

Captain Code- Javascript Based Gaming Module

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Abstract

This research document deals with a major role in the development of the code-based game. A document purely described can have a major impact during the production phase and after the game is completed. To solve these types of issues, this document is framed after taking in account the best practices from SRS. This document helps understand the key technologies used, limitations, terms about the game elements and the future scope of this paper. Through this initiative one can solve the programming questions as solving the puzzles while playing the game. For generating interest of the solvers different levels are made from easy to hard. If anyone not able to crack the code, he will be having the hint option to overcome that situation. To make this game more interesting, we have tried to design this website more attractive in the solar system form which consists of planets in the different rounds form.

Keywords: JavaScript, React, Node.js, PostgreSQL, game-based learning.

Introduction

This document will propose all features and procedures to develop the online coding game web application system. This document specially contains details about objectives, scope, limitation, process model, requirements, team development, paper schedule and finally execution of the web application. This online coding game will be very useful for learning different programming languages for those who want to learn in a fun way. It will help the user learn different languages and develop their skills.

“Captain Code” is a website that basically concentrates on teaching new programming languages on a web browser in a fun way. This website is developed to provide an easy way for beginners to learn different languages. Thus, a user can learn without stress and with fun.

It is a complete online coding game with different difficulty levels. Captain code is lost in space exploring new planets and civilizations and he needs help getting home after running out of fuel on an unfamiliar planet. So, in order to get home, he needs to solve different puzzles in the form of programming language which he can choose one out of different

language. Then, he needs to solve coding challenges using that language that will give him fuel points if he successfully solves the problem. Using those fuel points, he can unlock different planets, and guide Captain code home. The difficulty level increases as Captain Code solves each question. Thus, if Captain Code can solve all the problems, he will find his way home, and the player will learn a programming language while having fun. The motivation was taken from the previous existing 3D gaming environment which is quite dynamic and motivational[7]. Videogames have been criticized since long as it has no intellectual/educational background resulting dumb mind[1]. The game designed by us is completely opposite as it requires complete programming mind set and is one of the intellectual ways of learning from the mistakes also termed as reinforcement learning.

This paper portrays every one of the necessities for the venture. The motivation behind this undertaking is to give a virtual picture to the mix of both organized and unstructured data of our venture "Captain Code". "Captain Code" is a single-player coding game on a web browser. The player will progress through levels which require precise knowledge of the environment, though the game encourages creativity by allowing the player to think how to solve the real-world problems in form of programming questions.

Technology Used

In this paper key technologies like React JavaScript, Node.js and PostgreSQL were used. Also, in addition to these JavaScript frameworks, JavaScript libraries such as Redux, Express, Three.js, Docker and Sequelize were used. For the JavaScript transpiler a library names "Ace" was used[2][3]. Passport was used for the authentication system.

1. React JavaScript

React JavaScript is an open-source JavaScript library component used for building user interfaces. React is effective and declarative for creating virtual DOM in memory. It alters only those changes which must be done[4].



Fig1: Logo of React JS

The market is having V16.8.6 as the latest version. Simple views are designed for each state in application. It is created and maintained by Facebook[5].

2. Node.js

Node.js is free which runs on different platforms like Linux, windows, Mac OS. Node.js creates dynamic pages which runs on server side. It can collect data from the user in the form format in which details can be added, modified, and updated.



Fig 2: Logo of Node.js

The real-time applications which are node.js based are Advertisement servers, Game servers, Chat applications and many more. Today so many large companies are using Node.js such as Paypal, eBay, LinkedIn etc.

3. PostgreSQL

The PostgreSQL took birth in 1986 at university of California. Again, it is open source and object-relational database system. It offers many features like building applications, to protect data manipulations and fault tolerance environments.



Fig 3: Logo of PostgreSQL

It is free and open SQL standard which was designed on unix-based platforms. Afterwards it was made portable for various platforms such as Solaris, Mac OS and Windows etc. Most of the companies starts using PostgreSQL now like Cisco, Red Hat, Apple etc.

