Project Proposal
TIC TAC TOE

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1 Problem Analysis

Tic Tac Toe is a simple 3×3 grid-based game where two players alternately place X and O, aiming to align three in a row. As software, it requires handling input validation, turn switching, win/draw detection, and a user-friendly interface. Features such as replay, AI opponents, or score tracking can also be added. The game is chosen for its simplicity and usefulness as a programming exercise. It helps practice arrays, loops, conditions, and object-oriented concepts. Java makes it easy to implement, and the project can later be extended with graphics, AI, or even online multiplayer.

2 Literature Review

Tic-Tac-Toe game can be played by two players where the square block (3 x 3) can be filled with a cross (X) or a circle (O). The game will toggle between the players by giving the chance for each player to mark their move. When one of the players make a combination of 3 same markers in a horizontal, vertical or diagonal line the program will display which player has won, whether X or O.[1]

Tic-Tac-Toe is a solved game. It has at most board states (5,478 after removing symmetries) and a total of 255,168 possible games. Because of its small state space, it is often used as an example in AI.[2]

The Minimax algorithm is used to determine optimal moves. With alpha–beta pruning, the result remains the same but the number of nodes searched is reduced. That is why most textbooks and courses use Tic-Tac-Toe to demonstrate adversarial search.[3]

3 Methodology

The development of the Tic Tac Toe game will follow a stepwise approach as illustrated in the block diagram. At the beginning, a 3×3 board is initialized to represent the playing field. The game then proceeds by allowing Player X to make the first move, followed by Player O, with each move being validated to ensure it is placed in an empty cell. After every move, the system checks whether a winning condition has been met or if the board is completely filled, which would indicate a draw. Once the condition is verified, the program announces the result to the players, declaring either a winner or a draw. Finally, the system provides the option to either replay the game with a fresh board or exit the program. This methodology ensures that the game logic remains simple, structured, and user-friendly, while also maintaining accuracy in gameplay and offering replayability. The

