NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Computer Science and Engineering
College of Engineering

Java Ranch

Interactive Learning in Java

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Background

The programming language, Java, is commonly used to develop applications and web systems by developers worldwide. Many educational institutions are educating students on Java programming along with Object-Oriented (OO) concepts and design principles today. However, learning to program in Java is not the hardest part for most, it is the concepts and design principles that students find challenging to learn and lecturers find difficult to teach.

Objectives

The goal of this project is to enhance learning among students who are relatively new to Java. Additionally, this project aims to be an interesting, informational and educational application that educates students on the usefulness of Object-Oriented concepts and design principles. This project also guides users on the application of said concepts and principles into their own program.

System Design

Java Ranch is a web-based application, made with Unity development platform. A web-based application eliminates the limitations of incompatible mobile operating systems namely iOS and Android.

Java Ranch is able to run on web browsers that support WebGL (Web Graphic Library); JavaScript API that is used for rendering 2D and 3D graphics without the use of a plugin.

IE 11+

iOS 8+

Some of the browsers that are able to run this application would be Google Chrome, Firefox, Internet Explorer, Opera and Safari.

UI Design Considerations

Since Java Ranch is an educational application, it is important that its user interface achieves a high level of usability. Hence Java Ranch emphasize on the importance of having a simple and clean interface. Furthermore, Java Ranch is designed with educational learning theories in mind which help users learn more effectively. The theories that are applied are; Cognitive Learning Theory, Behaviorism Learning Theory, Constructivism Learning Theory, Humanism Learning Theory and Connectivism Learning Theory.

In addition to educational learning theories, principles of effective teaching are also applied to the design of Java Ranch. The principles of effective teaching is a powerful set of principles that can make teaching more effective and efficient.

Features

The concepts and frameworks of OO is the main focus for Java Ranch and it guides users towards applying the said concepts and frameworks in Java. The main concepts that the project focused on are Abstraction, Encapsulation, Polymorphism and Inheritance. However, other concepts such as Association, Aggregation and Composition are also included. The design principles that the project focused on are Single Responsibility Principle (SRP), Open-Closed Principle (OCP), Liskov Substitution Principle (LSP), Interface Segregation Principle (ISP) and Dependency Inversion Principle (DIP), they are known as S.O.L.I.D principles.
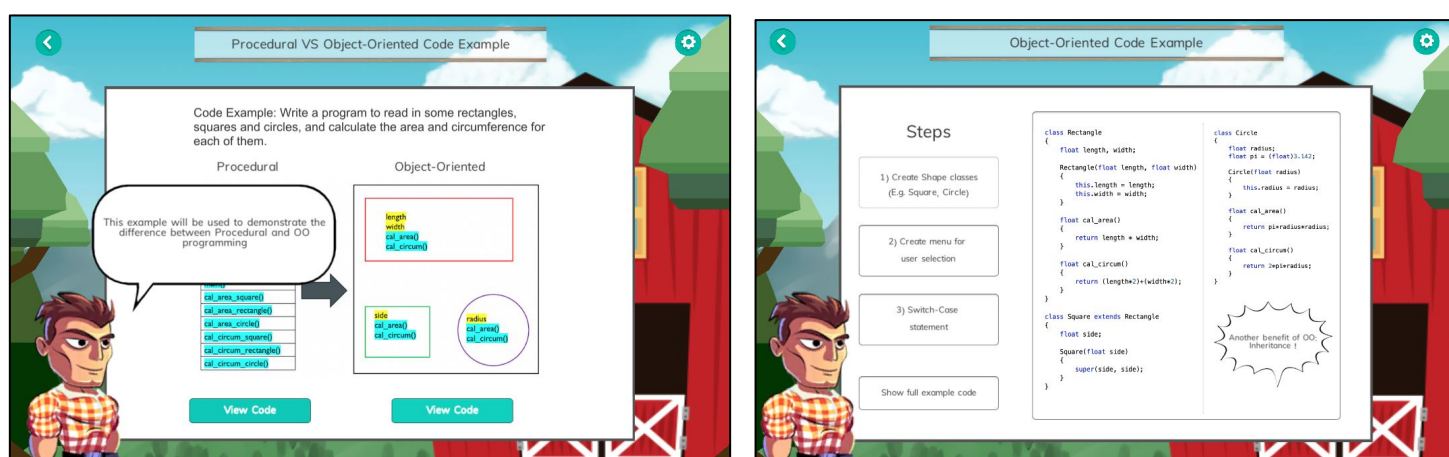
Fun Quiz

An interesting and fun quiz is available for users to attempt, which helps them gauge their knowledge in terms of OO concepts and design principles. The quiz consists of 10 randomised questions related to what is being taught in the application. There are at least 20 informative and interesting questions in the question pool, which ensures that users will less likely receive the same questions when they re-attempt the quiz. The questions are created in Multiple Choice Question (MCQ) format, hence enabling users to gauge their knowledge in terms of Object-oriented concepts and design principles effectively and easily.
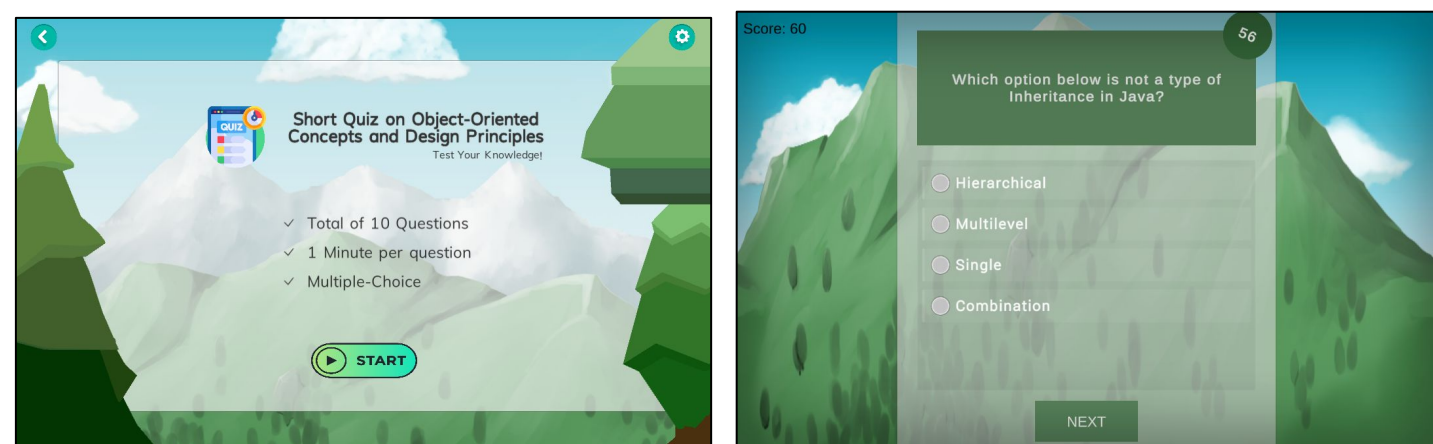
Survey Findings

After conducting the survey, all applicants voted that Java Ranch successfully help them understand Object Oriented concepts and design principles better. Since the survey result reflects the expected result with regards to the initial project objective, it is concluded that the project objective has been met to a large extent.