CHAPTER 3

Java Programming Fundamentals

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What is JAVA?

- JAVA is an Object Oriented programming language as well a platform.

- By using JAVA, we can write various types of Application program for any type of OS and Hardware.

- JAVA is designed to build interactive, dynamic and secure applications on network computer system.

History of JAVA

JAVA was started with a project (Green) to find to write applications for electronic devices like TV-Set top Box etc. Which was originally named Oak. Later renamed with JAVA.

1991	**James Gosling developed Oak to program consumer electronic devices**
1993	**World Wide Web explodes**
1995	**JAVA formally announced as a part of Netscape web browser.**
1996	**Java Development Kit (JDK) 1.0 by Sun Microsystems.**
1997	**JDK 1.1 launched with JAVA Servlet API**
1998	**Sun introduced community source "Open" and produces JDK 1.2 for Linux**
1999-01	**JDK 1.3 released and J2EE, J2SE,J2ME appeared**
2002	**JAVA Web Services Developer Pack released for Web Development.**
2005	**JAVA Enterprise System 2005Q4 released with integration of various features like monitoring, security etc. for Solaries, Windows etc.**
2006	**The Netbeans IDE 5.0 is released. Sun Open sourced Java EE component as the Glassfish project to JAVA.net.**

Characteristics of JAVA

- Write Once Run Anywhere (WORA)
  JAVA Program can be run on different platforms without any changes.
- Light Weight Code
  Big applications can be developed with small code.
- Security
  JAVA Programs are safe and secure.
- Built-in Graphics & Supports Multimedia
  JAVA is equipped with Graphics feature. It is best for integration of Audio, Video and graphics & animation.
- Object Oriented Language
  Java is Object Oriented Language, near to real world.
- Platform Independent
  Change of H/W and OS platform does not effect JAVA program.
- Open Product
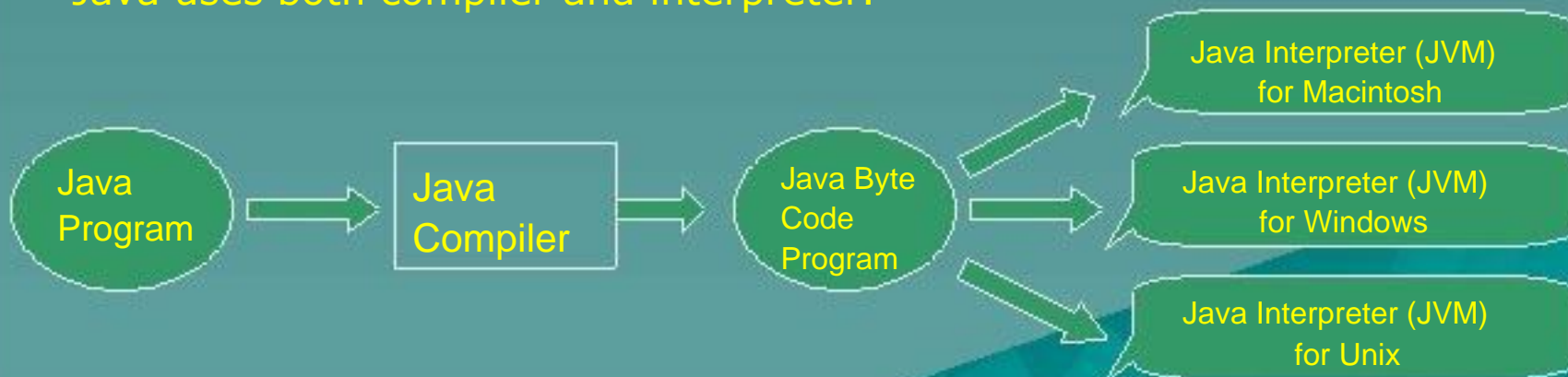 It is open i.e. freely available to all with no cost.

Byte Code- Magic of Java Compiler

A program written in HLL must be converted into its equivalent Machine code, so that computer can understand and execute. This conversion is known as Compilation. Generally, the converted machine code depends on the H/w and OS platform. So, that a Windows program will not work on UNIX, a Mac application will not run on Windows etc. Since they are Platform dependent.

