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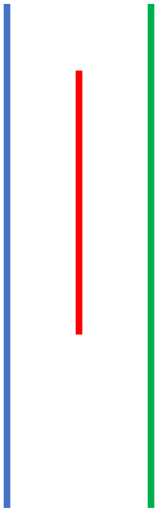


By:
Javed Ansari (PUL077BCT033)
Kripesh Nihure (PUL077BCT037)

A PROJECT PROPOSAL TO THE DEPARTMENT OF ELECTRONICS AND
COMPUTER ENGINEERING ON C++ PROGRAMMING

DEPARTMENT OF ELECTRONICS AND COMPUTER ENGINEERING
LALITPUR, NEPAL

ACKNOWLEGDEMENT

The sensation and final upshot of this project required a lot of guidance and assistance from many people and we are exceptionally honored to have got this all along the completion of our project. All that we have done is only due to such supervision and assistance so we would like to express our sincere and earnest gratitude to all individuals who granted their helping hands to accomplish our project timely and efficiently.

Firstly, we would like to express our sincere gratitude to our lecturer Er. Daya Sagar Baral for providing such an splendid opportunity to do the project work in C++ and giving us all support and guidance which made us accomplish the project duly. We are extremely thankful to him for providing such a nice support and guidance. We owe our deep gratitude to all our classmates and friends who took keen interest on our project work and guided us all along, till the completion of our project work by providing all the necessary information for developing a good system.

We are thankful to and fortunate enough to get constant encouragement, support and guidance from our senior brothers and sisters which helped us in successfully completing our project work. Also, we would like to extend our sincere esteems to the Department of Electronics and Computer Engineering for granting us such a platform of doing project work. So we would like to express our sincere gratitude to our teachers to provide us with such an challenging task which would enhance our skills and our knowledge related to the Object Oriented Programming.

The instructors are responsible to ensure the smoothness of the classroom activities alongside with the monitoring the student's attendance, attention and activities. Manual observation is a tedious job and affects the whole learning process. With the incorporation of IOT devices and computational algorithms

Also, I'd like to express my deepest thanks to our teacher and lab assistant for guiding me through this course. With their guidance, I believe I/We can do any simple/complex project. I would like to also thank them for giving us this wonderful opportunity. With this project, we will be able to apply our knowledge/skill of programming into a real world problem. Also, from this project, we will get to know some unique idea about project from our friends side too.

ABSTRACT

This project work was given to us as a minor project for our academic session B.E. (Computer) Second Year First Part as prescribed in the syllabus designed by IOE, TU. The main aim of this project was to develop a user-friendly program using an Object Oriented Programming language, C++. For this project we made a game named 'Bagh-Chal' and 'Buddhi-Chal'.

TABLE OF CONTENTS

1. INTRODUCTION

Bagh-Chal (meaning "Tiger game") is a strategic, two-player board game that originated in Nepal. The game is asymmetric in that one player controls four tigers and the other player controls up to twenty goats. The tigers 'hunt' the goats while the goats attempt to block the tigers' movements. This game is also seen in southern India with a different board, but the rules are the same. This game is popular in rural areas of the country.

Buddhi Chal means mind game in Nepali, and is front the same root as Buddha (the pali word budh meaning, "to know"). This game is similar to tic-tac-toe but played with token (goti) in the game. Players firstly have to put their 3 tokens on the board turn-by-turn and then they get chance to move their token. Winner will be decided according to the pattern of their token. The pattern is same as that of Tic-Tac-Toe.

1.1. Background

Bagchal is a strategic, two-player traditional board game that originated in Nepal. It is one of the most interesting *hunting games* (those games played between unequal forces with different goals, where pieces use to symbolize animals). *Bagh* in Nepali means **tiger**, and *chal* means **move**, hence you could translate it as the *Tiger Moving Game* or *Move the Tigers*.

The game is asymmetric in a way, that one player controls four tigers and the other player controls up to twenty goats. The tigers 'hunt' the goats while the goats attempt to block the tigers' movements.

