Programming language overview

The project is to develop software which contains the friendly user interface and interactive functionality. In detail, the software shall be able to animate and display graphical objects and react to what users do, such as button clicking event and text inputting event.

In this case, the programming language to be used in the project shall be adaptable to a graphical user interface (GUI) and able to respond to user request through the GUI. Three main programming language will be introduced below with both advantages and disadvantages. The aim is to find a suitable tool for the project.

Java

In JDK, Java provides two basic tools for building a graphical user interface, which are AWT and Swing. JavaFX was once a component of JDK but is a third-party tool now. AWT was introduced before Swing and heavily depended on the Windows platform, while Swing is more flexible and can be executed in multiple platforms with Java. However, AWT can run efficiently because it directly calls Windows functions for some operations.

Advantages

Java is a cross-platform language based on Java Virtual Machine. Both Swing and JavaFX take advantage of this feature, which allows the software built to be easily distributed in multiple platforms. It not only meets the majority of the users’ requirements (hope to run on Windows), but also allows more users using the software on other platforms. Basic functions to build software we need are fully supported in those Java tools. Another advantage is that JavaFX is taught in this semester. The team is already getting used to it.

Disadvantages

AWT was introduced at the time JDK 1.0 was released. Swing is released since JDK 2.0. Both are old and provide a coding style to build the windows. It is not straightforward to see and adjust the layout. Besides, Swing supports cross-platform but sacrifice efficiency. JavaFX is not prevalent in the main market and leads to small supports and updates on it. Relevant discussions and resources are not sufficient, even on the Internet. Lack of references would be an obstacle to the team’s progress.

JavaScript

JavaScript is a programming language which is always used with Web. A web browser is responsible to parse the Web code along with JavaScript and display interactive content to users. A web browser is a basic software on Windows, Mac, iOS and Android. It allows multiple platforms to access a web page in the same way. Rather than JVM which needs to be installed first, a web browser is equipped in almost every digital device. It is a fully cross-platform tool to build software once but run anywhere.

Advantages

The web consists of two parts, front end and back end. The front end provides a user interface only using markdown language, and the back end works as a server which listens to the actions that users take and handle these actions with programming language JavaScript. The field of web software has been developing fast since the mobile market expanded in recent years. Many third-party tools and open-source software therefore take place. Online resources such as plugins and existing web structures and plentiful discussions are also helpful for building such software. It splits front and back ends which also further specifies the division of labour of the team and improve the efficiency. It is much easier to build fluent animation and implement the modern design.

Disadvantages

The web was taught in the last semester, and only basic knowledge of it is well learned. Most of the programming skills are forgotten by the team. The efficiency of web software can be relatively low comparing to a pure programming language like Java.

C#

Advantages

The syntax is elegant. C# as a commercial product is well supported by Microsoft and have plenty of relevant tools.

Disadvantage

C# is a product of Microsoft and can only work on Windows. Team 10 has not yet learnt anything about this. It would be a brand-new field, and exploring it could take much time.