Mobile App I - Project Final Report

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Team: 10

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Project Name: Net the Mobile Game

Mission Statement

Our project is to build a mobile app game called “Net”. The goal of the game is to rotate pieces, so they all join in with no loops in an n x n grid. The game will contain different levels and difficulties to keep the user engaged.

Project Information and Background

The game, “Net”, is a popular logic puzzle. However, it is only available through web browsers. This format is not optimal for mobile devices and lacks offline capabilities. Mobile users looking to play this game will have to go through a browser to play which has many implications and is not perfect. Our project will aim to create a dedicated mobile app that adapts the “Net” puzzle game. This app will have features like offline play, touch screen capabilities, and will be optimized for mobile devices. The target audience includes fans of logic puzzles of all ages. People who like games like Sudoku and Minesweeper will enjoy this game due to its similarities to those other logic games.

In this context, innovative, within this project, means providing features that browser versions lack, such as offline functionality, mobile-friendly design, and expanded customization options. From a broader perspective, puzzle games remain one of the most consistently popular genres in the mobile market. Many classic web-based puzzles have not yet been adapted into high-quality mobile apps. This presents a clear opportunity: bringing a proven, beloved puzzle to a better-suited medium where it can reach a wider audience. Our project contributes to the ongoing trend of revitalizing logic games for modern platforms while providing players with a smoother and more enjoyable experience.

Project Results

- Figure 1: Main Screen, which introduces the user to the game. The user can either resume a current game or start a new game if there is no current game.
- Figure 2: Game Screen, which displays the interactive game interface where the user can play the game and attempt to complete the puzzle.
- Figure 3: Cell Settings, which allows the user to select the difficulty of the game, giving it a unique experience, and allowing the user to constantly be challenged.
- Figure 4: Game Settings, which allows the user to customize the game itself. The user can edit the width of the pipes, the curvature, and the color, allowing full customization and a pleasant user experience.

Figure 1.
Main Screen

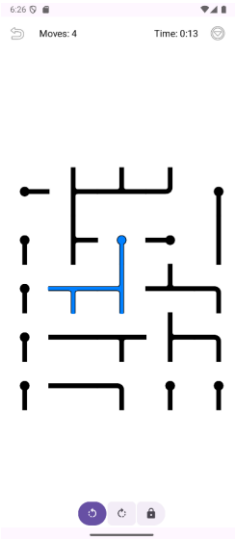

Figure 2.
Game Screen

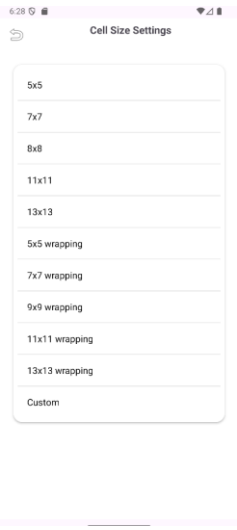

Figure 3.
Cell Settings

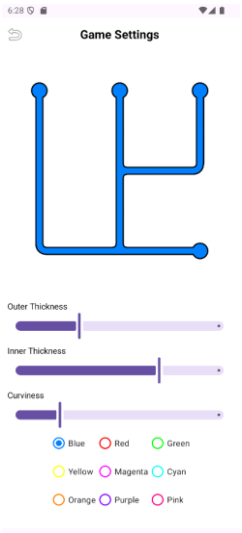

Figure 4.
Game Settings

1. Implementation Tasks

Title	Description	Result
Main Menu Screen	Implemented the main landing screen that displays the game logo, “New Game” button, “Resume” button, and navigation icons for Settings and Info. The buttons correctly navigate to their respective screens.	Fully Functional
New Game Screen	Created the interactive puzzle grid screen where users rotate pieces, lock pieces, or unlock pieces. The UI includes top navigation, difficulty indicator, and visual feedback for pieces states. Pieces change color based on connection status.	Fully Functional

Settings Screen	Implemented the visual customization screen with color selection, outline thickness slider, curvature selector, and sample preview. All UI controls update the model instantly, and user selections persist throughout the session.	Fully Functional
How to Play Screen	Built the Info screen containing game instructions, explanation of controls, and the game objective. Includes navigation back to the main screen.	Fully Functional
Game Settings (Grid Size and Variants)	Implemented a dedicated screen for selecting puzzle size (3×3, 5×5, 7×7, 10×10, etc.), as well as the "wrapping" variant.	Mostly Functional UI updates correctly, but custom size was never implemented.
Game History Screen	Created a list-style screen showing previously completed games, including grid size and time played.	Fully Functional
Win Screen	Created the win screen that displays once a game is solved.	Fully Functional
Figma Prototype	The team created a full, detailed Figma prototype that includes every screen, interaction, and navigation before development.	Fully Functional