4. JavaScript

Initially, JavaScript was created “to make pages alive”. JavaScript is easy programming language of HTML. It is the combination of HTML and CSS. It also creates dynamic pages which are auto validated with interactive drop-down menus.



Fig4: Logo of JavaScript

The motive of JavaScript is to enhance the interaction of user with the web pages. In other words, making page more interactive and livelier with JavaScript. It is used for mobile application development and game development.

5. JavaScript Libraries

Redux, Express, Three.js, Docker and Sequelize

Redux is an open source JavaScript library which is used for managing the application state. It is also used with other libraries which is most commonly used such as React and Angular JS. It was developed by Abramov and Andrew Clark.

Expressor Express.js is flexible Node.js JavaScript standard server framework. It is released as free open source software which is developed for web application and mobile applications.

Three.js is modern powerful tool that is used to build browser-based games. It is complex to learn but most of the 3-D games are based on Three.js only which works SVG elements, canvas elements and WebGL library[6].

Docker is the tool used for development and execution of gaming application, it consists of docker container which deploys the application on itself and give a dynamic environment for the same.

Sequelize is a JavaScript application also known as promise based Node.js used specially in gaming applications and for Postgres, MySQL, MariaDB, SQLite and Microsoft SQL Server.

Product Definition

It is a complete online coding game with different difficulty levels. Captain Code is lost in space while exploring different planets and star systems but now he needs help to return home after running out of fuel on an unfamiliar planet. So, in order to get home, he needs to solve different puzzles in the form of programming questions which he can choose. Then, he needs to solve coding challenges using that language that will give him fuel points if he successfully solves the problem. Using those fuel points, he can unlock different planets, and

guide Captain Code home. The difficulty level increases as Captain code solves each question. Thus, if the Captain can solve all the problems, he will find his way home, and the player will learn a programming language while having fun.

Use Case: Play the Game

Essential On-screen characters: Anyone playing the game

Objecting in setting: To play the game

Precondition:

1. The User is logged in either through Google or GitHub authentication[7].
2. The database has been activated to run and the game screen has showed up.

Triggers: The player needs to begin or resume the game.

Situation:

1. Go to the main menu of the game.
2. Select the level of the game.
3. Move the player in the 3D space and choose one planet.
4. Solve the question using provided examples.
5. Points added in form of fuel on success.
6. Level Upgraded after solving each question.
7. Leaderboard shows the position of the player.
8. Exit the game after the player is done with the game.

Need: Precondition must be executed first.

Modular Functionality

The different modules have been designed in the application to represent the complete game.

First module is login module represented in Fig5, one can login through Gmail or git-hub. On successful login the different levels come up based on different difficulty criteria. The level cannot be skipped, and player must unlock the level staircase by clearing the previous level in the hierarchy. The term planet is given to the levels depicted shown in Fig 6 and Fig 7.

Before starting the game, player will get multiple choices of starting the New game, resume his previous game, directly selecting the difficulty levels or Exiting from the game as shown in Fig 8.

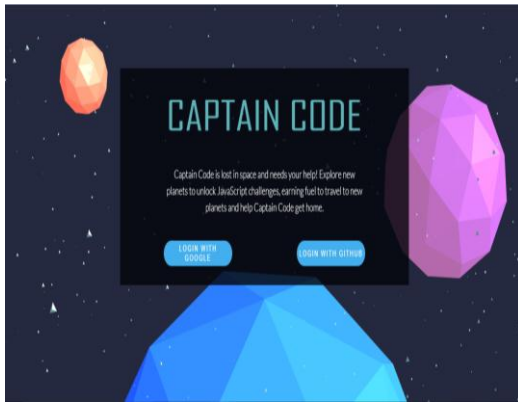


Fig 5: Screenshot of login Page.