A program written in JAVA is platform-independent i.e. they are not affected with changing of OS. This magic is done by using Byte code. Byte code id independent of the computer system it has to run upon.

Java compiler does not produce native executable code for a particular machine. Instead it produces a special format called Byte code, which is interpreted by Java Virtual Machine (JVM) at the time of execution.

Java uses both compiler and interpreter.

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Java Program  →  Java Compiler  →  Java Byte Code Program  →  Java Interpreter (JVM) for Macintosh
                                                            →  Java Interpreter (JVM) for Windows
                                                            →  Java Interpreter (JVM) for Unix
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Java's IDE - NetBeans

- NetBeans IDE is a free, open-source, cross platform Integrated Development Environment (IDE) which supports Java programming. It is equipped with the most advanced GUI building tools to facilitate Rapid Application Development (RAD).

- **NetBeans offers the following features-**
  1. Drag & Drop GUI creation.
  2. Advanced Source Code Editor.
  3. Web Service
  4. Excellent Debugging tools.
  5. Wizards, Code generator and Management tools.

Components of NetBeans:

1. **Title Bar**
2. **Menu Bar & Pull Down Menus**
3. **Toolbar**
4. **Project Window**
5. **Navigator & Inspector Window**
6. **GUI Builder**
7. **Code Editor Window**
8. **Palette (GUI Tools)**
9. **Properties Window**
10. **Output Window**

What is RAD ?

RAD describes a method of developing software through the use of pre-programmed tools or wizards. The programmed tools or controls are simply dropped on a screen to visually design the interface of application. Ex. VB IDE, NetBeans etc.

JAVA and GUI

How GUI application works ?

- Graphical User Interface (GUI) based application contains Windows, Buttons, Text boxes, Dialogue boxes and Menus etc. While using a GUI application, when user performs an action, an Event is generated. Each time an Event occurs, it causes a Message which sent to OS to take action.

GUI in JAVA

- In Java, GUI features are supported through JFC (Java Foundation Classes). JFC comprises all the features which are needed to build a GUI application.

  Prier to Java 1.2 JFC components was called Abstract Windows (AWT). After Java 1.2, a more flexible Swing Components was introduces.

- A GUI application in JAVA contains three basic elements.-

  1. Graphical Component:

  It is an object that defines a screen element such as Button, Text field, Menus etc. Each component has certain properties. They are source of the Events. In java It is also known as Widget (Window Gadget). It can be container control or child control.

  2. Event:

  An Event refers to the occurrence of an activity. It is generated, when user does something like mouse click, dragging, pressing a key on the keyboard etc.

  3. Event Listener: It contains method/functions which is attached to a component and   executed in response to an event. In Java,

4. ListenerInterface stores all Event-response-methods or Event-Handler methods.

Basic Graphical components in JAVA (Swing controls)

The palette of controls offered by Java Swing, contains some tools that can be used in Application frames/ Window/ Form. Commonly used controls are-

- jFrame: Used as a Basic Window or form.   jLabel:
- allows Non-editable text or icon to displayed.
- jTextField: allows user input. It is editable through text box.   jButton: An action is generated when
- pushed.   jCheckBox: Allow user to select multiple
- choices.   jRadioButton: They are option button which
- can be turned on or off. These are suitable for single selection.   jList: gives a list of items from which user
- can select one or more items.   jComboBox: gives dropdown list of items or new item
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cab be added. It is combination of jList + jTextField.
jPanel: It is container controls which contains other
controls using a frame.

Object Naming Rules and Conventions

A control object in Java, given a default name like
jTextField1, jButton1 etc. as they drawn on the
form. But we can give user friendly name to them
for easy reference as per the following Rule-

- Name must begin with a letter.
- Name must contain only letters, numbers, and _.
  Punctuation (, ; .) and spaces are not allowed.
- The letter j may be omitted to prefix some user
  familiar name or text.
- When an user familiar name is given, first letter is
  generally capitalized.

We can change object's default name by double clicking on control name in Inspector Window and providing a new name.