

JavaFX Framework and Comparative Analysis

Cheshta1, Dr. Deepti Sharma2

1M. Tech Scholar, 2Head of Department

Dept.of Comp. Sc. & Engg. , Advanced Inst .of Tech. & Management, Haryana , India
Palwal , Haryana , India

Abstract: Graphical User Interfaces (GUI s) plays a vital role in Human lives as they directly link the system with its end-users, allowing the exchange of information and enabling communication . Now- a-days there is a great demand of smart interfaces that is capable of promising the needs of the user. GUI s are generally built from other components, and sometimes they may be developed Independently by the third party vendors. JavaFX is nothing but a Java library that is used to build Rich Internet Applications. The applications that are created using this library run consistently across several platforms with ease. The applications that are developed using JavaFX can run on devices such as Desktops, Mobile Devices, TVs, Tablets, etc. For developing GUI Applications using Java programming, the programmers usually rely on the libraries such as Advanced Window Tool kit ,Applets and Swings. After the dawn of JavaFX, Java programmers can easily develop GUI applications effectively that has rich content.

Keywords: JavaFX, Rich Internet Applications, GUI, Advanced Window Tool Kit, Swings, Applets.

1. Introduction

JavaFX is nothing but a Java library that is used to build Rich Internet Applications. The applications that are created using this library run consistently across several platforms with ease. The applications that are developed using JavaFX can run on devices such as Desktops, Mobile Devices, TVs, Tablets, etc..

For developing GUI Applications using Java programming , the programmers usually rely on the libraries such as Advanced Window Tool kit ,Applets and Swings. After the dawn of JavaFX, Java programmers can easily develop GUI applications effectively that has rich content.

Rich Internet Applications oftenly abbreviated as RIA are those web applications that provides similar features and experience as the desktop applications. These application offers better visual experience than the normal web applications to the users. These are then delivered as browser plug-ins or as a VM(Virtual Machine) and are used to transform legacy static applications into more advanced, enhanced and animated ones.

Unlike the desktop applications, Rich Internet Applications don't require any another software to run. As an alternative, one can install additional softwares such as ActiveX, Java, Flash Player depending on the need of an Application.

In the Rich Internet Application, the graphical representation is conventionally handled on the client side, as it is having a specific plug in that usually provides support for the rich graphics. In essence, data manipulation in these type of applications is carried on the server side, while all the related object manipulation is carried out on the client side.

Mainly we have three technologies through which we can develop an Rich Internet Application. These include the following [1]-

- **Adobe Flash**

This platform was developed by Adobe Systems and is used for creating Rich Internet Applications. Along with the RIA , it can also be used to build other Applications like Desktop Applications, Mobile Applications and Games, etc.

It is the most commonly and widely used platform for developing RIA's with a desktop browser penetration rate of 96%.

- **Microsoft Silverlight**

Similar to Adobe flash, Microsoft Silverlight is a application framework for development and the execution of Rich Internet Applications. Initially this was used for streaming the media. The current versions support graphics, animation and multimedia.

This platform is used rarely with a desktop browser penetration rate of 66%.

- **JavaFX**

JavaFX is a Java library by means of which you can develop Rich Internet Applications. By using Java technology, these applications have a browser penetration rate of 76%.

2. NEED FOR JAVA FX

For the development of Client Side Applications having rich features in it , the programmers earlier were used to depend on various libraries for adding various features such as Media, UI/UX controls, Web, Graphics 2D , 3D, etc. JavaFX includes all the above mentioned features in a single library. Additional to this, the developers can also have the access to the existing features of a Java library such as Swings,Applets.

JavaFX provides the user with a rich set of graphics and media API's and it leverages the modern Graphical Processing Unit(GPU)through hardware accelerated graphics. It also provides interfaces through which developers can combine graphical animation and UX control.

We can also integrate and use JavaFX with JVM based technologies such as Java, and JRuby. For opting JavaFX, there is no need to learn another technologies, the prior knowledge of any of these technologies will be good enough to develop RIA's using JavaFX.

3. Features of JavaFX

[3]Here are the features that make JavaFx unique :

- **Written in Java**

The JavaFX library is purely written in Java and is supported for all the languages that can be executed on a JVM, that includes – Java, Groovy and JRuby. Since JavaFX applications are JAVA based hence these are also platform independent.

- **FXML**

JavaFX features a language commonly known as FXML, which is just like HTML declarative markup language. The basic purpose of this language is to define a user Interface.

- **Scene Builder**

JavaFX provides developers with an application called as Scene Builder. On integration of this application with the IDE's such as NetBeans, the users can use the drag and drop design interface.

- **Rich UI controls**

JavaFX library contains UI controls by means of which we can develop a full-fledged application.

- **CSS like Styling**

JavaFX provides developers a CSS like styling. Using this feature , developers can improve the design of their application if they have basic knowledge of CSS.

