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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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, ± 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
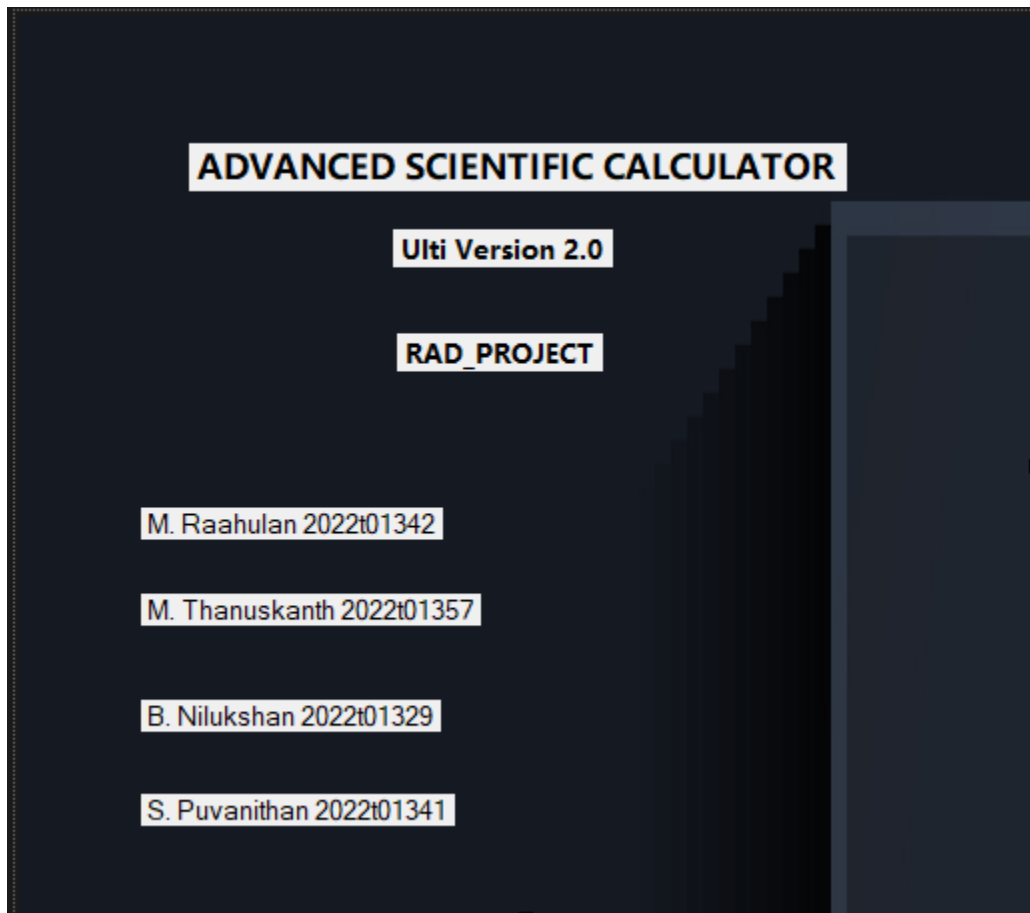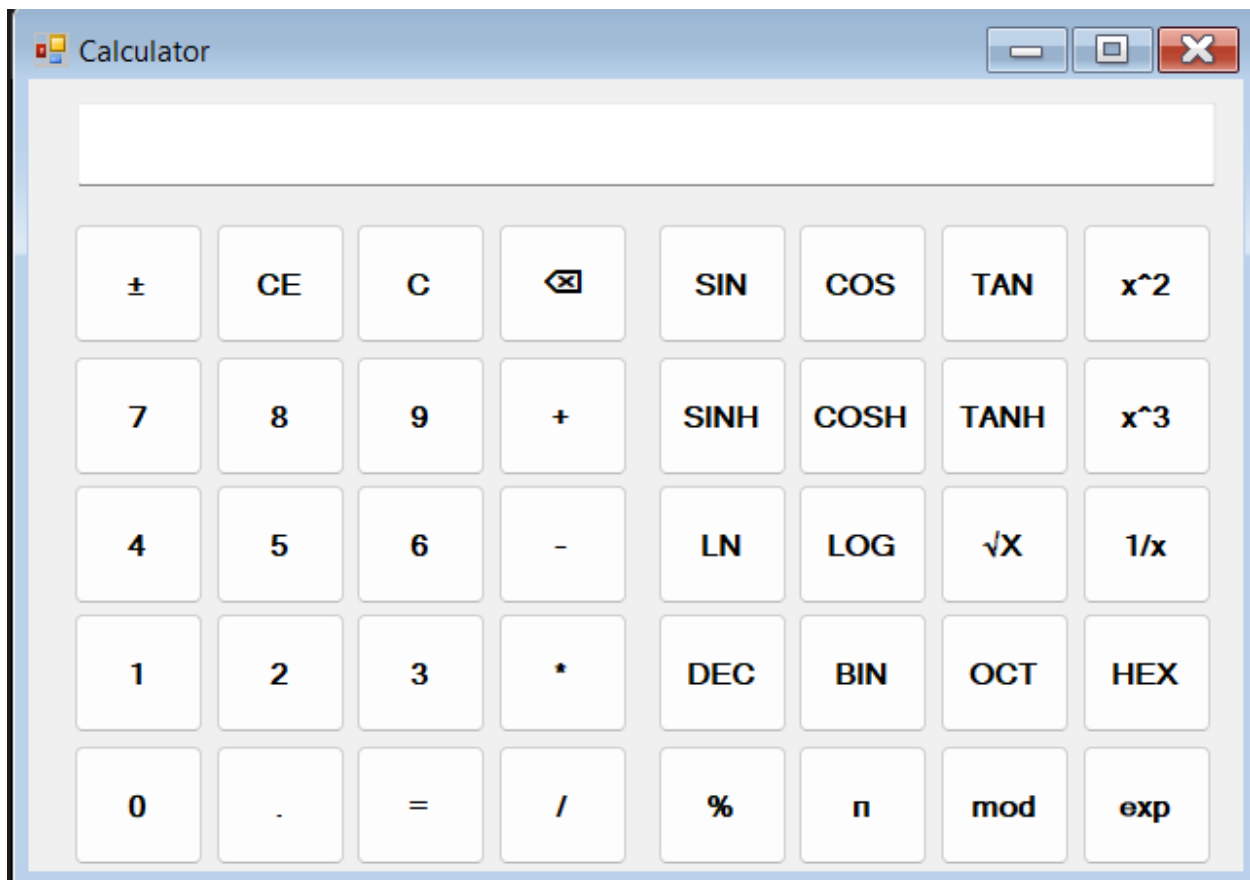
6. User Interface Screenshots

Figure 1:SplashScreen

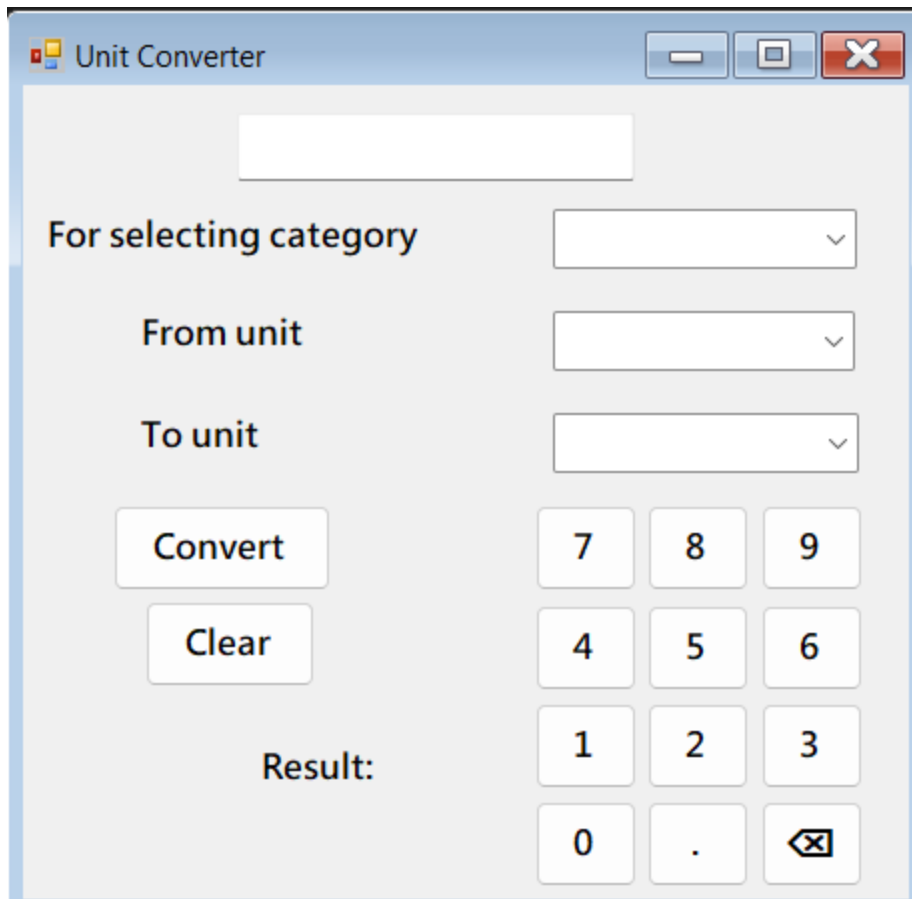*Figure 