National University - Manila

College of Computing and Information Technology

Computer Science Department

CacheUp

A Flashcard & Quiz game application focusing on Computing and Information Technology courses

In fulfillment of the requirements for the course,

Application Development and Emerging Technologies

(CTAPDEVL)

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COM222

June 2025

ACKNOWLEDGEMENT

We, members of Team “ANMLT”, would like to extend our sincerest gratitude to all those who assisted and mentored us in the process of creating our project, CacheUp. It was a tough yet valuable learning experience, and we are eternally grateful to everyone who enabled it.

First, we would like to extend our sincerest gratitude to our adviser, Ms. Armida Salazar, for her encouragement, guidance, and constructive feedback. Since the start of the project, Ms. Salazar has inspired us to perform our best and made excellent recommendations that influenced our ideas and enhanced our output. Her constant support provided us with the clarity and direction needed to keep us focused and finish our project successfully.

We would also like to extend special thanks to the efforts and collaboration of our group members: Beatriz Dela Cruz, Margarete Paat, Allana Pascual, Mary Pascual, and Cael Ramos. Each of us played varying roles and responsibilities, and by our strong collaboration and dedication, we were able to materialize our vision. The success of this project is an embodiment of our collective commitment and cooperation.

Finally, we would also like to extend our sincerest appreciation to our families and friends for their constant patience and support. Their motivation enabled us to remain focused, particularly when we had to put in long hours working on the project.

Thanks to everyone's assistance, guidance, and support, we were able to make CacheUp come alive and develop something that we can all be proud of.

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PROJECT PROPOSAL

DESCRIPTION

CacheUp is a quiz-based game application with a flashcard feature that focuses on basic subjects in Computer Science and Information Technology. It offers a simple learning environment for reviewing and mastering technology-related topics, such as using the flashcard feature for simple learning of terms or using the quiz feature to challenge the user's knowledge about the topic. Whether it be for a written examination, interview, or for the purpose of refreshing one's memory, CacheUp makes tech learning accessible, effective, and fun.

PURPOSE

The primary purpose of CacheUp is to provide users a practical and effective way to study and master critical knowledge of Computer Science and the overall Technology field. By organizing complex topics into categories and levels to choose from, CacheUp helps improve their memory retention, visual learning, and strengthens understanding that can also be tailored for each learner.

OBJECTIVES

The CacheUp application aims to:

- ★ Provide a streamlined learning experience.
- ★ Be able to teach users the topics under Computer Science and Information Technology
- ★ To serve as a convenient refresher tool for both students and professionals.

FEATURES

Main Menu

The Main menu gives access to three features of the CacheUp application: Quiz mode, Flashcards, Achievements list, as well as Settings. This enables the user to navigate the application easily.

Quiz Mode Gameplay

“Quiz Mode” is the core feature of the CacheUp application, as this is the main content of the overall game application. The quizzes are organized through categories and subcategories. Subcategories are conditioned to be locked except for one upon first playing the game. The user will have to progress to unlock other subcategories in each category.

Each subcategory quiz has questions that are organized by difficulty: EASY, MEDIUM, and HARD. Through the gameplay, the quiz will let you know immediately if you got the wrong or the right answer. This allowed the user to be less pressured and more open to learning the modules, making this quiz more of a practice and a refresher than an actual test.

The questions implemented in the database are more than the questions that are presented in the quiz, which allows the system to shuffle and select the questions randomly per difficulty. The questions in the quiz are completely shuffled, regardless of the question difficulty.

Pointing System

As said in the Quiz Mode feature, the questions in each quiz are arranged by their difficulty. These difficulties have different rewarding points to offer: easy questions give 1 point, medium questions give 2 points, and hard questions give 3 points. There are a total of 11 questions per quiz: 5 easy questions, 3 medium questions, and 3 hard questions. All in all, the total points the user can acquire are 20.

Flashcards

“Flashcards” is another core feature of CacheUp that allows the user to review the selected modules freely through the use of animated flashcards. Like Quiz Mode, each module is organized by categories and subcategories, but the users are allowed to freely view the modules without any conditions. This is completely free to play through and has no pointing system beneath this feature.

