

# University of Colombo

## Faculty of Technology

Department of Instrumentation and Automation Technology

IA 2210 - Rapid Application Development



Group Assignment

### Advanced Scientific Calculator

**Group Number-12**

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|---------------------------|---------------------|
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## Table of Contents

1. Introduction.....	3
2. Objectives .....	3
3. Tools & Technologies Used .....	3
4. Project Structure.....	3
5. Form Descriptions.....	3
5.1 Splash Screen.....	3
5.2 MDI Main Form.....	3
5.3 Scientific Calculator.....	3
5.4 Temperature Converter.....	4
5.5 Unit Converter .....	4
6. User Interface Screenshots.....	4
7. Features Implemented.....	8
8. Challenges Faced .....	8
9. Individual Contributions .....	8
10. Conclusion .....	9
11. References.....	9

## 1. Introduction

This project demonstrates a Windows Forms application built using C#. The system includes a Scientific Calculator, a Temperature Converter, and a Unit Converter, all integrated within an MDI (Multiple Document Interface) structure. The purpose is to apply the principles of Rapid Application Development (RAD) and GUI design using Visual Studio.

## 2. Objectives

- ❖ To build an interactive Windows desktop calculator with extended functionality.
- ❖ To include scientific and unit/temperature conversion features.
- ❖ To demonstrate the use of C# controls, event handling, and form communication.

## 3. Tools & Technologies Used

- Microsoft Visual Studio (Windows Forms)
- C# Programming Language
- .NET Framework
- Windows Forms Designer

## 4. Project Structure

- ✓ Form1.cs – MDI Parent Window
- ✓ **FormCalculator.cs** – Scientific Calculator logic and UI
- ✓ **FormTemperatureConverter.cs** – Converts between Celsius, Fahrenheit, Kelvin
- ✓ **FormUnitConverter.cs** – Converts length and weight units
- ✓ **SplashScreen.cs** - Displays project info for 5 seconds.
- ✓ Supporting controls: ComboBoxes, Buttons, TextBoxes, Labels, MenuStrip

## 5. Form Descriptions

### 5.1 Splash Screen

- Displays project info for 5 seconds.

### 5.2 MDI Main Form

- Hosts child windows
- Menu options to open each feature (Calculator, Temp and Unit Converters)

### 5.3 Scientific Calculator

- Supports standard arithmetic (+, -, \*, /)
- Scientific functions (sin, cos, tan, log, exp, etc.)

- Binary, Hex, Octal, Decimal conversion
- Clear, CE, Backspace,  $\pm$  toggle

#### 5.4 Temperature Converter

- Converts between Celsius, Fahrenheit, Kelvin
- Input via on-screen number pad
- Result shown dynamically

#### 5.5 Unit Converter

- Two conversion categories: Length, Weight
- Unit pairs include: Meter, Kilometer, Foot, Inch, Gram, Pound
- Clear UI with number pad input and result label

