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PULCHOWK CAMPUS

Bagh-chal

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A PROJECT PROPOSAL TO THE DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING ON OBJECT ORIENTED PROGRAMMING APPLICATION USING C++

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING

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This is a programming project on Object Oriented Programming in C++. First and foremost, we would like to express our sincere gratitude towards our lecturer Daya Sagar Baral for his constant guidance, inspiring lectures and helpful encouragement.

We would like to thank the Department of Electronics and Computer Engineering, Pulchowk Campus, Institute of Engineering for providing us opportunity of collaborative undertaking which has helped us to implement the knowledge as project for second year, and developing project of our own which will greatly enhance our knowledge and provide us a new experience of teamwork.

Any kind of suggestion or criticism will be highly appreciated and acknowledged.

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1. INTRODUCTION

Bagh-chal is a recreational turn based game played by two players on a 5x5 point grid with one player controlling tiger pieces and the other player controlling goat pieces.

The game Bagh-chal is asymmetric in that the tiger player controls four tigers and the goat player controls up to twenty goats. In the first phase of the game, four tigers are placed on each corner of the board and the goat player places their goats on any empty point on the grid on their turn. The tiger player can move one of their pieces to a valid point on their turn. A valid point is any point that is empty and either adjacent to the tiger or one step in the direction of an adjacent goat. In the second phase, after all the goats are placed, the goats move the same as tigers,
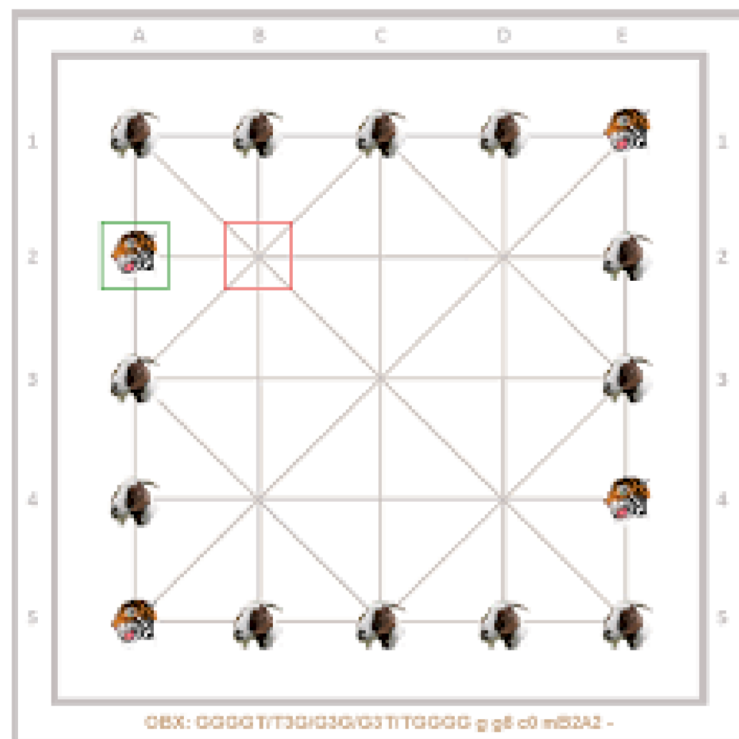
A tiger can 'eat' a goat if it jumps over the goat to an empty tile. The objective of the tiger player is to 'eat' all the goats and that of the goat player is to block all possible moves of the tiger player.

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1.1. Background On Object Oriented Programming (C++)

Object-oriented programming (OOP) is a computer programming model that organizes software design around data, or objects, rather than functions and logic. An object can be defined as a data field that has unique attributes and behavior.OOP focuses on the objects that developers want to manipulate rather than the logic required to manipulate them. C++ is a general-purpose programming language that was developed as an enhancement of the C language to include object-oriented paradigm. It is an imperative and a compiled language.

C++ is a middle-level language rendering it the advantage of programming low-level (drivers, kernels) and even higher-level applications (games, GUI, desktop apps etc.). The basic syntax and code structure of both C and C++ are the same.

Applications of C++:

Operating Systems Systems Programming. e.g. Linux-based OS (Ubuntu etc.)

Browsers (Chrome Firefox)

Graphics Game engines(Photoshop, Blender, Unreal-Engine)

Database Engines (MySQL, MongoDB, Redis etc.)

Cloud/Distributed Systems

Simple and Fast Multimedia Library (SFML) is a cross-platform software development library designed to provide a simple application programming interface (API) to various multimedia components in computers. SFML provides a simple interface to the various components of the PC, to ease the development of games and multimedia applications. It is composed of five modules: system, window, graphics, audio and network. With SFML, the application can be compiled and run out of the box on the most common operating systems: Windows, Linux, MacOS and soon Android iOS. SFML has official bindings for the C and .Net languages. And thanks to its active community, it is also available in many other languages such as Java, Ruby, Python, Go, and more.