Each subcategory has 10 items to showcase.

Categorized Modules

CacheUp organizes modules through categories and subcategories, for the users to easily navigate the modules they want to cover or prioritize more.

CacheUp features 8 Built-in Categories:

- Introduction to Computing
- Fundamentals of Programming
- Computer Hardware
- Database
- Data Structures & Algorithms
- Networking
- Operating Systems
- Web Development

Achievements Feature & Badge Collection

CacheUp features achievements that are accompanied by badges in the face of the mascot. The user can view the achievements they can obtain through the main menu.

Achievements can be obtained through their progression in Quiz mode. 3 achievements can be obtained:

- "CATEGORY FINISHER" - The user must complete all quizzes in a category, regardless of the number of mistakes.
- "PERFECTIONIST!" - The user must complete all quizzes in a category with a perfect score of 20 points.
- "OVERALL PERFECT!" - The user must complete all quizzes in each category that CacheUp has offered with a perfect score of 20 points.

User Progression

CacheUp uses a database in order to save the user's scores and notable unlocked achievements. Therefore, even if the user leaves the app, it will still save their progress they have gained in the game.

UNIQUENESS

CacheUp exclusively focuses on subjects tackling Technology and Computer Science. This Specialization allows the app to offer deeper and more relevant content to the right tech users. By narrowing the scope of the application, CacheUp delivers higher-quality learning materials and a more efficient study experience, making it more convenient for tech learners who want to avoid the hassle of looking for the specified tech courses in other learning applications or online.

TARGET USERS

CacheUp focuses on the selected group of people as its primary users, these are the following:

- ★ College Students who are interested in Computer Science or Information Technology.
- ★ Professionals in the tech field.
- ★ Self-learners.
- ★ Educators are looking for alternative learning tools for teaching.

RATIONALE

A large number of learners may find it challenging to access dependable and tailored study tools focused solely on the expansive field of Computer Science and Information Technology. CacheUp bridges this gap by offering a dedicated platform designed for individuals in the tech industry who seek convenient and effective ways to enhance their knowledge. Its content is crafted to be both engaging and easy to absorb, supporting continuous learning and helping users revisit or reinforce concepts they may have overlooked or studied previously.