### 6. User Interface Screenshots

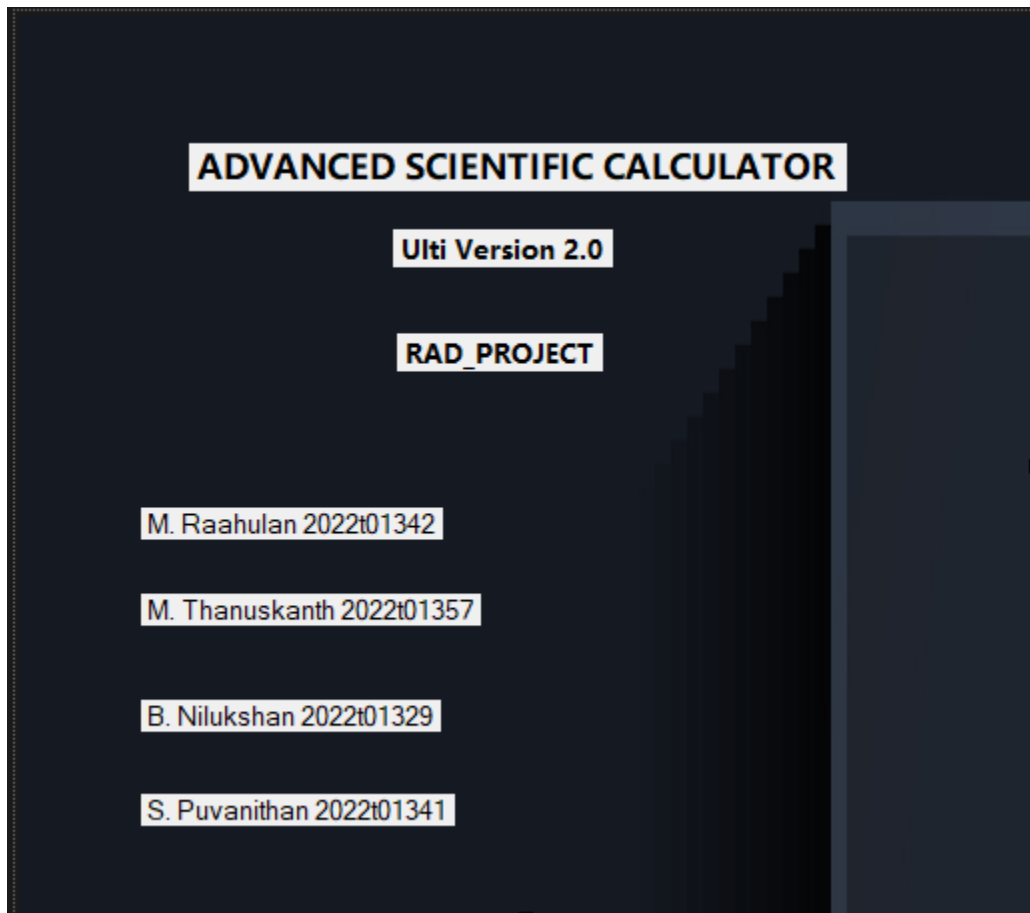


Figure 1: SplashScreen

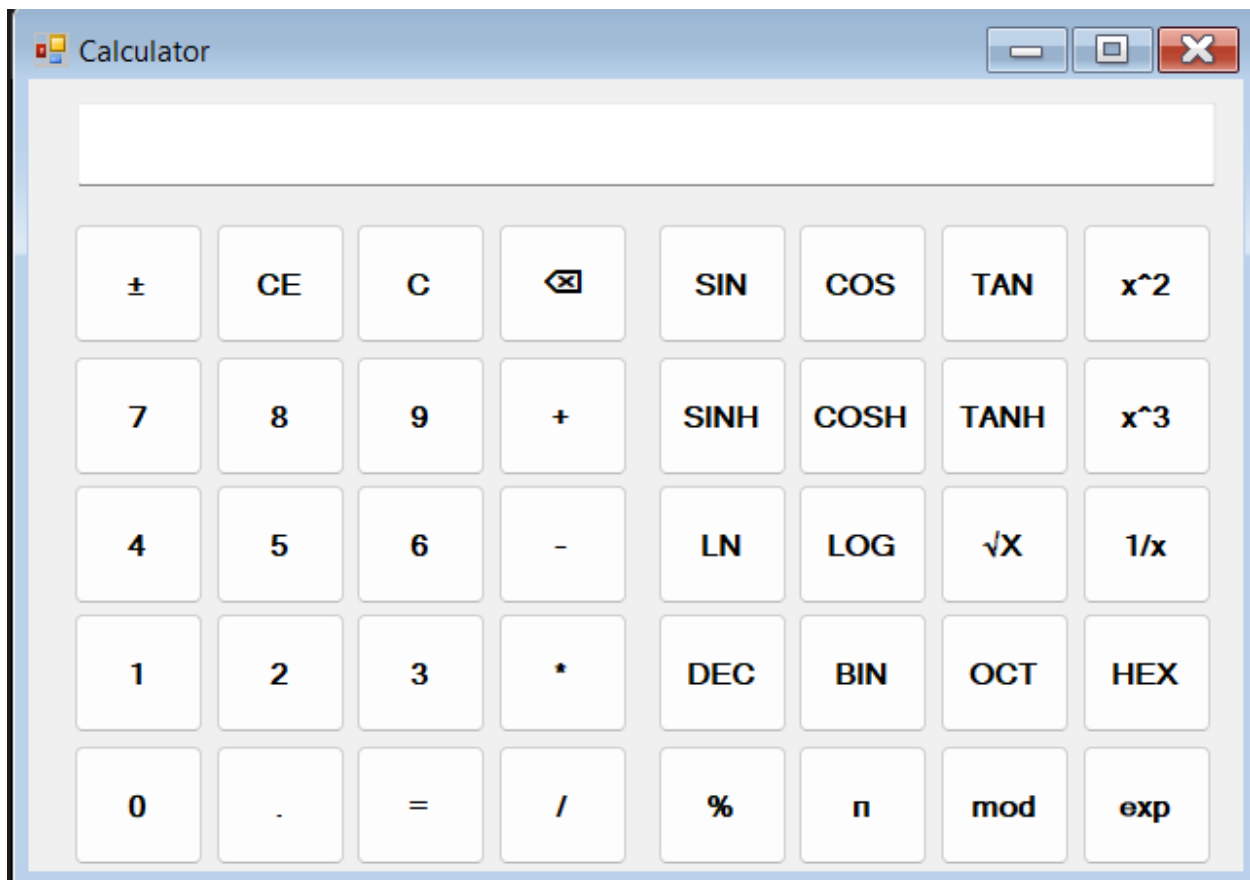