Collaborative Work

Team Member	Contributions	Percentage of Contributions
Duy Nguyen	Designed the Figma for the overall app structure and assisted with the first draft of the project proposal. Surveyed people and got feedback on the UI, gathering the opinions of multiple people.	25%
Phyo Niang	Implemented the fragments, ensuring smooth navigation between each page. Assisted with the Final Project Report.	25%
Roshan Khatri	Implemented the ViewModel and worked on the Game States (ex. If the user selects the reset option, the game should return back to its original state.) Created the slideshow presentation and worked on the Final Project Report	25%

Lucas Torres	Worked on the main game logic (ex. Turning of the pipes, ensuring there is one unique solution, user settings and customization.). Ensured the game ran smoothly and effectively.	25%

Skills Learned

Skill Name	Description
Kotlin	Roshan, Duy and Phyo learned and used Kotlin for the first time for this project. This allowed them to expand and learn a new language, which could be beneficial in the long run.
Surveying	Duy learned and gained experience of how to properly conduct surveys and gathered feedback regarding a project. This is beneficial in the workforce when needing to push out a product but need to gather intel first.
Game logic and View rendering separation	Lucas learned how to handle separation of game logic from view rendering. This is optimal for testing and performance, and it's easily maintainable.
Group meetings	We all collectively learned and gained experience on how to work properly with a team. We set up meeting times with an agenda to ensure we are on the same page. We made sure to identify blockers if there were any and discussed how to work around or solve those blockers.

Project Challenges

Description	Impact	Actions Taken
Team Communication Delays	We had some communication gaps at the start, which delayed our progress. Many issues had to be related to not properly communicating and not checking in as often. This led to certain features, like the game logic and UI to be delayed since we weren't on the same page regarding expectations and priorities. This also pushed back our internal guidelines and reduced time for testing.	We addressed the issue as a team and reorganized our workflow. We set up more consistent check-ins and clarified responsibilities. Tasks were rebalanced so each member know exactly what they were doing, and if there were any issues, it would be brought up at the team meeting, which had a proper agenda.
Finalizing the UI layout	It took longer than expected to settle on the visual layout, spacing, and style for each	To overcome this, the team quickly drafted a Figma prototype until everyone agreed

	screen, which slowed down UI implementation. There was a lot of confusion on where to led with the UI (such as button placement and color theme), which led to delays in each fragment.	on a consistent visual direction. We held design focused meetings and gathered feedback and used the prototype as a strict reference during implementation. Doing this ensured consistency and the remaining UI development to be more smoother.

Lessons Learned

Description	Recommendation
We learned the importance of early communication.	We recommend communicating early and often to make sure everyone is on the same page. Communication is key. Without proper communication, the project becomes stagnant.
We learned the importance of sprint runs and ensuring the work gets spread evenly.	Have a sprint runs that aligns with a specific person. Try to split the work evenly for fairness. The earlier you split the work and understand who is doing what, the smoother the project goes.

Unresolved Issues & Potential Optimizations

Category	Description & Example
Screen Rotation	When the device is rotated to landscape mode, several screens, including the Main Menu, Settings, Info, and Game Settings, do not resize correctly. This issue occurs because the app's layout was designed for portrait orientation. When it rotates, the Activity is recreated and the screen dimensions become wider but much shorter, causing the elements to overflow vertically.
Custom Cell Sizes	For future optimization, we can create a custom size for the user who wants to play with a cell size that we do not offer by default. This allows the user for complete customization on how they wish to play, leading to more satisfaction reviews.

Summary

Our project transformed the classic web-based logic puzzle "Net" into a fully functional mobile experience. Throughout development, we built a complete game system, including board generation, pipe manipulation, path visualization, and victory detection, supported by a ViewModel architecture for organized state management. One achievement was designing a visually consistent interface across multiple screens and ensuring smooth transitions accompanied by our Figma prototype. At the same time, the project had several technical challenges, particularly around detecting loops, preserving game state during configuration changes, and optimizing UI performance on larger boards. These challenges made us explore and review Android concepts such as lifecycle management. Overall, the project helped us gain insight into mobile architecture, collaborative development, and balancing logic-heavy algorithms with user-friendly design.