Two sides take part in the game: **4 tigers** trying to capture the **20 goats** who defend themselves by blocking the tigers. The game board consists of a grid of 25 points with lines of valid movement connecting them (see graphic above).

Moves are made along the lines drawn on the board. Notice that there is not any line between some of the points that could be diagonally connected, so there are some restrictions.

Since forces are unequal, the objective is also different for both sides:

- **Goats** must **surround the four tigers** so that any of them can't make any valid move according to the following rules.
- **Tigers** win if they **capture five goats**.
  Sometimes it is said that tigers must capture all the goats to get the victory, but in practice when several goats are captured their possibilities of blocking the tigers are very few, so it is not worth extending the game when five goats have been already captured.

1.2 Motivation

We were motivated to do project on the topic related to game because it increases algorithmic thinking. Also, after doing this project, we will be able to apply all the concepts of OOP. We can treat player as object and perform several operations on it.

2. OBJECTIVES

The main objectives regarding our project are as follows:

- ❖ To create a project on Object Oriented Programming (OOP) to make its concept clearer.
- ❖ To explore the features of C++ language.
- ❖ To be familiar with resource reusability by making user defined header files.
- ❖ To build an attractive UI for the users to help them interact easily with our programs.
- ❖ To optimize program in terms of time and space up to greatest extent as possible.
- ❖ To make us able to work in major projects in coming future.
- ❖ To learn to work in a team

3. EXISTING SYSTEMS

The game we have proposed already exists in the real world as mobile applications in both ios and non-iOS systems. Also, it has been made by our seniors as well for the same purpose, project for OOP. But we will be trying something new in order to make it unique and worthy by providing better user interface and also trying to implement ML for computer aided gameplay.

