我觉得可以放，第二段我加一些看看

（复制之后加了一些）

The project is to develop software which can visualise sorting algorithms. 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. Platforms need to be suitable for both users’ usage and developers’ development. As a significant coding tool, the choice of IDE should also be carefully considered. Analysis of these three parts is presented as follows.

Three main programming language will be introduced below with both advantages and disadvantages.

Programming Solutions Overview

Four programming languages and a framework solution will be introduced below with both advantages and disadvantages.

Pure programming language solutions

This section discusses pure programming language solutions which only utilises single programming language without any frameworks.

Java

In JDK, Java provides two basic tools for building a graphical user interface, which is AWT and Swing. JavaFX was once a component of JDK but is a third-party tool now. AWT was introduced in JDK 1.0 and heavily depended on the Windows platform, while Swing is more flexible and can be executed in multiple platforms with Java. [1][2]

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 to be easily distributed in multiple platforms. [3] Basic functions to build software are fully supported in those Java tools. As a back-end language, Java takes advantage of object-oriented and it is good at express the business logic of the front end. Its property of strongly typed also improves the efficiency of the programming process.

Disadvantages

AWT was introduced in JDK 1.0 and Swing is released in JDK 2.0. Both are old and using a coding style which develops the user interface with built-in graphic components. It is not straightforward to see and adjust the layout.[1][2] Besides, relevant discussions and resources are not sufficient, even on the Internet. Lack of references would be an obstacle to the team’s progress. As for Java itself, the efficiency of compiling would not be satisfying.

C#

Using C#, developers can create secure and robust software that runs in the .NET ecosystem. It is an object-oriented language that is introduced by Microsoft.[7]

Advantages

The syntax is elegant and expressive.[7] As a commercial product, C# is well supported by Microsoft, there are plenty of relevant tools and a fully supported online community built by Microsoft. Therefore, learning resources would be sufficient, and troubleshooting might be easy with other developers’ help. Graphics programming is also well supported in C#.

Disadvantage

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

C

C is a procedural programming language and supports structured programming. This is highly efficient and widely used to build software such as operating systems and embedded systems.

Advantages

The logic of software being built is totally expressed in procedure with the C programming language. This provides high efficiency since the hardware parses and executes the code directly in order.

Disadvantages

As a programming language always used for software at the bottom such as system-like software, C language does not support graphical interface. It does not support object-oriented features as well.

Python

Python is an interpreted, high-level programming language. It is object-oriented and supports procedural and functional programming.

Advantages

Python is dynamically typed and garbage-collected, which is friendly for developers to focus on the logic of the software itself. It also emphasizes code readability; therefore, it is suitable for teamwork.

Disadvantages

Python can do basic Graphical User Interface (GUI). However, the team has limited knowledge of how to apply such tools. As a high-level language, the executing efficiency of python is relatively low.

Web framework solution with JavaScript or Java

Web framework is a framework solution to construct the whole software. JavaScript and Java are programming languages which can be used with the Web. The web framework software can be deployed into a web browser as a website or convert to an executable file for running on other platforms such as Windows, Mac OS, iOS and Android as well.

Advantages

Web solution allows accessing a web page on multiple platforms with the same contents. Therefore, it is a fully cross-platform solution to build software once but run everywhere. The web consists of two parts, front end and back end. The front end provides a user interface only using markdown language HTML5,[4] and the back end works as a server which listens to the actions that users take and handle these actions with programming language JavaScript or Java. The field of web software has been developing fast since the mobile market expanded in recent years.[5] Many third-party tools and open-source software, such as Spring framework, take place.[6] Online resources such as plugins and existing web structures and plentiful discussions are also helpful for building such software. What’s more, a web application can be easily converted into a desktop executable file, which can run on multiple platforms without a browser.

Disadvantages

The web was taught in the previous semester, and only basic knowledge of it is mentioned. The communication between the front end and back end may lead to relatively lower efficiency compared to a pure programming language like Java.[5]

References

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