2. OBJECTIVES

This project does not aim to advance our Game development skills within a matter of days or weeks. Instead, the major objective of this project is to encourage us to implement object oriented approach to think, model and develop basic algorithms into program code. The main objectives of this project can be summed us as:

- To understand Object Oriented Programming paradigm and build a project using it. C++ is preferred over other languages like Python because C++ offers better efficiency and speed and is suitable for almost every platform including embedded systems whereas Python can be used only on certain platforms that support high-level languages.

- To explore the basic attributes of C++ programming language.

- To learn about resource re-usability by building user defined header files.

- To be familiar with software development library designed to provide a simple Application Programming Interface (API) to various multimedia components in computers using SFML library.

- To develop effective and efficient program by optimizing time and space constraints.

- To learn the fundamental concepts about game development.

- To acquire teamwork and communication skills as a result of working as a team.

3.   PROPOSED SYSTEM

3.1.   Description

The project aims to be a single platform Bagh-chal game which can be used to play the game of Bagh-chal between two players on the same computer. We will have a menu screen through which the player can start a new game. In game we will have the current state of the board displayed on the screen. We will use custom assets for the board and the pieces.
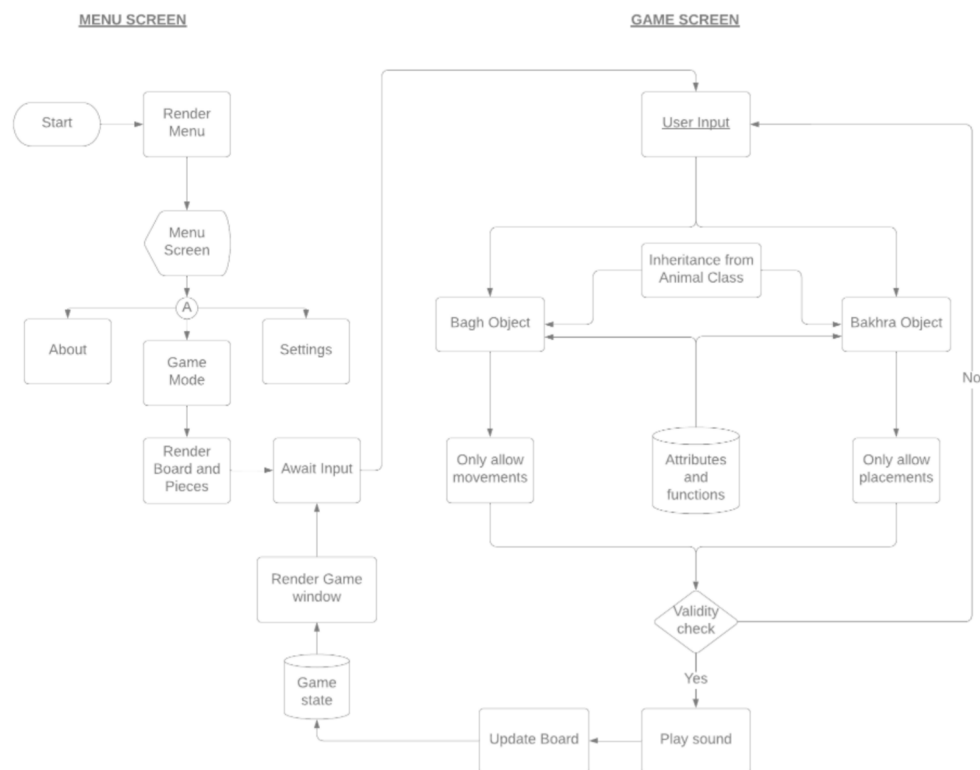
3.2.   System Block Diagram

Figure : Block Diagram

4. METHODOLOGY

To complete our destined project, we are aiming to follow the given methods:

4.1. Initiating and planning

We will be initiating by planning and dividing the work among 3 of our members. We will be familiarizing ourselves with the required library (SFML) along with it we will be refreshing our knowledge on the rules needed for Bagh-Chal.

4.2. Algorithm Design

After getting the required rules and information, we shall be designing the alogrithm and flowchart of the game project. A basic working model algorithm will be designd to further test and validate.

4.3. Software Design

With the basic set of algorithm in our hand, we shall then be writing the code in OOP paradigm. The project will be carried out on C++ as its main skeletal and SFML as its graphics implementation since it is easy to learn and use. As for IDE and compiler we will be using Visual Studio Code and Code-Blocks as our IDE and Ming-W g++ as compiler in Windows operating system and gcc(GNU Compiler Collection) in Linux.