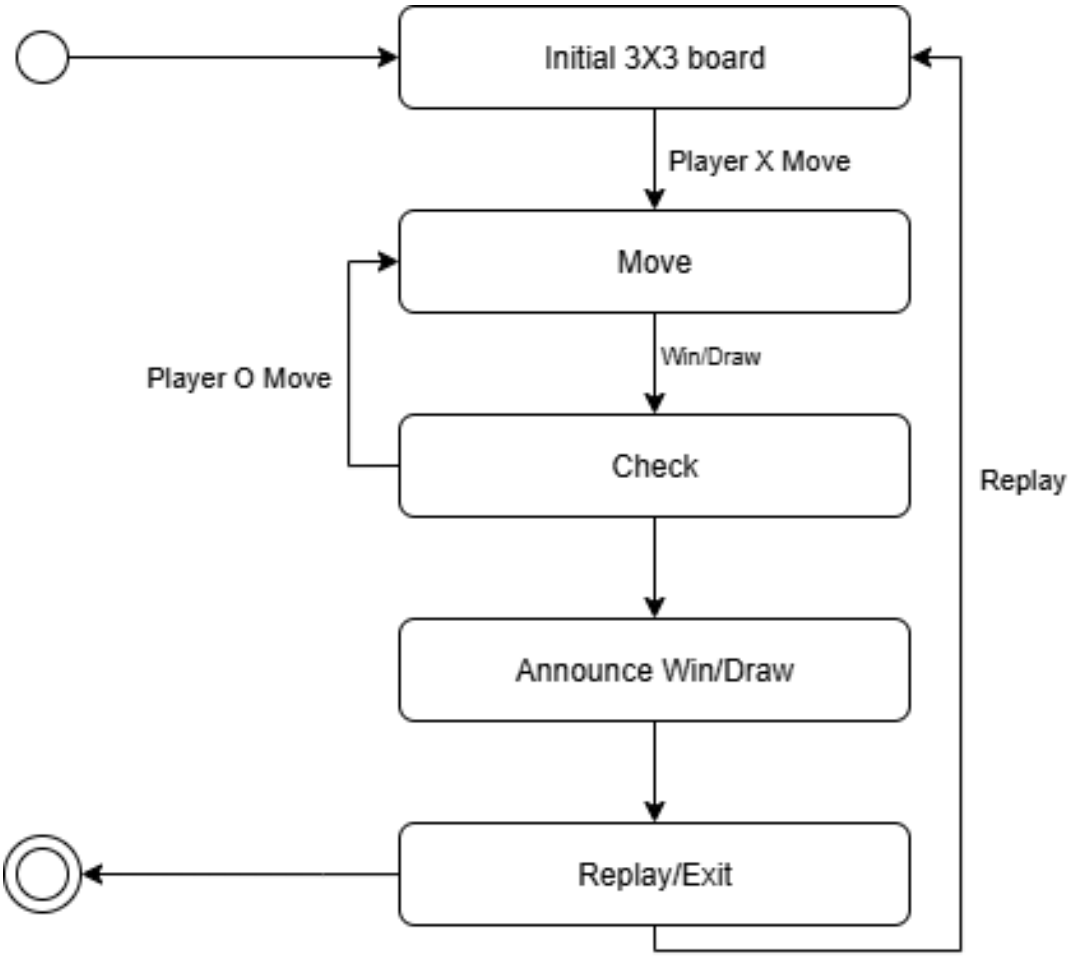

Figure 1: Block Diagram of Tic Tac Toe System

block diagram of the Tic Tac Toe system is shown in Figure 2.

4 Feasibility Study

4.1 Economic Feasibility

- Hardware requirements are minimal, except for a computer or laptop.
- Free tools like Java JDK and IDEs (Eclipse/IntelliJ/NetBeans) will be used.
- No licensing or subscription costs involved.
- Development cost is minimal and affordable for students.
- High benefit at almost zero expense.

4.2 Operational Feasibility

- The board will automatically update with "X" and "O" after each move.
- The system will display clear messages whenever a player wins or the game ends in a draw.
- Players will have a Restart option to begin a new game at any time.
- No special training is required to use the system.

4.3 Technical Feasibility

- Required technology, tools, and expertise are available.
- System performance is fast with accurate gameplay.
- User-friendly interface ensures easy play.
- Potential for future improvements exists.

5 Main Phases

- Project proposal and planning.
- Requirement specification of the Tic Tac Toe game.
- Selection of suitable SDLC model (Iterative/Incremental).
- Developing block diagram and data flow diagram (DFD) of the game.
- Develop UML use case diagram for the Tic Tac Toe system.

- Develop UML sequence/communication diagram to show gameplay interaction.
- Develop UML class diagram to represent board, player, and game logic.
- Coding and implementation of the Tic Tac Toe game in Java.
- Software testing with different scenarios (win, draw, invalid input).

Table 1: Project Task Schedule for Tic Tac Toe Game Development

SL	Task	Week	Responsible Person	Phase
1	Requirement Specification & Analysis	1	Project Manager & Team Members	Research & Planning
2	Requirement Finalization	1	Project Manager & Team Members	Analysis
3	System Design (Block diagram, DFD, UML)	2	Project Manager & Team Members	Design
4	Game Logic Design & Modeling	2	Project Manager & Team Members	Design
5	Implementation (Java Coding)	3	Project Manager & Team Members	Implementation
6	Testing (Win/Draw, Replay option)	4	Project Manager & Team Members	Testing
7	Enhancement (Scoreboard/AI)	5	Project Manager & Team Members	Testing/Improvement
8	Final Integration & Documentation	6	Project Manager & Team Members	Deployment

6 Work Plan

The work plan for the Tic Tac Toe project is divided into several short phases. In the first week, the specification and planning of the requirements will be completed. The second week will focus on system design, including diagrams and game logic modeling. Coding and implementation will be carried out in the third and fourth weeks, followed by testing in the fourth and fifth weeks. If time permits, enhancements such as a replay option or AI opponent will be added in the fifth week. Finally, in the sixth week, the project will be documented, finalized, and submitted.