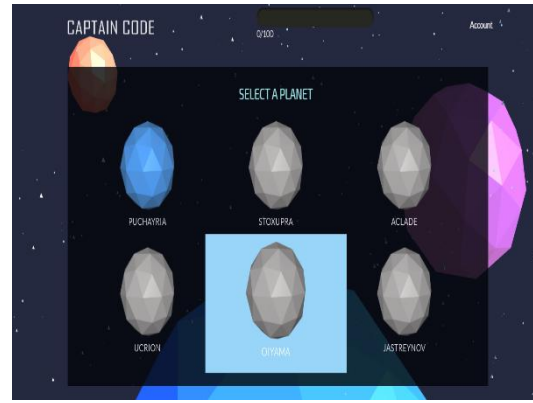


Fig 6: Planets representing different levels.

After he starts the game and selecting the planet of his choice further, he will get options like of settings, move around the space, changing volume or showing more controls related to the game.



Fig 7: Further stages of the level selected

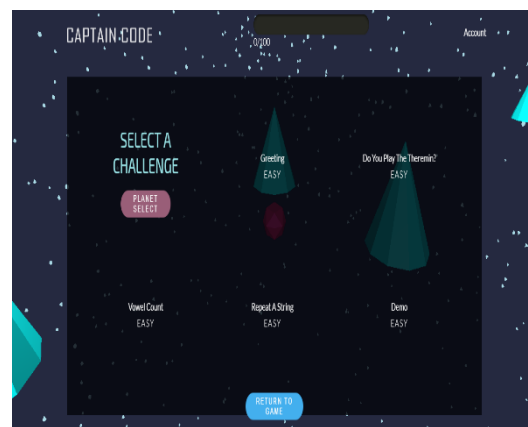


Fig 8: Different difficulty stages of the level.

At last after he finishes the game, he would be able to see his scorecard too. One report card will be generated of his scores on the scoreboard. Another choice is given to the same player that is if he wants to improve his score of any the level by repeating the level, he can also do that by selecting that particular level. But again, questions will be changed of that particular level and if he cracks that code plus with less time duration then his scores will be improved of that same level. And at the end he can quit from the game after successful completing the game.

The planet further has various quiz based on JavaScript all must be cleared before completing the level as depicted in Fig 9. Completion of each quiz question results in increasing of the fuel by 10 as shown in Fig 10.

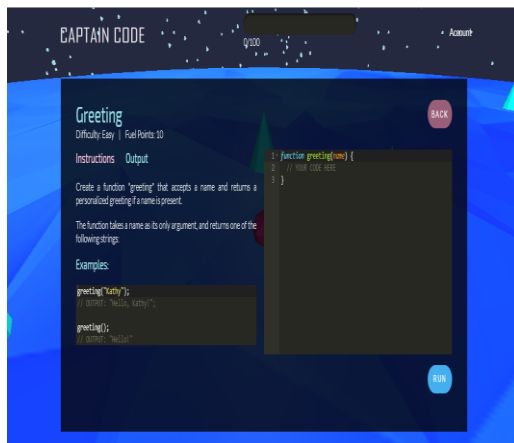


Fig 9: Puzzle having JavaScript query



Fig 10: Results depiction.

Result

The purpose of this paper is to provide a virtual image for the combination of both structured and unstructured information of our paper “Captain Code”. The result of this game was a full-fledged web application with the ability to create new users with option to sign up using 3rd party services such as Google and GitHub. This web application has functionalities such as real time transpiler to interpret the written JavaScript code in the editor, authentication, 3D – game environment and ability to select game levels[8].

Conclusion and Future works

In this paper we looked at different templates to have a clear understanding of the initial structure of a code-based game, then we made a standard template with improvements in the structure of the game. Finally, we prepared a complete analysis of our document proposal. The reason for this investigation was to discover the level of fulfillment, needs and advantages of our proposition. In future, different languages can be added so that this proposed game can be played across the globe and different weapons can be introduced to make it more interesting and quality as well as quantity of the questions like scenario-based can be added in the future.

Currently it is totally presenting the JavaScript platform and has only one weapon as JavaScript and based on that one language selection it has different stages divided as Easy, Medium and Hard.

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