TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
PULCHOWK CAMPUS

A PROJECT PROPOSAL ON

OBJECT ORIENTED PROGRAMMING WITH C++

A Chess Game

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We would like to thank the Department of Electronics and Computer Engineering, Institute of Engineering, Pulchowk Campus for providing us the opportunity to develop a project that will enhance our knowledge and provide us a new experience of teamwork.

Any kind of suggestion will be highly appreciated and acknowledged.

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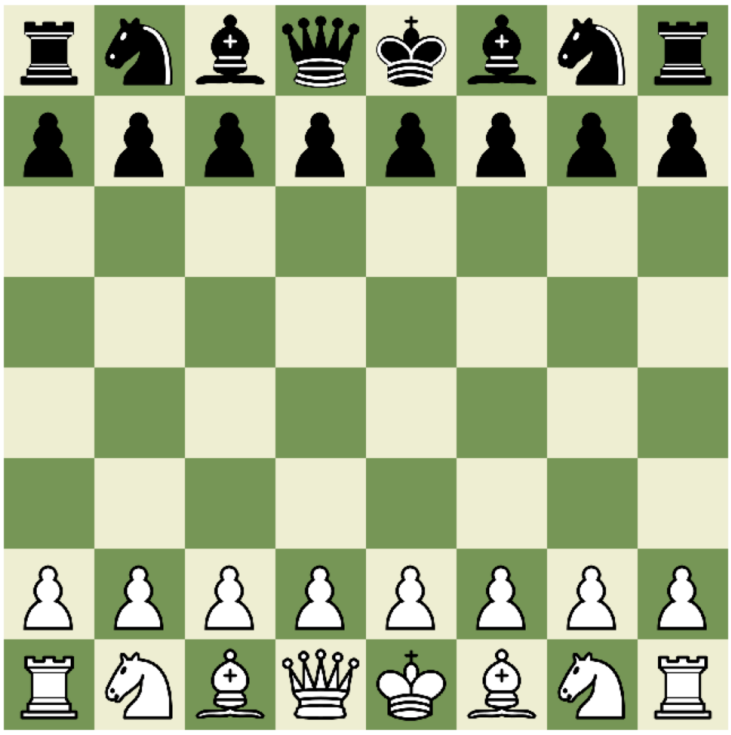
1. INTRODUCTION

Chess is a competitive and recreational board game played between two players on a checkered board with specially designed pieces of contrasting colours, usually white and black.

Basic Game Settings:

The chessboard is two dimensional with size of 8×8. One player is in control of the white pieces, and the other player is in control of the black pieces. The chessboard contains white at the bottom and black at the top of the board. There are six types of pieces: king, queen, bishop, rook, knight, pawn. Each player begins with 1 king, 1 queen, 2 bishops, 2 rooks, 2 knights and 8 pawns. The game starts with the first move by white. After that the players alternate turns in accordance with fixed rules. The design of chessboard shall be like this:



The game will end with three possibilities: checkmate, draw or dead position. The game will be written using the object oriented programming approach in the C++ language along with the use of Simple DirectMedia Layer (SDL) as a cross-platform software development library for the graphical user interface.

2. OBJECTIVES

The main objectives of our project are as follows:

1. To create a project on Object Oriented Programming and understand its concepts better.
2. To explore the features of C++ language.
3. To be familiar with resource re-usability by making user defined header files.
4. To learn the basics of game development and game physics.
5. To be familiarized with graphics programming and game development using SDL in C++ programming language.
6. To optimize program in terms of time and space up to greatest extent as possible.
7. To build an attractive UI for the users to help them interact easily with our game.
8. To learn to work and communicate effectively in a team.
9. To be prepared to work in major projects in the coming years.

3. PROPOSED SYSTEM

3.1. Description

The project aims to be a cross platform chess game, which can be used as a way to play a game of chess between two people. The primary goal is to be able to simulate a chess game. We will have a menu screen with the ability to choose the preferred color, and the per player time to play the game. In game we will have all the game information displayed in the screen, and we will be using custom assets for the chess pieces. Additionally we also aim to create an adversary, against which we will be able to play the game as single player, with the option of switching between the two in the menu screen.

