GUI Design and Programming
Part - I

GUI realization using Java

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Getting Started

1.1 What is Java?
Java is two things:

Programming language and Platform

- Simple
- Object-oriented
- Distributed
- Interpreted
- Robust
- Secure
- Architecture-neutral
- Portable
- High-performance
- Multithreaded
- Dynamic
Java programs are both compiled and interpreted
Java bytecodes

- Allow Java programs to be written once but running on almost any platform
Platform: A hardware or software environment in which a program runs

The Java Platform:

Software ONLY platform runs on other hardware-based platform

Java Platform has two components

![Diagram showing Java Program, Java API, Java Virtual Machine, and Hardware-Based Platform]
Java Virtual Machine (VM):

- Mechanism which seems to execute the bytecodes e.g. Interpreter
- Virtual because the actual execution is done by the hardware, not the VM

Java Application Program Interface (API):

- A large collection of ready-made software components, e.g. graphic, network, etc.
- Group into libraries (packages) of related components
Java Programs:

Applet:
- A special kind of Java program that runs on a Java-enabled browser, e.g. Netscape, IE
- Must follow a programming convention

Application:
- A standalone program that runs directly on the Java platform
- Similar to other languages, e.g. C, C++
Why Java???

- Get started quickly
- Write less code
- Write better code
- Develop programs faster
- Avoid platform dependencies with 100% pure Java
- Write once, run anywhere
- Distribute software more easily
Getting Started

1.2 A taste of Java
Example 1: The “Hello World” Application

Step 1: Create a Java Source File
Using a text editor, create a file named HelloWorldApp.java with the following Java code:

```java
/**
 * The HelloWorldApp class implements an application that
 * simply displays "Hello World!" to the standard output.
 */

class HelloWorldApp {
    public static void main(String[] args) {
        System.out.println("Hello World!");  //Display the string.
    }
}
```
Step 2: Compile the Source File
a. Open a DOS prompt window in your PC
b. Type
   `javac HelloWorldApp.java`

- If succeed, the compiler creates a file named `HelloWorldApp.class` in the same directory (folder) as the Java source file (`HelloWorldApp.java`)
- This class file contains Java bytecodes
- If fail, make sure the program is typed and named exactly as shown above, using the capitalization shown
Step 3: Execute the Bytecodes
Type

```java
java HelloWorldApp
```
Example 2: The “Hello World” Applet

Step 1: Create a Java Source File
Create a file named `HelloWorld.java` with the Java code shown here:

```java
import java.applet.Applet;
import java.awt.Graphics;

public class HelloWorld extends Applet {
    public void paint(Graphics g) {
        g.drawString("Hello world!", 50, 25);
    }
}
```
Step 2: Compile the Source File
a. Open a DOS prompt window in your PC
b. Type
   
   `javac HelloWorld.java`

- If succeed, the compiler creates a file named
  `HelloWorld.class` in the same directory (folder) as the
  Java source file (`HelloWorld.java`)
- This class file contains Java bytecodes
- If fails, make sure you typed in and named the program
  exactly as shown above, using the capitalization shown
Step 3: Create an HTML file that includes the Applet

Using a text editor, create a file named \texttt{Hello.html} in the same directory that contains \texttt{HelloWorld.class}. This HTML file should contain the following text:

\begin{verbatim}
<HTML>
<HEAD>
<TITLE> A Simple Program </TITLE>
</HEAD>
<BODY>

Here is the output of my program:
<APPLET CODE="HelloWorld.class" WIDTH=150 HEIGHT=25>
</APPLET>
</BODY>
</HTML>
\end{verbatim}
Step 4: Run the Applet

To run the applet, you need to load the file **Hello.html** into an application that can run Java applets.

This application might be a Java-compatible browser (e.g. Netscape) or another Java applet viewing program (e.g. Applet Viewer).
Getting Started

1.3 Programming Environments
Many programming tools are available in the market

JDK - Java Development Kit
- Command-line based tool
- No GUI support. Have to develop Java program in DOS mode

Java Workshop, Visual Café for Java, JBuilder, Visual Age for Java
- Windows based tool
- With GUI support and visual programming capability

Java Studio
- High level Java programming tool
- Programming by connecting objects graphically
Java Workshop 2.0

Provide
- Intuitive user interface
- JavaBeans support
- Visual Java GUI Builder
- Profiler
- Support for JDK 1.1 standards
- Multi-platform support
Project

- Project is the fundamental unit of job in Java Workshop 2.0
- A project keeps track of the various files needed to build, browse, run, and debug
- Projects are grouped together into portfolios
- There are four different project types:
  - Applet
  - Standalone Program
  - Java package - a library of classes
  - Java beans - reusable software components
Java WorkShop Tools

BUILD
Build the current project

RUN
Run the current project
  - For applet, an HTML file is created and run in the applet viewer
  - For standalone program, the output will go to the console

PROFILE
Produce a performance report
  - Showing how much time is spent in each program method
  - Showing how many times each method is executed

SEARCH
Find references to strings of text in specified source files
Java WorkShop Tools

PROJECT MANAGER
Create, import, edit, and remove projects

ATTRIBUTE
Edit properties of interface components in GUI builder projects

HELP
Provide information about Java WorkShop
Project Development Stages

Create Project → Edit Source Build GUI → Build Project → Debug Project

Test/Profile Project → Browse Source → Edit Project
Example 3: To build a project with Java Workshop 2.0

An Applet called Blink is to be built and run

Step 1: Create project

1. Click the Projects button
2. Set the current portfolio to be personal
3. Choose File -> New -> Project
4. Type Blink in the project name box
5. Click the Applet radio button for the application type
6. Click the Projects button
7. Click the No GUI radio button
8. Save the Blink project in the default directory
9. Add existing Java files to the Blink project
10. Use the html page generated by Java WorkShop
Step 2: Build project

1. Check the Java WorkShop Project Manager window for the name of the current project to be Blink
2. Click the Build button on the Java WorkShop main tool
Step 3: Run project

1. Check the Java WorkShop Project Manager window for the name of the current project to be Blink
2. Click the Run button on the Java WorkShop main tool
Exercise:

Complete Tutorials 1, 2 and 3 in the Java WorkShop Tutorial

If you have time, complete also Tutorial 7