

Web - Based Game Development Proposal

Shahbaj Ahmad

Abstract: *In this report, a web-based game is proposed which would involve graphical entertainment in the form of puzzles, to be solved by the students at the university. An online game with interactive learning will satisfy the basic needs of the learning environment and will offer an engaging learning experience to the university's students. A web-based game is an excellent way to achieve students' attention and create learning situations and techniques to engage them. It would be education and entertainment combined with advanced technology available on various platforms like tablets, PCs, smartphones, etc. Students can easily utilize it as a digital platform to gain supplemental knowledge through entertainment.*

Keywords: Language, Java, Functionality, JavaScript, Web Format, HTML, Web Server, University Database, JavaScript enabled web browser, Web audio, full screen API input, Logical system architecture

1. Introduction

In this report, a web - based game is proposed which would involve graphical entertainment in the form of puzzles, to be solved by the students at the university. An online game with interactive learning will satisfy the basic needs of the learning environment and will offer an engaging learning experience to the university's students. A web - based game is an excellent way to achieve students' attention and create learning situations and techniques to engage them. It would be education and entertainment combined with advanced technology available on various platforms like tablets, PCs, smartphones, etc. Students can easily utilize it as a digital platform to gain supplemental knowledge through entertainment.

The following sections discuss the feasibility of the web - based game for the students at the university in question. The legal and social aspect, economic feasibility, and technical feasibility is discussed in detail. The cost estimation including technical team expenses, the cost of game development, and the total cost recommendation are further discussed. The technology proposed in the report for developing the game is the waterfall model. The use cases justifying the design along with the sequence diagram of playing the game are covered. The game's system is depicted in a simple block diagram. In the end, a reflection on the learning from the report preparation is provided along with references.

Feasibility study

The feasibility study in the following subsections assesses the technical, social, legal, and economic challenges of the proposed web - based game.

Social feasibility

The social constraints for the target web - based puzzle include fear among the user, students in this case, of not achieving the score levels as self - expected or as expected among the peers. It may lead to fear related to losing status or getting disapproved by social groups to which the student belongs owing to playing online games. Overuse of such an online platform may cause adverse effects physical and mental on the students such as backbone issues, and eyesight issues, thus affecting their health and safety. Therefore, social constraints may be taken as negatively impacting online gaming continuance intention.

Legal Constraints

The proposed game may require further analysis on copyright (Weebly, n.d.), licensing agreement, patent, and trademark. It would be essential to perform a freedom - to - operate search within the vicinity of the university where it would be offered to the students for playing. Copyrighting the idea of the game will prevent it from being copied by others which may otherwise lead to legal issues for the copiers. The idea of the game may be patented if it is new and does not already exist in the market in any form.

Economic feasibility

This feasibility shall include the overall cost of all the resources required to build the game. This will include the cost of each employee dedicated to the game development, and the amount to be charged from the client (university in this case) for developing and maintaining the online game.

The technical team will include a programmer cum manager who would be proficient in 2 languages, another programmer having expertise in one programming language, a graphic specialist, a narrative designer, and a software tester.

The client has specified that the delivery of the game project is required within 6 months approximately. Therefore, the salaries of each employee are considered for 6 months instead of the annual salary. The cost is estimated on the game design, game project development, and testing. The hardware required for the project is already available at the client's facility. The costs have been estimated as shown below

Team Manager with expert programming skills in 2 languages: £50, 000

Programmer with skills in 1 language: £28, 000

Graphics Specialist: £40, 000

Narrative Designer to focus on game system design and narrative design: £25, 000

Tester: £25, 000

Office Space Cost: £15, 000

Proposal Fee (additional): £7, 000

Volume 11 Issue 10, October 2022

www.ijsr.net

[Licensed Under Creative Commons Attribution CC BY](#)

The chart shows the budget allocation clearly as per the intended proposal with approximately

Design cost: 40% (Interface - 17%; Game: 23%)

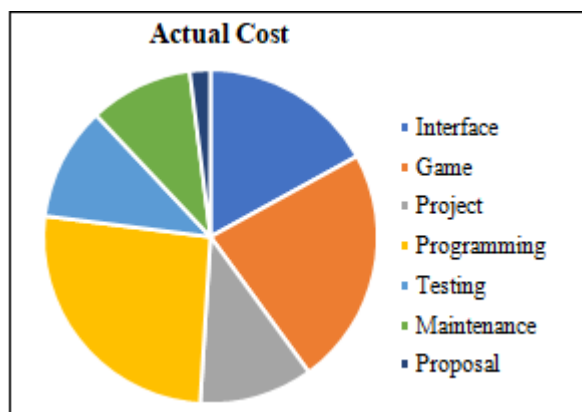
Project cost: 11%

Programming: 26%

Testing cost: 11%

Maintenance: 10%

Proposal Fee: 2%



The company shall incur double the actual cost of the employee's salary because of *on costs*. Subsequently, the additional cost involves the project proposal fee of 2 % of the total cost. Therefore, the total cost is recommended to be £358, 000. The employees in the technical team have expertise in their tasks and shall deliver three completely functional scenarios in the game.

