**GUI in Java**

Graphical User Interface or GUI in short is the actual interface a user gets to see while using an application or a program. Almost all modern programming language provides feature for a developer to develop application with advance User Interface so that the end user can make proper use of the system while now knowing about the complicacies of the actual program. It acts like an abstraction layer between the actual command line program and the user. GUI in java can be defined as easy and comfortably usable visual experience builder for applications generated by Java. GUI, mainly, consist of multiple components known as GUI components that provide several features and make it possible to develop the required interface (Hartman, 2022). Some of the components are labels which allow the facility to give title to the particular section/element, text fields which all the facility to enter something by the user, buttons which all the facility to give commands or execute an event, windows/frame which is like a container that contains all other components and so on.

At the time the command line interface is not something anyone beside students of computer science interact with as it has become obsolete, and GUI has taken over it because it provides easy usability without understanding underlying working mechanism of an application. When JAVA first released in 1995, it already had AWT or Abstract Window Toolkit. It was pretty powerful toolkit that allowed to develop almost all the features required in an application program. It, however, had one issues for some developers as the program it created appeared different in different platform because it was using the native subroutine of the system it is running on. To solve this problem in a later version of JAVA i.e., Java SE 1.2 Swing toolkit was introduced in 1997. It was the most used application of that decade and is still embedded in many systems worldwide. Swing provided its own components that rendered the same way in all the system it was run on. However, development of Swing has been stopped by oracle and it is only in maintenance mode. Even then it will never be removed from java as it is still widely used worldwide in multiple devices. Finally, in 2007 JavaFX was announced as the Java’s GUI, graphics and multimedia API of the future. JavaFX 1.0 was released in 2008 and multiple updates have been made to it ever since (Deitel & Deitel, 2021).

AWT, Swing, JavaFX can all be used to create a GUI in java; however, I am only going to discuss AWT and Swing as still they are the most widely used toolkits. AWT consists of 12 packages of 370 classes. Out of these the main two packages that are generally used are java.awt and java.awt.event (Hock-Chuan, 2021). The java.awt package consists of GUI component classes such as Label, Text Field, Button; Container classes such as Panel and Frame; Layout manger such as Grid Layout, Flow Layout, Border Layout; and graphics classes such as Graphics, Font, Color etc. The java.awt.event package consists event classes such as Key Event, Mouse Event, Action Event etc.; listener interface such as Mouse Listener, Key Listener etc. On the other hand, Swing is even more vast than AWT and consists of 18 packages with 737 classes for its latest version (Hock-Chuan, 2021). Swing basically has everything AWT and in addition to that has much more features added to it. The main feature of Swing is that it allows developer to choose the look and feel of the application i.e., developer can choose to show the look and feel of Java or the look and feel of underlying OS. Swing also supports mouse-less operation i.e., it can be designed to operate entirely just by using the keyboard.

**References**

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