3.2. System Block Diagram

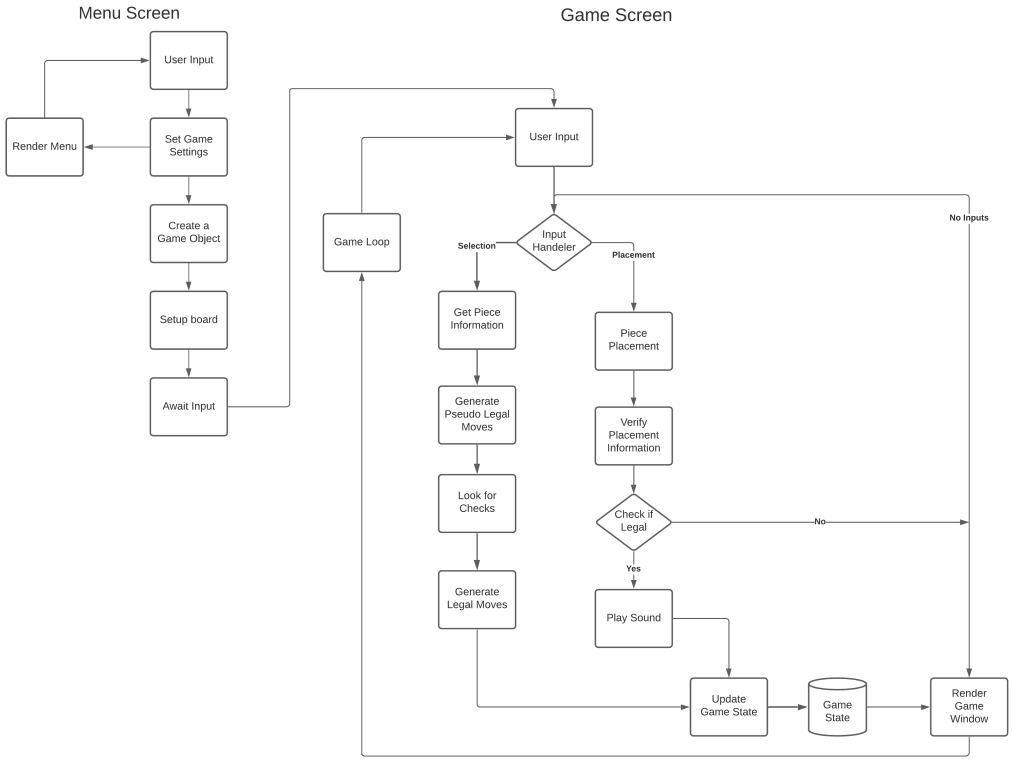


Figure 3.1: Block Diagram

4. METHODOLOGY

We shall be moving forward with the following steps:

4.1. Planning and Gathering information:

We will be gathering information about Chess game and various libraries required for the project. The planning for the work division among the three of us shall be done.

4.2. System Model and Design:

A basic model of the game will be proposed and relevant features will be implemented into the game. New testable features shall be added regularly and validated.

4.3. Software Development:

The program is being written in Visual Studio Code in the C++ language following the object oriented programming approach. As compiler, we will be using msvc for windows and g++ for unix systems. We will be using **SDL 2** (Simple Direct-Media Layer) which will provide hardware abstraction layer for computer multimedia hardware components. Additional SDL2 Libraries (SDL2_ttf, SDL2_mixer, SDL2_image) shall be in use. We will also be using Cmake for build automation and debugging.

4.4. Testing and Implementation:

The program will undergo testing and to measure usability , functionality and performance.

5. PROJECT SCOPE

We are aiming to create a simple working chess game. The project starts by familiarizing our self with the rules of chess. We are following the rules implemented by FIDE.The chess game project will include all the rules of chess and create a working version of the game of chess.

The scope of the project includes:

- Making and showing the chess board
- Putting the chess pieces in the right squares
- Movement of pieces including special movement like castling, en passant.
- Checking the state of game for checkmates,pins and captures
- Creating a AI adversary, using minmax algorithm, which can go toe to toe with a human human opponent.

The scope doesn't include:

- Variants of chess
- Analysis of the game

5.1. Constraints

Our project shall have some constraints that will have to be overcome. Firstly, setting up and implementing SDL library is challenging. We might face difficulty in implementing special moves like En Passant and Castling . We have to check the state of game in every move which might be tedious during development and might introduce a lot of bugs. We keep these constraints in mind but with the understanding that these challenges will be a great learning opportunity for us and with that belief, we will be giving our best to the project.

5.2. Project approach

We are approaching the project in a bite-size at a time. First, we will develop the board then the pieces and so on. We are taking this approach so that we can solve the bugs arrived in the small portion then and there so that the bugs are minimized in the final state of the game and it is easier to solve the problems incurred.

5.3. Acceptance clause

The project and its features are accepted and added to final project only when all three of us are happy with the features.

6. PROJECT SCHEDULE

The schedule that we will have adopted for our project can be summarized below:

Topic	**Days Required**
Choosing a topic	1
Coding the core of the project (Grids)	2
Coding the chess pieces	3
Movement of the pieces	4
Special movement of the pieces (Castling,En passant)	2
Coding the detection of Gamestate(checkmates)	3
Debugging the project	7
Completion and testing of project	2
Documentation of project	2

The above mentioned schedule is an approximation and might change as per requirement.