- **Integrated Graphics library**

JavaFX provides support for classes for 2d and 3d graphics. JavaFX supports for graphics based on the Hardware-accelerated graphics pipeline known as Prism. When used with a supported Graphic Card or GPU it offers smooth graphics. In case the system does not support graphic card then prism defaults to the software rendering stack.

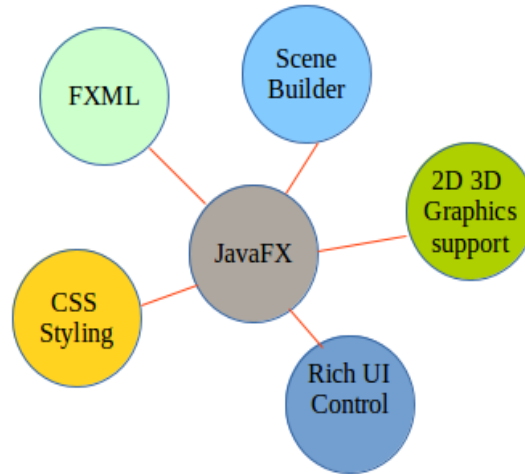


Fig. 1 depicting features of JavaFX

4. Architecture

JavaFX is a collection of Java libraries designed to enable the developers to create and deploy rich internet applications that behave consistently and constantly across platforms. Figure 2 depicts the architectural components of the JavaFX as stated by Oracle . Below the JavaFX public APIs lies the engine that helps in running the JavaFX code.

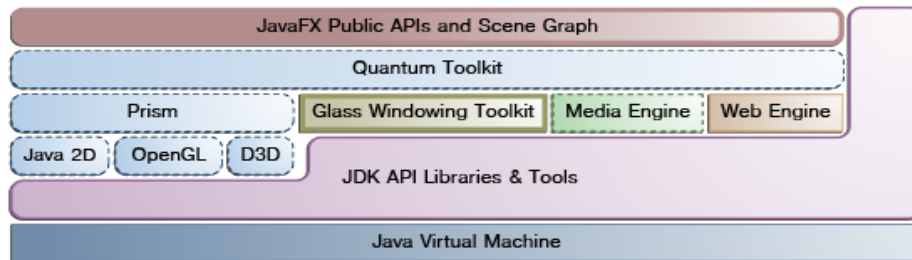


Figure 2 depicting the JavaFX architecture

- [4]The first layer of the JavaFX architecture provides a complete set of public APIs that will support the development of rich client application. These APIs provide endless flexibility to develop rich client applications . The Scene Graph is the starting point of the application that can handle the input which is to be rendered.
- The JavaFX Graphics System consists of mainly Prism and Quantum tool kit .

<i>Comparison Factors</i>	<i>AWT</i>	<i>SWINGS</i>	<i>JavaFX</i>
UI Controls	These have various UI controls but limited graphical Interface	Richer Set of Components than AWT but still these doesnot have as many components	Endless Components , rich in animation and 2D and 3D graphics
Platform Independence	These are platform specific components. Behaves Differently on different OS	Since these are purely java based. These are platform independent	Platform Independent Components with high mobility
Look and Feel	Look and Feel is fixed and could not be changed. Moreover the look and feel varies from OS to OS	Though they are built on AWT, they display pluggable Look andFeel	These possess much better look and feel as these have option to change the CSS
Size of application	Heavy Weighted	Light weighted	Light weighted
3 Dimensional Support	NO	NO	YES
Processing Speed	LOW	MEDIUM	HIGH
Built – in charting	NO	NO	YES
Device Compatibilty	Suitable for only Desktop applications	Suitable for only Desktop applications	Used for desktop applications, web browsers and mobile devices

Table 1 Depicting Comparison between AWT , Swings and JavaFX

Prism is a high performance and hardware–accelerated graphical pipeline which is used to render the graphics in JavaFX. It can be used to render both 2-D and 3-D graphics.

Quantum tool kit is an abstraction over the low-level components of Prism, Glass, Web Engine . It binds Prism and GWT together and makes these available to JavaFX for use.

Glass Window Tool kit main responsibility is to provide operating services. Its basic purpose is to serve as the platform-dependent layer that is used to connect the JavaFX platform to the operating system.

5. Conclusions

So with the above comparison we can now easily conclude that With JavaFX , we can build many types of applications such as mobile applications, web application setc Typically, these are network-aware applications that can be deployed across multiple platforms and will display information in a high-performance modern Graphical User Interface that supports or features audio, video, graphics, and animation.

References

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Ms. Cheshta is an M. Tech Scholar in the department of Computer Science & Engineering at Advanced Institute of Technology & Management, Palwal, Haryana, India

Dr. Deepti Sharma is HOD in the department of Computer Science & Engineering at Advanced Institute of Technology & Management, Palwal, Haryana, India