4.4. Testing and debugging

We shall first be developing minimum viable product sample of project for testing and debugging. Further testing and debugging will be done to add feature and edit the project code as per our need and capability.

5. SCOPE OF PROJECT

We are aiming to make a simple working Bagh-chal game. The project will include all the rules of a game of Bagh-chal and create a working version of the game. Considering the limited time frame we shall have, the project will include:

   (i) Generating and displaying the game board.

  (ii) Putting the right pieces in the right places.

 (iii) Movement of pieces i.e., movement to valid positions

 (iv) Checking the state of game to analyze the status of game i.e, if more Bakhra's can be added or not.

  (v) To determine the winner of the game once either player reaches their respective winning state.

The scope of the project,however, does not include:

   (i) Cross platform compatibility

  (ii) Multiplayer games across a network

 (iii) Analysis of the game

5.1. Constraints

Our project will have some constraints and hurdles we shall have to overcome. Firstly, setting up and learning to use SFML library is challenging. We need to check the state of game and the validity of the players' moves in every turn which might be tedious during development. We keep these constraints in mind with the understanding that overcoming these challenges is a great learning opportunity.
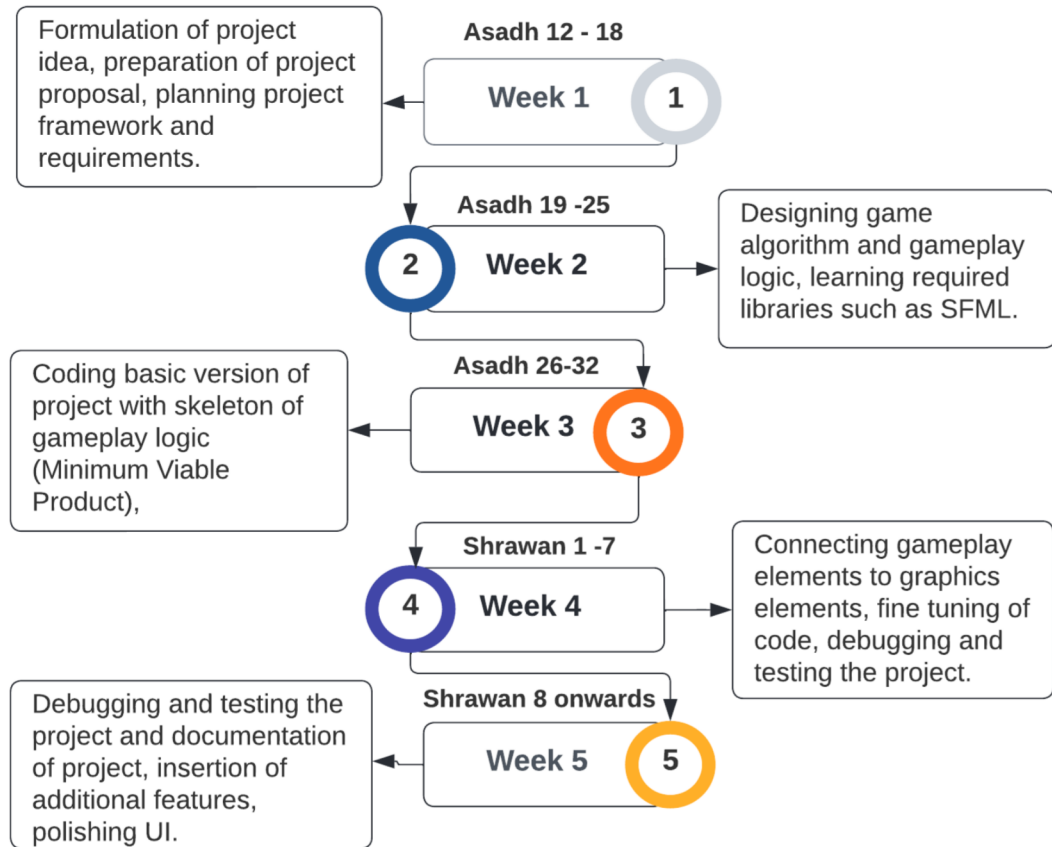
6.   PROJECT SCHEDULE

Formulation of project idea, preparation of project proposal, planning project framework and requirements.

Asadh 12 - 18

Week 1   1

Asadh 19 -25

2   Week 2

Designing game algorithm and gameplay logic, learning required libraries such as SFML.

Coding basic version of project with skeleton of gameplay logic (Minimum Viable Product),

Asadh 26-32

Week 3   3

Shrawan 1 -7

4   Week 4

Connecting gameplay elements to graphics elements, fine tuning of code, debugging and testing the project.

Debugging and testing the project and documentation of project, insertion of additional features, polishing UI.

Shrawan 8 onwards

Week 5   5

Figure: Schedule