2Scientific Calculator*
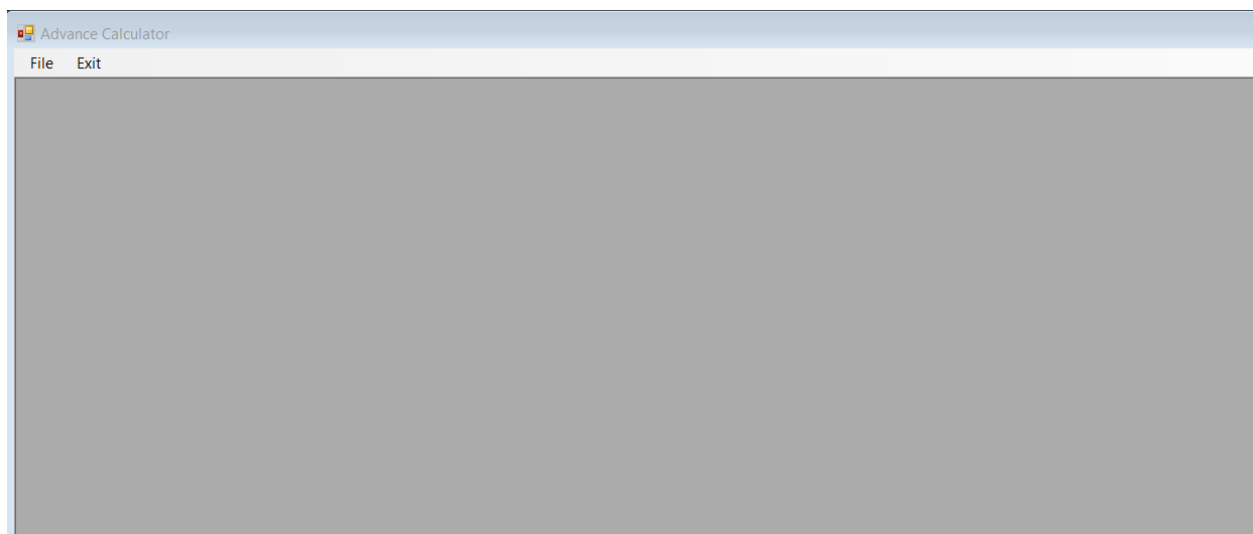
Figure 3: Temperature Converter

Figure 4: Unit Converter

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