

**Java**

**Graphical User Interface**

# Java GUI

A graphical user interface consists of **graphical components**, such as:

- Windows
- Buttons
- Menus
- Text fields

**Swing** is the principal **GUI toolkit** for Java programming language.

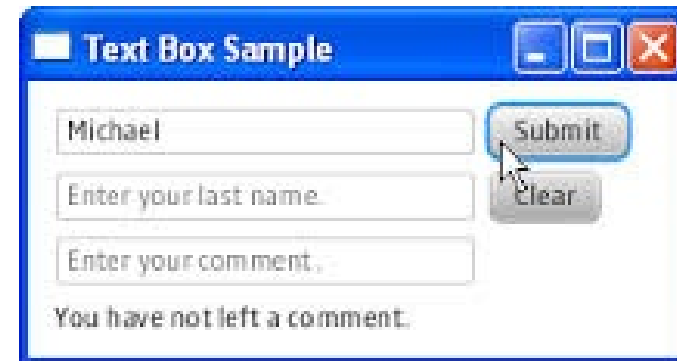
- **`import java.awt.*;`**
- **`import javax.swing.*`**

# Events

A GUI application program shows the user a graphical interface containing several graphical components.

The user controls the application by interacting with the graphical components, doing such things as:

- Clicking on a button to choose a program option.
- Making a choice from a menu.
- Entering text in a text field.
- Dragging a scroll bar.
- An action such as clicking on a button is called an event.

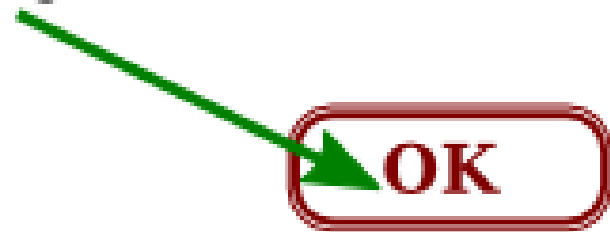


# Event-driven Programming

- When you perform an action on a graphical component you generate an **event**.
- A user interacts with a GUI application by causing events.
- In **event-driven programming** the program responds to these events.
- The application responds to events in the order they arrive.
- The order of the events is determined by the user, not the program.
- A well-written program works correctly no matter what the user does.

# Event Handling

- User clicks button, button generates event



Visible button,  
represented by  
a `JButton` object

`ActionEvent` object is  
sent to listener



Event-handling object  
of type `ActionListener`  
responds to the event

# Three Parts of a GUI Program

1. **Graphical Components** that make up the Graphical User Interface.
  - The graphical components of Java include:
    - Swing objects
    - AWT (Abstract Window Toolkit) objects. (Before Swing)
2. **Listener methods** that receive the events and respond to them.
  - Listener methods are Java methods that you write.
3. **Application methods** that do useful work for the user.
  - Application methods are ordinary Java methods that perform useful computations.

# JFrame and JPanel

- In a Java GUI program, each GUI component in the interface is represented by an object in the program.
- One of the most fundamental types of component is the window.
- Windows have many behaviors.
  - They can be opened and closed.
  - They can be resized.
  - They have "titles" that are displayed in the title bar above the window.
  - Most important, they can contain other GUI components such as buttons and menus.

# JFrame and JPanel

- Java has a built-in class to represent windows. There are several different types of window.
- The most common type is represented by the JFrame class
- A JFrame is an independent window that can act as the main window of an application.
- A JFrame object comes with many of the behaviors of windows already programmed in.
- It comes with the basic properties shared by all windows, such as
  - A titlebar and the ability to be opened and closed.
- Since a JFrame comes with these behaviors, you don't have to program them yourself!