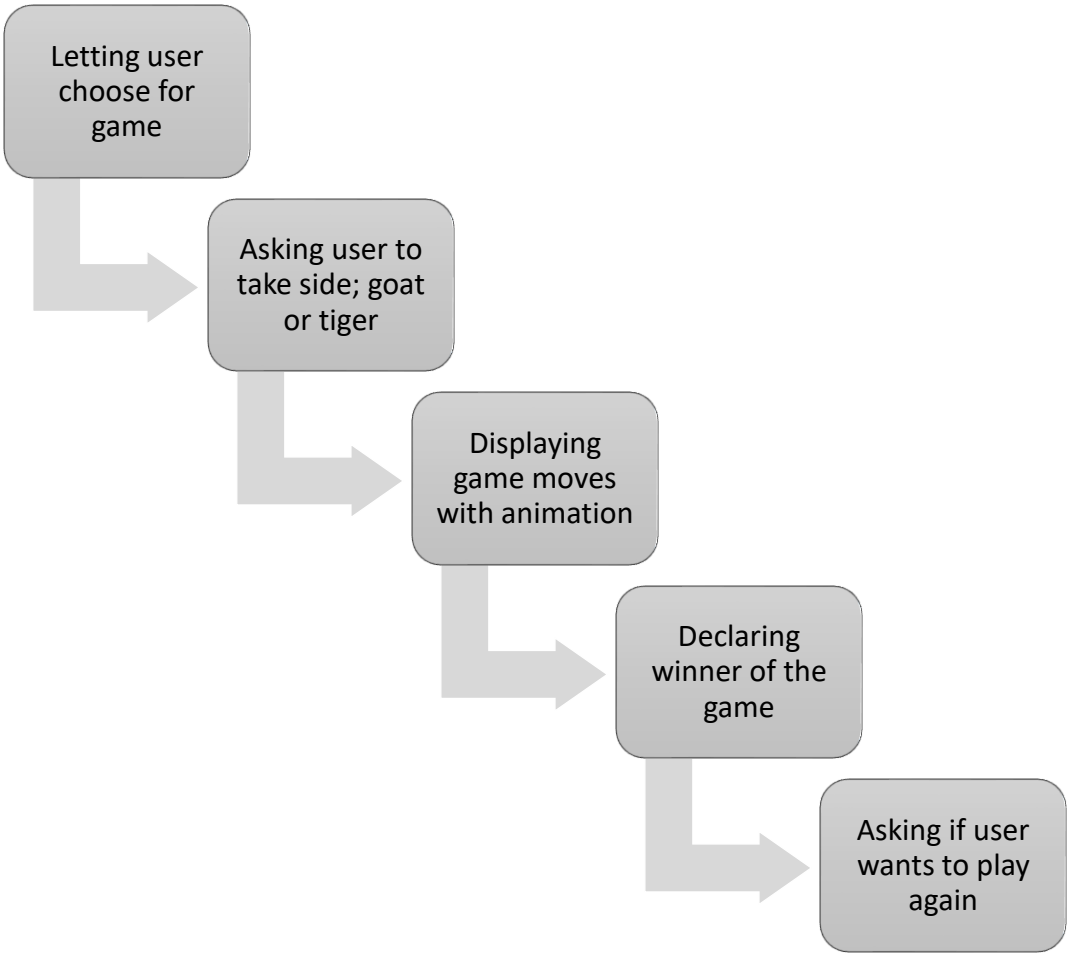
4. PROPOSED SYSTEM

4.1. Description:

This project is based on C++ programming language using SFML graphics library and Object Oriented Programming concept. The concept of code reusability, data abstraction and system free coding will also be taken care of as far as possible. C++ has the capability to manage the memory allocation/ deallocation on any objects that will be created during the program which will help us in increasing performance efficiency.

The game we are proposing, Bagchal and Buddhichal are taken as predator and prey game that originated from Nepal. In the old times, it was more common among the youngsters and elderlies. But it seems that the game is not played anymore but we , Javed and Kripesh, as a team are proposing to develop the same games in C++ using SFML framework.

4.2. Block diagram:



5. METHODOLOGY

Methodology This project is based on C++ programming language utilizing SFML graphics library, and “Object Oriented Programming” concept. Different classes were created with required number of private and public member data and member functions for smooth running of the program preserving the concept of data hiding. The concept of code reusability, data abstraction were implemented in the project. The events for each object was handled by the different member functions and that they formed a final outlook working together simultaneously.

C++ has the capability to manage the memory allocation/deallocation on any objects that we've created which can increase the performance of our program. This program is performance critical software that requires 100% usage of the hardware user has, and C++ is only popular language that gives you such abilities:

- High abstraction level - fine Object oriented programming and generic programming
- Very good and deterministic control of the resources you use.
- Ability to optimize special parts to very high level that is almost impossible to achieve with other popular languages.

The strength of C++ when it comes to complex program development is the ability to exactly layout the data-structures that your software will use. C++ provides the ability to override important performance bottlenecks such as memory allocation. It has the ability to structure and place things exactly where they want in the memory.

6. GAME ALGORITHM

How the game goes on

Before the start of the game, pieces are placed as follows:

- The twenty goats are placed out of the board.
- The four tigers are placed in the four corners of the board.
- Players move alternatively, starting the goats. The actions made by goats divide the game into two phases:
- While all the 20 goats have not been placed on the board, the only possible move is to place one of them at one of the free junctions of the board.
- After all the goats have been placed on the board, they may be moved from their position to any adjacent junction following any straight line.
- A tiger or goat cannot move a piece in such a way that a similar position appears repeatedly on the board.