Figure 2Scientific Calculator

Temperature Converter

Enter Temperature

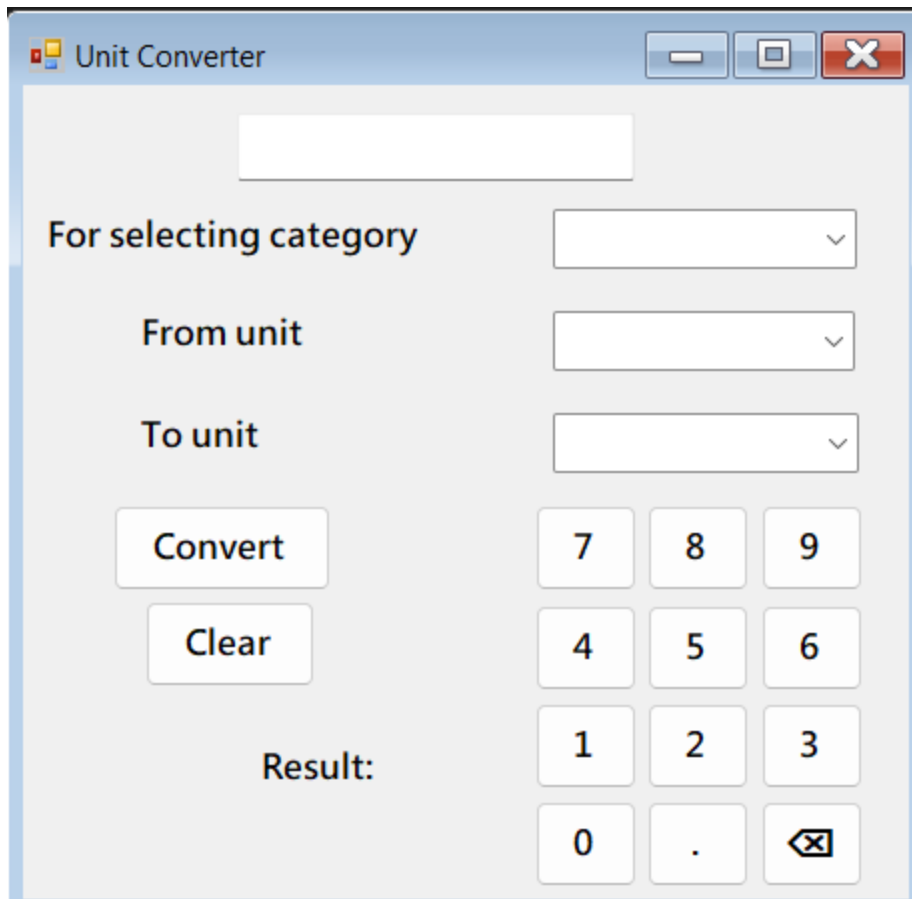
From

To

Result:

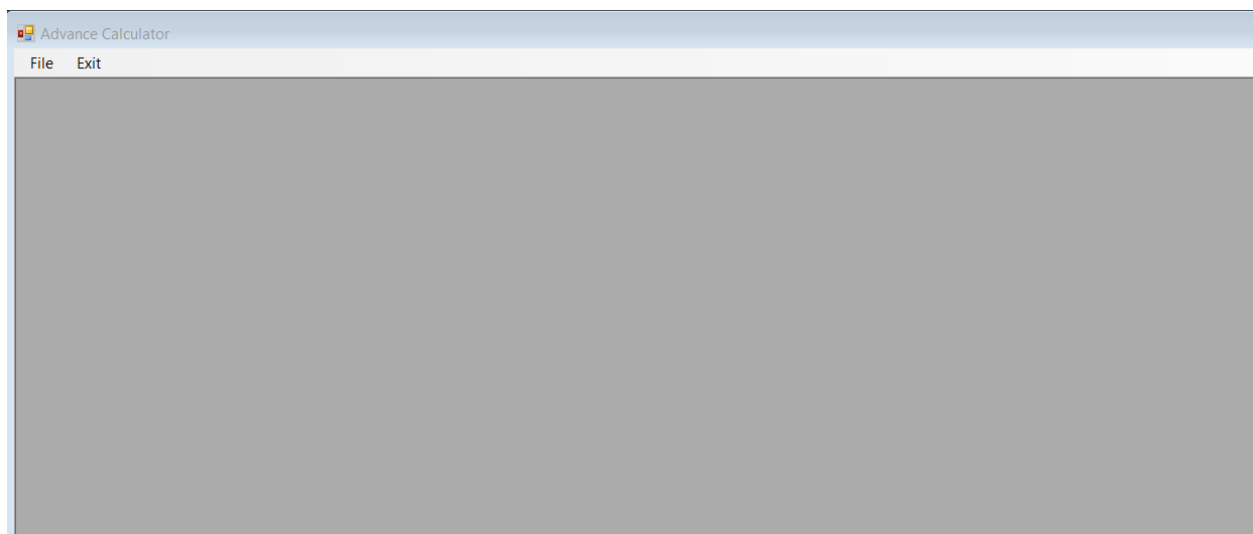
7	8	9
4	5	6
1	2	3
0	.	⌫

Figure 3: Temperature Converter



The image shows a Windows-style application window titled "Unit Converter". It features a standard title bar with minimize, maximize, and close buttons. The main interface includes a text input field at the top. Below it, the text "For selecting category" is followed by a dropdown menu. Further down, the labels "From unit" and "To unit" are each followed by a dropdown menu. On the left side, there are two buttons: "Convert" and "Clear". On the right side, there is a numeric keypad with buttons for digits 0-9, a decimal point, and a delete/clear button. At the bottom left, the label "Result:" is present.

Figure 4: Unit Converter



The image shows a Windows-style application window titled "Advance Calculator". It has a title bar with "File" and "Exit" menu options. The main area of the window is a large, empty gray rectangle, which likely serves as a workspace for calculations or displaying results.

Figure 5: MDI Main Form

## 7. Features Implemented

- Fully working MDI container with menu navigation
- Scientific button functionality with method handling
- Decimal control, error validation, CE, C, and backspace
- Input validation and conversion logic for real-world accuracy
- Easy-to-use GUI layout with event-driven logic

## 8. Challenges Faced

- Handling decimal inputs without duplication
- Managing cross-form variable access
- ComboBox update based on category selection
- Dynamically updating labels and controls

## 9. Individual Contributions

Member Name	Contribution
M.RAAHULAN      2022t01342	UI Design, Unit Converter Implementation
M. THANUSHKANTH 2022t01357	Calculator Functions, Input Validation Logic
B.NILUKSHAN      2022t01329	MDI Structure, Splash Screen, Report Compilation
S.PUVANITHAN      2022t01341	Temperature Converter, Final Integration



## 10. Conclusion

This project provided practical experience in C# Windows Forms development using RAD techniques. The calculator system effectively demonstrates multi-form integration, control usage, and user interaction, delivering a real-world utility tool.

## 11. References

- Microsoft C# Documentation
- .NET WinForms Tutorials
- Stack Overflow (UI layout help)
- Class lecture slides and assignments