Technical feasibility

The hardware and software specifications that would accomplish the user requirements are mentioned below.

- Language: Java
- Functionality: JavaScript
- Web Format: HTML
- Web Server
- University's Database
- JavaScript - enabled web browser
- Web audio and full - screen API input

The hardware and software components to make up the game system are available to the client. The list of components in a basic device to run the game is stated below.

- 2GHz Processor, 20 GB of the hard disk
- Monitor's minimum resolution of 1024 X 768
- Windows 7 Operating System or higher or MacOS
- Headphone, sound card, keyboard, touchpad
- High - speed broadband internet connection
- Supporting browsers to avoid unpleasant gaming experiences (Chrome* 36+, Safari 6+, Mozilla Firefox 31)

- JavaScript should be enabled in the chosen browser.
- Cookies and pop - up windows should be enabled.
- Adobe Flash or Real Player for graphics and animation.
- Dashboard interaction through Java

Development methodology

The waterfall Product Development model is selected for developing the web - based game for the client. This model is commonly used in traditional software development (Aalto, 2015). It will involve the collection of the gaming requirements as expected in the end product. Based on those requirements the technical team shall create a project plan and schedule. The professionals in the team would follow the project plan and proceed to develop the game through a series of well - defined project stages following the scheduled deadlines of each stage. Each stage has a specific set of tasks and deliverables which are required to be completed before proceeding to the subsequent stage. Each stage puts more complexity into the project. During the last stage, all the parts of the game developed in the previous stages are assembled and tested if the overall game fulfilled the expected requirements.

The pre - production stage(Saiqa Aleem, 2016) involves requirement specifications, description language of the game system, and its reusability. A game design document is developed at the end of this stage which has a rational description of the components of the game, interrelations, and vocabulary for productive development. This document is very crucial to the final game developed, as a poor design document may lead to the failure of the entire project. A game prototype is developed during this phase to understand the play mechanics of the game and to assess the user's experience. Game design tools may further be used in this stage to create game events without requiring any programming skills.

After the pre - production stage, the production stage tasks are performed in a *waterfall* manner. The requirement team plays a crucial role in defining functionalities and front - end tasks which may result in a longer duration in implementing the game. Assets like interface design, etc. are created, and storyboard production is done involving game scenarios through flowcharts or other planning techniques. The formal language description includes the semantics to gain insight into the programming language for developing the game, Java in this case. Java is among the most widely used programming languages which make it easy to increase the complexity of the game, in terms of involving complex stages of puzzles. The efficiency can further be improved by integrating development artifacts into the puzzles through programming. The functionalities like sound engineering, scripting, animations, graphs, networking, and memory management are all managed in the production stage.

The post - production stage involves the stages of quality assurance and testing stages of the waterfall model. To maintain the quality of the game, it is important to validate the game implemented in the production stage. In the waterfall model, this validation is not possible at each stage of the project lifecycle. Therefore, this stage decides whether the overall game development project is a good quality game in its final shape or not. The testing stage involves the public

release of the final product so that bugs can be identified by the game players. This is still not the final release of the game. Any missing feature or functionality of the game is identified and appended during this stage. It would be wise to choose the testing process for the game as it will be expensive to rectify errors if detected in it after the implementation stage, which may further impact the schedule of the project.

The waterfall model is apt for this project as this model enforces structured organization of each of its stages and is best suited for development focused on achieving milestones. It allows early design changes in game development.

2. Modeling, Design, and Implementation

Use cases

The use case involves actors, their roles that need to be accomplished in the system, and the basic course of action for the use case. This technique is popularly used to document and understand the system requirements. The major steps to apply the use case to this system will include identifying the actors and documenting the use cases and their course of events. The actors involved in the target game are students/players, admin, server, and accounts. The use cases for developing a web - based game for the university are given below.

Student Use Cases

a) Login:

- A student chooses login into the system from the menu through the browser.
- The system requests that the actor enter his/her name and password.
- The actor enters his/her name and password.
- The system validates the entered name and password and logs the actor into the system.
- If the use case is successful, the student is now logged into the system. If not, the system state is unchanged. The system displays an error message if the student enters an invalid name and/or password.

b) Play Game:

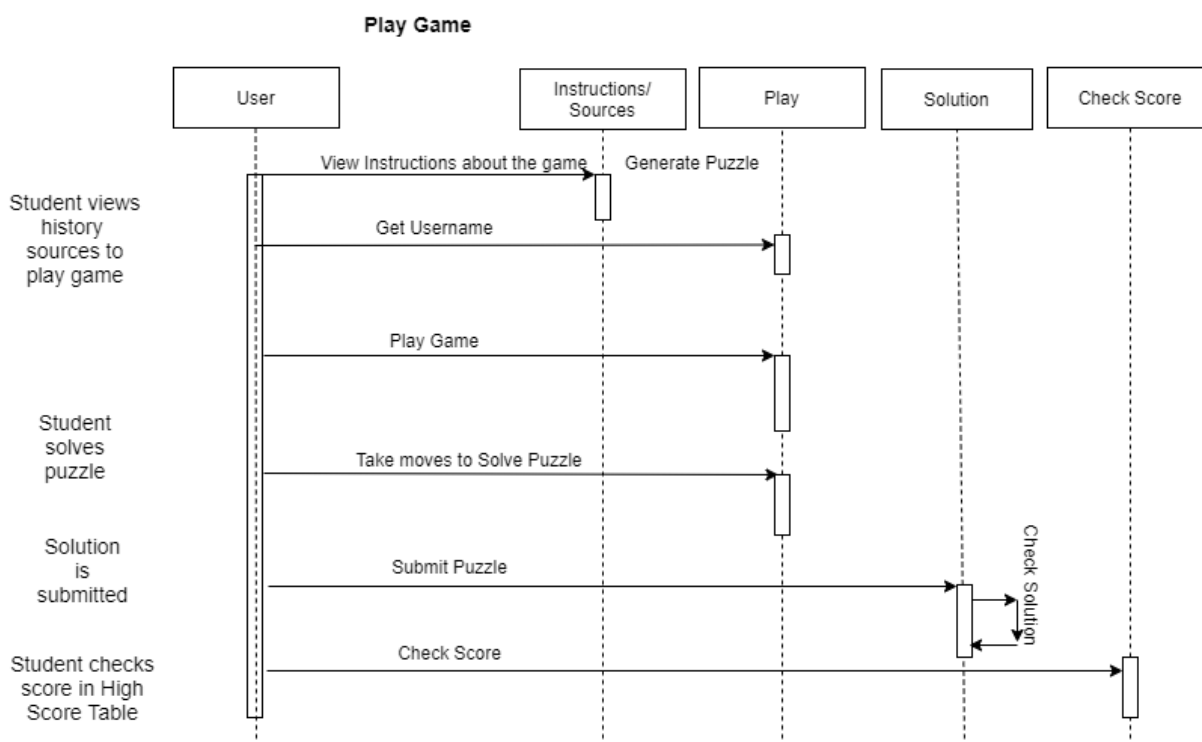
- Student chooses to play a game from the menu.
- Start level is displayed.
- Student reads history.
- Student provides text entries and solves the puzzle.
- Student earns score in high - score table.

c) In - Line Chat: The student chooses to chat with other students.

- Server Use Case
- Admin Use Case
 - Add/block Users
 - Check Progress
 - Edit/upload Content
- Accounts System

Sequence diagram

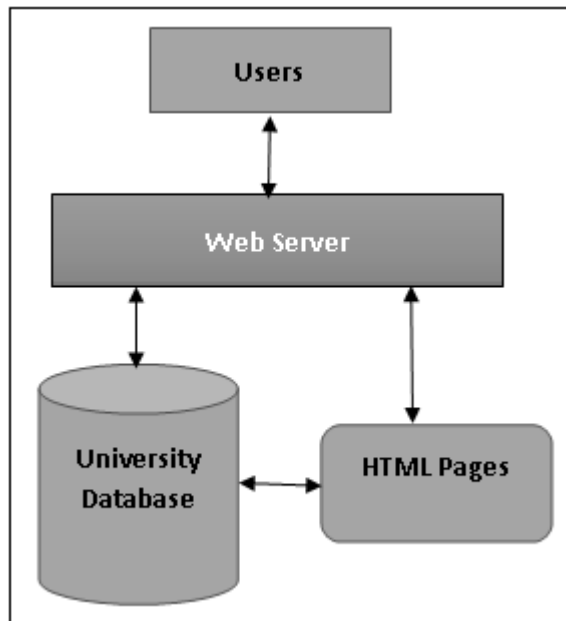
The sequence diagram for playing the puzzle game is given below



Logical system architecture

The logical model of the gaming system is shown below. The web server shall host the game and the students playing it. The users will request login/play games using a web server. They will receive a response through HTML pages

and the scores of the games played will be stored in the database. Interaction with other users (Chat in) will also take place through HTML pages



Reflection

The sections of the report which required maximum time were the technical team formation to achieve the project completed within the expected period and the development methodology for game development. The former part contributed to optimizing the cost estimations. Once the profiles were outlined, the total cost was estimated including the additional costs. The chosen methodology offers to delve into the design development of the game. The maximum man - hours would be spent on the design phase in the waterfall model to ensure correct results since the method reflects non - adaptive design constraints and there is no feedback system after every stage which may be taken from the client to ensure that the project is on the right track.

The project development was an enriching experience and offered an excellent platform to understand the strategy of web - based game development.

References

- [1] (Saiqa Aleem, 2016) Saiqa Aleem, Luiz Fernando Capretz& Faheem Ahmed. "Game development software engineering process life cycle: a systematic review". Journal of Software Engineering Research and Development volume 4, Article number: 6 (2016) <https://jserd.springeropen.com/articles/10.1186/s40411-016-0032-7>
- [2] (Aalto, 2015) Oskari Aalto. "Mobile Game Product Development Models". Thesis on Business Information Technology. November 2015.
- [3] (Weebly, n.d.)The Legal and Ethical Constraints Of Video Game Production. Understanding the Creative Media Sector - Computer Games <https://jackcurwenunit7.weebly.com/task-2---legal-and-ethical-constraints.html>