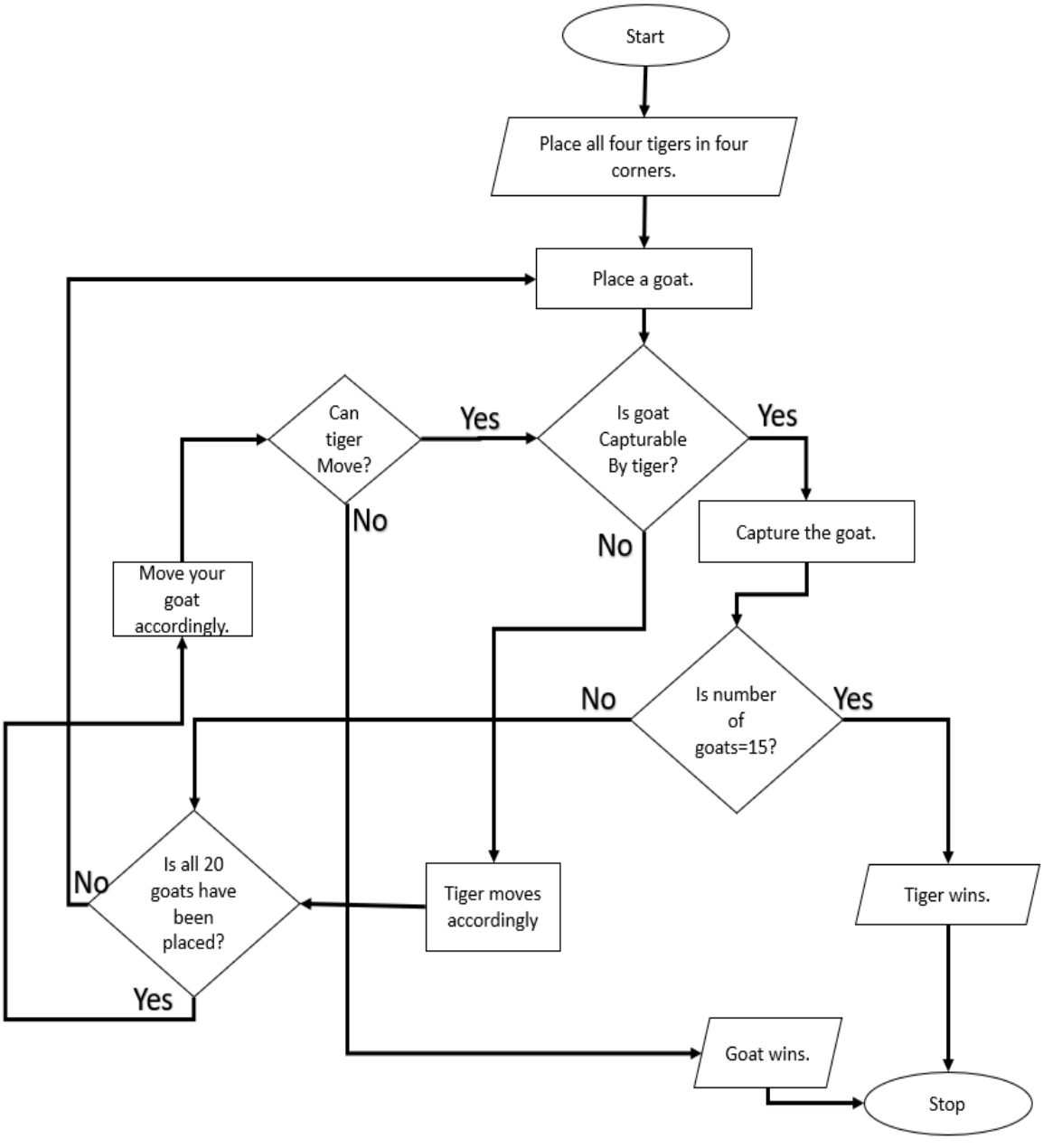
The tigers, during the game, may perform two kinds of movements:

- Same as goats, they may be moved along any of the lines to an adjacent junction.
- They also may capture one goat placed on an adjacent junction by *jumping* over following a straight line and landing on the next junction adjacent to the position occupied by the goat.

