GUI-Based Scientific Calculator

Java College Project Presentation

By: M.shashi kiran(24070721019)
D.ajay(24070721011)
T.sainivas(24070721041)
A.shashank(24070721001)
M.Aditya(24070721018)

Department of Computer Science

Introduction

A scientific calculator is a software application designed to perform mathematical operations beyond simple arithmetic. This project implements a GUI-based scientific calculator in Java using Swing components to provide an interactive and user-friendly interface

Objectives

•To design and develop a GUI-based scientific calculator using Java.

• To implement essential mathematical and trigonometric operations.

• To ensure accuracy, usability, and reliability of the application.

• To enhance programming and GUI development skills.

Problem Statement

•Manual calculation of complex mathematical expressions can be time-consuming and error-prone. Hence, there is a need for a software-based solution that provides accurate and efficient computation with a user-friendly interface.

Scope of the Project

- The calculator supports both basic and advanced mathematical operations.
- Includes trigonometric, logarithmic, and exponential functions.
- GUI allows easy interaction and improved visualization of operations.
- Portable and platform-independent through Java.

Tools and Technologies Used

- Programming Language: Java
- GUI Framework: Swing
- IDE: Eclipse / NetBeans / IntelliJ IDEA
- Operating System: Platform Independent
- JDK Version: 8 or above

System Design

•The system follows a modular design approach:

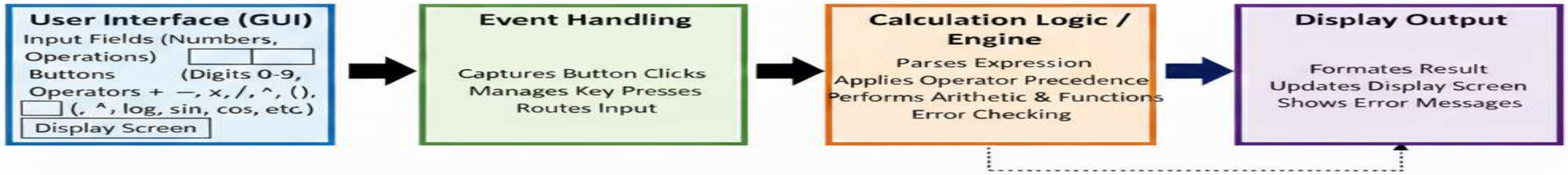
• Input Module – Accepts user inputs via buttons.

• Processing Module – Performs computations using Java logic.

• Output Module – Displays results on the screen.

• Error Handling – Manages invalid inputs and exceptions.

Architecture Diagram



GUI Layout

- The GUI consists of:
- Display Screen for showing input/output.
- Buttons for digits, operators, and scientific functions.
- Menu options for clearing, exiting, or additional settings.

Implementation

- The calculator is implemented using Java Swing.
- ActionListeners are used for handling button events.
- Mathematical operations are performed using Java Math class.
- Exception handling ensures smooth functioning of the application.

Sample Code Snippet

```
JButton btnAdd = new JButton("+");
btnAdd.addActionListener(new   ActionListener()
{
public void actionPerformed(ActionEvent e) {
   num1                                                    =
Double.parseDouble(textField.getText());
    operator = '+';
   textField.setText("");
  }
});
```

Output


Scientific Calculator
100
ON
OFF
C
←
7
8
9
/
√
4
5
6
*
x²
1
2
3
-
x³
0
.
=
+
1/x
sin
cos
tan
log
ln
π
e
(
)
Read-Only
Smart Insert

Advantages

- Easy to use and user-friendly GUI.
- Fast and accurate calculations.
- Supports advanced scientific operations.
- Cross-platform compatibility using Java.

Limitations and Future Scope

Limitations:

- No support for graph plotting.
- Limited memory functions.

Future Enhancements:

- Add support for graphing and history storage.
- Include dark mode and voice input features.

Conclusion

- The GUI-based Scientific Calculator developed in Java provides a reliable and efficient solution for performing mathematical operations. It demonstrates the practical application of Java Swing, event handling, and software design principles in a real-world context.

Thank You