

UNIT 11 — JAVA APPLICATIONS

Lesson 1: AWT and Swing

(8 Hrs. Unit) — Object Oriented Programming in Java

CACS204 • II/III Semester • TU BCA

Learning Objectives

- Understand what a GUI is and why GUI toolkits are used.
- Understand the meaning and purpose of AWT.
- Understand Swing and its role in Java GUI programming.
- Identify common AWT and Swing components.
- Understand the basic difference between AWT and Swing.
- Create and understand a basic JFrame window.

Lesson Roadmap

- ✓ GUI → AWT → Swing → AWT vs Swing → Swing components → JFrame → first Swing program.
- ✓ This lesson provides the foundation for the remaining Unit 11 topics such as buttons, text fields, layouts, events, menus, tables, and dialogs.

1. What is a GUI?

GUI stands for Graphical User Interface. It allows users to interact with a computer program through graphical elements such as windows, buttons, text fields, menus, checkboxes, lists, and tables instead of relying only on a command-line interface.

Example: Command-Line vs GUI

Command-line: the user types commands or values into a terminal.

GUI: the user can enter a name into a text field and click a button such as Submit.

A typical GUI window may contain a title bar, labels, input fields, buttons, and other controls.

2. What is AWT?

AWT stands for Abstract Window Toolkit. It is Java's original GUI toolkit and provides classes for creating graphical user interfaces.

AWT classes are mainly available in the `java.awt` package.

AWT Component	Purpose
Frame	Creates a window.
Label	Displays text.
TextField	Accepts single-line text input.
Button	Creates a button.
Checkbox	Creates a checkbox.
Choice	Provides a choice/drop-down component.
List	Displays a list of items.

Importing AWT

```
import java.awt.*;
```

3. What is Swing?

Swing is a Java GUI toolkit that provides a rich collection of components for building graphical applications. Swing components are mainly available in the `javax.swing` package.

Swing Component	Purpose
JFrame	Main/top-level window.

Swing Component	Purpose
JLabel	Displays text.
TextField	Accepts single-line text input.
JButton	Creates a button.
JCheckBox	Creates a checkbox.
JRadioButton	Creates a radio button.
JComboBox	Provides a drop-down list.
JList	Displays a list.
TextArea	Accepts/displays multi-line text.
JTable	Displays data in tabular form.
JPanel	Acts as a container for components.
JDialog	Creates a dialog box.

Importing Swing

```
import javax.swing.*;
```

4. AWT vs Swing

Both AWT and Swing are used for GUI programming in Java. Swing provides a broader collection of GUI components and is the main toolkit used in the Swing topics of this unit.

AWT	Swing
Original Java GUI toolkit.	More advanced Java GUI toolkit.
Package: java.awt	Package: javax.swing
Uses components such as Frame and Button.	Uses components such as JFrame and JButton.
Provides a smaller set of GUI components.	Provides a larger collection of GUI components.
Uses native peer-based components.	Mostly uses lightweight components.
Less flexible for rich GUI construction.	More flexible for building rich GUI applications.

5. Recognizing Swing Components

A simple way to recognize many Swing components is the J prefix in their class names.

AWT	Swing
Frame	JFrame
Button	JButton
Label	JLabel
TextField	JTextField
Checkbox	JCheckBox
Panel	JPanel

Remember: the J is part of the Swing class name. It is not a separate keyword.

bcalink.com

6. JFrame — The Top-Level Window

A JFrame represents a top-level window in Swing. It provides the basic window in which other Swing components can be placed.

Basic JFrame Structure

Import Swing classes.

Create a JFrame object.

Set the window title.

Set the window size.

Make the window visible.

7. Your First Swing Program

Program 1: Creating a Simple JFrame

```
import javax.swing.*;

public class FirstSwingApp {
    public static void main(String[] args) {
        JFrame frame = new JFrame();
        frame.setTitle("My First Swing Application");
        frame.setSize(500, 300);
        frame.setVisible(true);
    }
}
```

Program Explanation

`import javax.swing.*;` — imports Swing classes so that JFrame and other Swing components can be used.

`public class FirstSwingApp` — defines the Java class containing the application.

`main()` — the starting point of this basic Java application.

`JFrame frame = new JFrame();` — creates a JFrame object representing the window.

`setTitle()` — sets the text shown in the title bar.

`setSize(500, 300)` — sets the window width to 500 pixels and height to 300 pixels.

`setVisible(true)` — makes the window visible.

8. Understanding JFrame Step by Step

Creating the Window

```
JFrame frame = new JFrame();
```

The variable `frame` stores a reference to the newly created `JFrame` object.

Setting the Title

```
frame.setTitle("My First Swing Application");
```

This sets the title displayed in the window's title bar.

Setting the Size

```
frame.setSize(500, 300);
```

The first value represents the width and the second represents the height, measured in pixels.

Making the Window Visible

```
frame.setVisible(true);
```

A newly created `JFrame` is not necessarily displayed automatically. Calling `setVisible(true)` tells Swing to display it.

9. Conceptual Flow

How the Program Builds the GUI

Java program starts → `main()` executes

`JFrame` object created → a window object exists

Title assigned → title bar text is set

Size assigned → window dimensions are set

Visible = true → the window appears on screen

10. What We Will Add Next

A `JFrame` by itself is only an empty window. The next step is to place components inside it. Unit 11 then builds from simple components toward complete Swing applications.

Next Topic	What You Will Learn
<code>JLabel</code>	Display text in a GUI.
<code>TextField</code>	Accept single-line user input.

Next Topic	What You Will Learn
JButton	Create clickable buttons.
Event Handling	Respond when the user interacts with components.
Layout Management	Arrange components inside windows and panels.

Key Takeaways

- ✓ AWT means Abstract Window Toolkit and is Java's original GUI toolkit.
- ✓ Swing provides a richer collection of Java GUI components.
- ✓ AWT classes are mainly in java.awt; Swing classes are mainly in javax.swing.
- ✓ Many Swing components use the J prefix, such as JFrame, JButton, JLabel, and JTextField.
- ✓ JFrame represents a top-level Swing window.
- ✓ A basic Swing window can be created by constructing JFrame, setting its title and size, and making it visible.
- ✓ The remaining Unit 11 topics build GUI applications by adding components, layouts, events, menus, tables, dialogs, and other Swing features.

— *End of Lesson 1* —