Sometimes the game could fall into a repetitive cycle of positions; especially goats may use this resort to defend themselves from being captured. In order to avoid this kind of situation, an additional rule has been established:

- When all the goats have been placed, it is not allowed to perform any move that causes any situation of the pieces that have been already repeated during the same game.

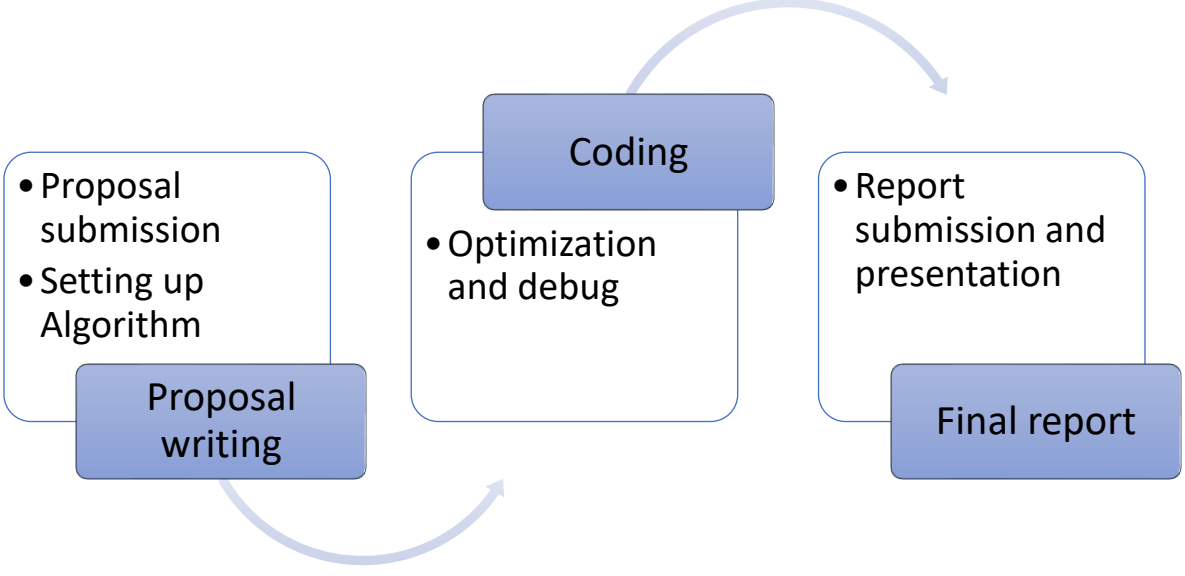
7. FLOWCHART


Start
Place all four tigers in four corners.
Place a goat.
Is goat Capturable By tiger?
Yes
Can tiger Move?
Yes
No
No
Capture the goat.
Move your goat accordingly.
Is number of goats=15?
No
Yes
Is all 20 goats have been placed?
No
Yes
Tiger moves accordingly
Tiger wins.
Goat wins.
Stop

8. PROJECT SCOPE

This project will help us to understand how can we implement the real-world problem using OOP. It will give us knowledge of various concepts of Object Oriented Programming and also the use of graphics library will enable us to create user friendly and attractive interface. This project is a part of the academic education made for learning motive but we may go for commercial launching of the application if everything goes as per our plan.

9. PROJECT SCHEDULE



10. CONCLUSION

This project is unquestionably a good way of learning and implementing the way for programming practice. This project will lead us to the winding up on the programming practice that for developing software a good judgment and proper analysis of the topic is required at first rather than the coding. The coding is not the initial step for emergent of any program, rather a good planning on the basic framework and making decision on the way of implementing the program is the most. After the coding of the program the system may not be as per our requirement but debugging, if any error, and testing and execution of the program are furthermore required. After the completion of the system, its management takes, is another most required obsession that is to be handled with great care. Also on using the graphics we might have to load different images for different purpose so proper discussion and proper decision is required as per the situation emerges. Thus, after the completion of our project, we can conclude proper judgment and implementation of the problems or topic leads to the good programming practice which might lead to have desired output.