has the following features:

❑ Display the result as follows:

John scores 20 marks. Performance is Excellent.

(where John is the name and 20 is the mark entered)

❑ Student who is below 20 years old and failed the test, it displays :

John needs to attend remedial session.

(where John is the name)

❑ Student who is above 50 or scores Excellent, it displays

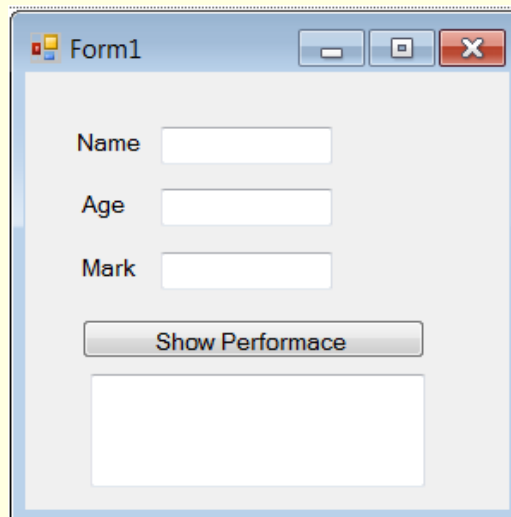
Sally will be rewarded.

(where Sally is the name)

Practical 3B

Question 2:

■ GUI Form Design:



Form1

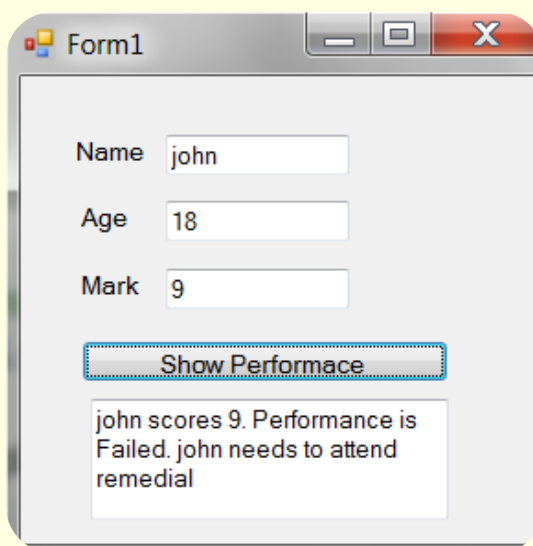
Name

Age

Mark

Show Performance

■ Sample output:



Form1

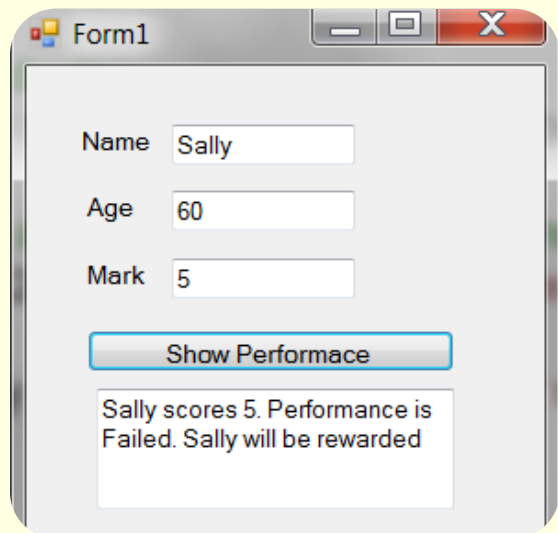
Name

Age

Mark

Show Performance

john scores 9. Performance is Failed. john needs to attend remedial



Form1

Name

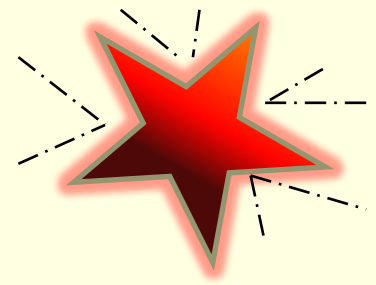
Age

Mark

Show Performance

Sally scores 5. Performance is Failed. Sally will be rewarded

Practical 3B



Question 3:

❑ Task:

Create a window application to read in a home loan amount (in dollars) and a senior citizen radio button. When user clicks on Compute Deposit button, it computes the required deposit based on the following schedule. It displays the calculated deposit.

Loan (\$)	Calculated Deposit (\$)
Greater than \$300,000	\$10,000 + 15% of loan
\$100,000 - \$300,000	\$5,000 + 10% of loan
Less than \$100,000	5% of loan

The application has the following features:

❑ Display the result as follows:

Your loan amount is \$10000 , calculated deposit is S\$500

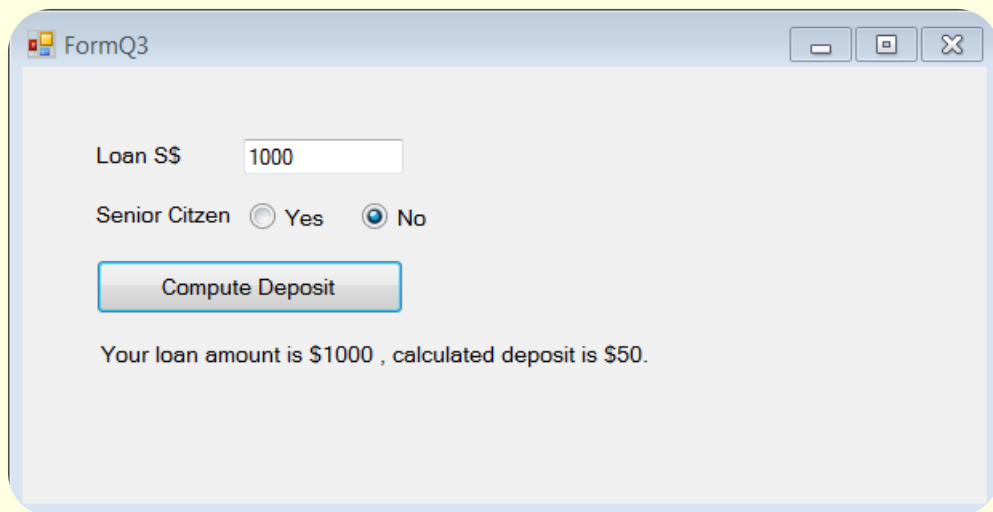
- ❑ There is a special discount of 0.5% for all senior citizen customers whose calculated deposit is more than or equal to \$500. It displays the calculated deposit after discount.

You are entitled for 5% discount. Discounted deposit is S\$475.

Practical 3B

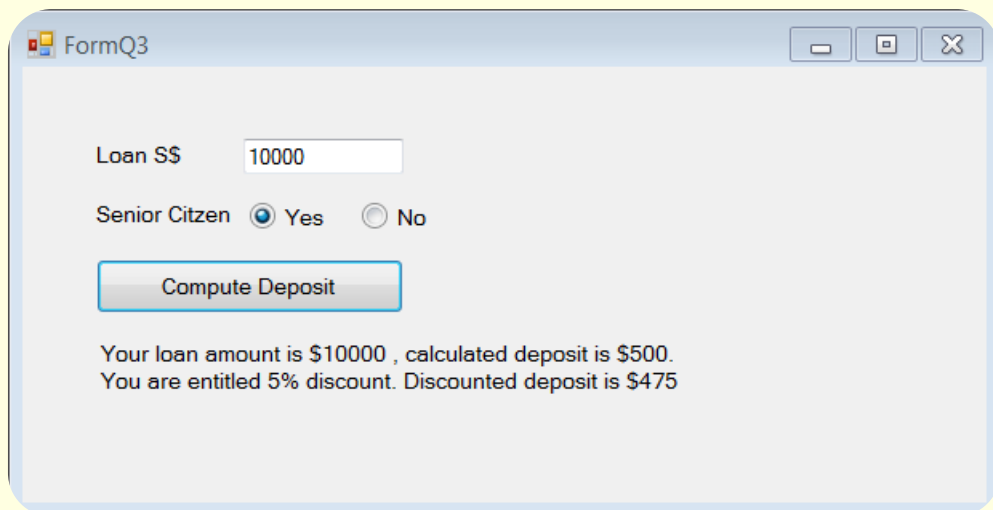
Question 3:

■ GUI Form Design and Sample output:



The screenshot shows a window titled "FormQ3" with a light blue header bar containing standard Windows window controls. The main area is white and contains the following elements:

- A label "Loan S\$" followed by a text input field containing the value "1000".
- A label "Senior Citizen" followed by two radio buttons: "Yes" (unselected) and "No" (selected).
- A rectangular button with a blue border and a gradient fill, labeled "Compute Deposit".
- A text label at the bottom stating: "Your loan amount is \$1000 , calculated deposit is \$50."



The screenshot shows the same "FormQ3" window after the "Compute Deposit" button has been clicked. The values and text have updated:

- The "Loan S\$" input field now contains "10000".
- The "Senior Citizen" radio buttons now have "Yes" selected and "No" unselected.
- The "Compute Deposit" button remains visible.
- The text label at the bottom now reads: "Your loan amount is \$10000 , calculated deposit is \$500. You are entitled 5% discount. Discounted deposit is \$475".

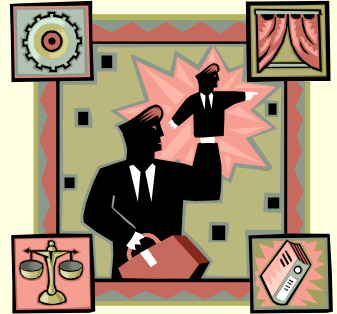
Practical 3B

Extras – Help for You! (Optional)

If you need extra help in applying **IF / ELSE** statements:

- ❑ You may refer to the elearning exercises
- ❑ It teaches you How to do a grade calculator using IF/ELSE statement
- ❑ The teaching aids are:
 - ❑ Grade Calculator Part 1
 - ❑ Grade Calculator Part 2
 - ❑ Grade Calculator Part 3
- ❑ They are video clip for you to follow. Have fun!

End of Topic 3B



Making Comparisons & Choices (More If /else and Exception Handling)

Part II