Building a Professional Calculator with Python

Day 20 (Last) - Python Basics

Shaida Muhammad

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ShaidaSherpao@gmail.com

Agenda

1   Building a Professional Calculator

2   Architecture

3   Project Files Structure

4   Coding ...

5   Demo and Future Work

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Project Overview

- **Objective**:

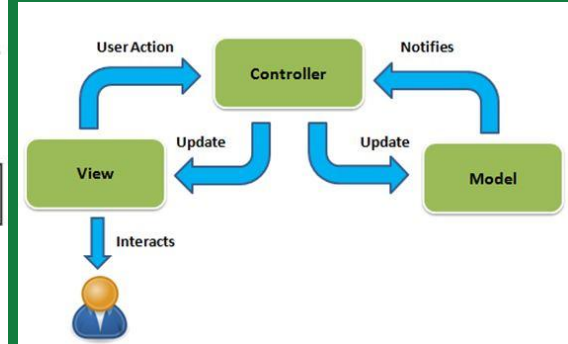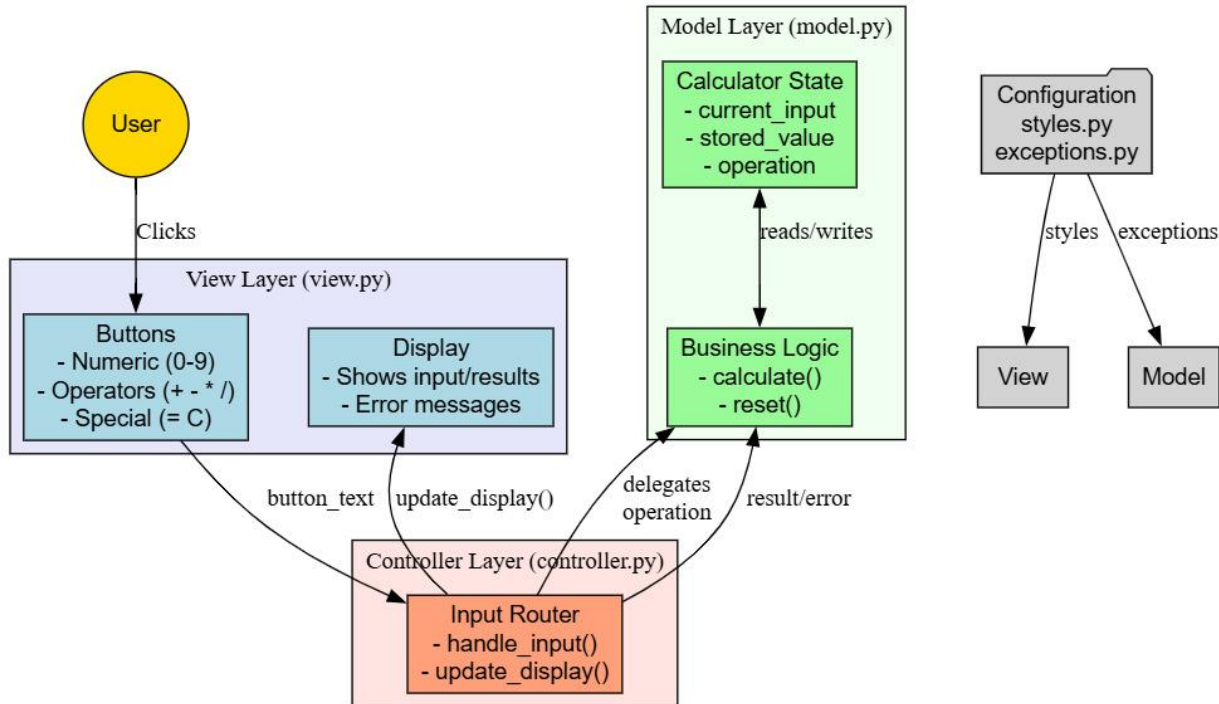 Build an extensible calculator with:
  - MVC architecture
  - Error handling
  - Professional UI

- **Key Features**:
  - Basic operations (+, -, *, /)
  - Clear (C) and equals (=) functions
  - Modular design for easy expansion

Architecture Diagram

- **MVC Pattern**

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Architecture

- **File Structure**:
  - `main.py        # App entry`
  - `view.py       # GUI`
  - `controller.py # Business logic`
  - `model.py      # Calculations`
  - `styles.py     # UI config`
  - `exceptions.py # Custom errors`

Key Code Snippets

- **Model (Business Logic)**

```python
def calculate(self):
    if self.operation == '/':
        if current_value == 0:
            raise DivisionByZeroError()
    # ... other operations …
```

- **2. View (Button Creation)**

```python
command=lambda: self.controller.handle_input(text)
```

- **3. Controller (Mediator)**

```python
def handle_input(self, button_text):
    if button_text == '=':
        self.model.calculate()
```

Error Handling

- **Custom Exceptions**:

```
class DivisionByZeroError(CalculatorError):
        """Raised on division by zero"""
```

- **Graceful UI Feedback**:

```
def show_error(self, message):
        self.display_var.set("Error")
```

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Demo & Testing

● **Test Cases**:

```
5 + 3 = 8

10 / 0 → Error

C → Reset

And more …
```

● **How to Run**:
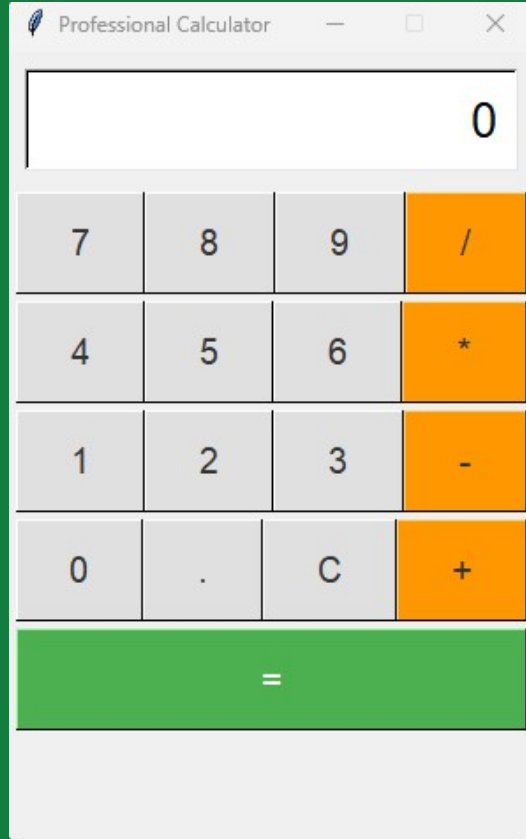
```
python main.py
       OR
Run Calculator.exe
```

Extensions

- **Future Enhancements:**
  - Memory functions (M+, MR)
  - Scientific operations ($\sqrt{\ }$, ^)
  - Keyboard support
  - Theme switching

App

Summary

- **Key Takeaways**:
  - ○ MVC enables clean separation
  - ○ Custom exceptions improve robustness
  - ○ Lambda fixes button argument passing

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Q&A

- Do you have any questions?
- Share your thoughts.

Closing

End of the course :)