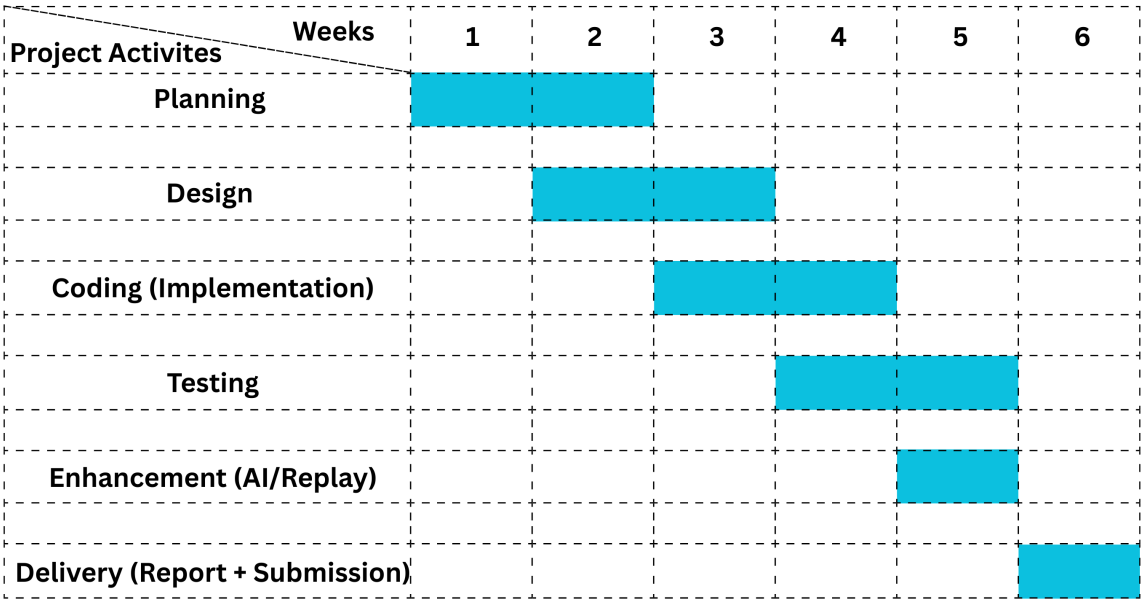

Figure 2: Gantt Diagram of TIC TAC TOE Game

7 Budget

Budget details are given in Table 2.

Table 2: Budget Details of Tic Tac Toe Project

SL	Criteria	Cost Specification	Estimated Cost (Tk)
1	Hardware Cost	Computer/Laptop	20,000
		Internet Connection	2,000
2	Software Cost	Java JDK (Free)	0
		IDE (Eclipse/IntelliJ)	0
3	Development Cost	Student Effort	5,000
4	Miscellaneous Cost	Documentation	1,000
		Printing/Reports	1,000
	Total Cost		**29,000**

8 Conclusion

The Tic Tac Toe project aims to design and implement a simple yet complete software system that simulates a well-known logical game. The project is highly feasible in terms of cost, time, and resources, and it provides an excellent opportunity for beginner programmers to learn and practice key programming concepts. The system ensures fair game play, accurate detection of win and draw conditions, and user-friendly interaction. Additionally, the project has strong potential for future expansion with features such as AI, score-keeping, and graphical interfaces. In conclusion, the Tic Tac Toe project is

small, practical, and educational, making it an ideal choice for beginner-level software development.

9 Reference

[1] Lalitha Saroja Thota, Manal Elsayeed, Naseema Shaik, Tayf Abdullah Ghawa, Ahlam Rashed, Mona Refdan, Wejdan Mohammed, Rawan Ali Suresh Babu Changalasetty, "Implementation of Tic-Tac-Toe Game in LabVIEW", International Journal of Computer Trends and Technology (IJCTT) – volume 12 number 2 – Jun 2014

[2] Gasarch, W. – MiniMax and Alpha–Beta Pruning (lecture slides); Wikipedia – Game complexity (Tic-Tac-Toe).

[3] Russell Norvig – Artificial Intelligence: A Modern Approach; University lecture notes – Adversarial Search.

10 Activities Table

Table 3: Activities Table

Name	ID	Activities
Masfiq Rahman Misha	2303020	Technical, Problem Analysis, Budget
Faria Naz Tama	2303025	Budget, Methodology, Workplan, Conclusion
Md. Akash Mia	2303039	Literature Review, Motivation