USE CASE DIAGRAM

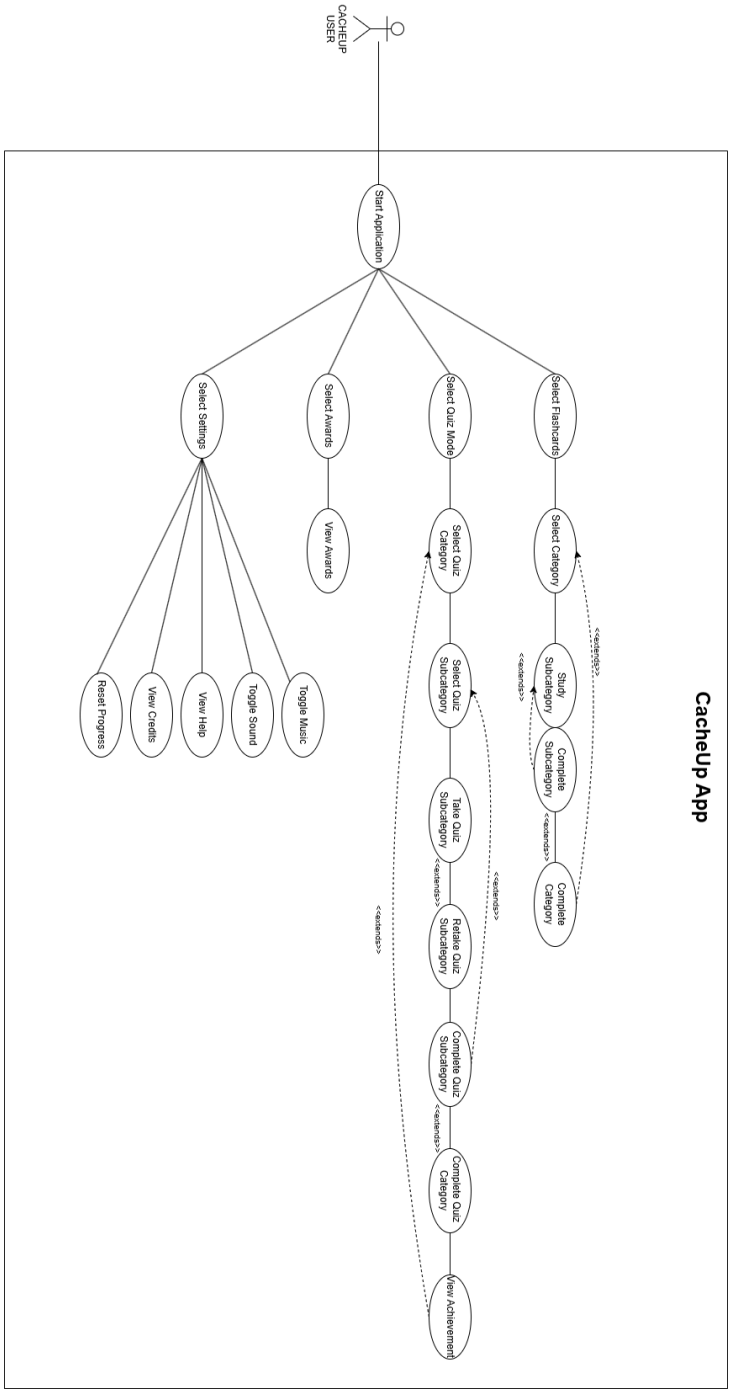

Figure 2.1: CacheUp's Use case diagram (Vertical format for enlargement.)

TEST CASE

ID starts with:	Corresponds to:
TCB	Welcome Screen
TCF	Flashcards Screen
TCQM	Quiz Mode Screen
TCA	Awards Screen
TCS	Settings Screen

FIRST EXECUTION

Test Case ID:	TCB01
Test Scenario:	Starting the app and entering the main menu
Test Steps:	1. User opens the app 2. User clicks the Start button on the welcome screen
Prerequisites:	The app is installed and being opened
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The app transitions from the welcome screen to the Main Menu, showing options like Flashcards, Quiz Mode, Awards, and Settings
Actual Results:	As expected
Test Status:	Passed ✅

FLASHCARD EXECUTION

Test Case ID:	TCF01
Test Scenario:	Opening a flashcard to study
Test Steps:	1. The user navigates to Flashcards 2. The user clicks on a category 3. The user selects a subcategory
Prerequisites:	None
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	Flashcards for the selected subcategory appear and can be navigated
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCF02
Test Scenario:	Reviewing completed flashcards
Test Steps:	1. The user opens a flashcard category. 2. The user navigates to a subcategory that has already been completed 3. The user opens and views the flashcards again
Prerequisites:	The subcategory must have been previously completed
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	Flashcards are accessible for review even after completion
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCF03
Test Scenario:	Navigating back from flashcard subcategory
Test Steps:	1. The user opens a flashcard category 2. The user taps the Back button
Prerequisites:	None
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The system returns the user to the Category screen
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCF04
Test Scenario:	Navigating through flashcards using "Next"
Test Steps:	1. User opens a category 2. The user opens a flashcard subcategory 3. The user taps the "Next" button 4. The user observes the progress indicator as they continue
Prerequisites:	The subcategory contains multiple flashcards
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	Tapping "Next" shows the next flashcard. A horizontal progress bar gradually fills as the user progresses
Actual Results:	As expected
Test Status:	Passed ✅

QUIZ MODE EXECUTION

Test Case ID:	TCQM01
Test Scenario:	Attempting to open a locked category
Test Steps:	1. The user navigates to Quiz Mode 2. The user clicks on a locked category (e.g: Fundamentals of Programming)
Prerequisites:	The user must have completed Introduction to Computing to unlock this category
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	A message should appear: "Complete 'Introduction to Computing' to unlock this category!"
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCQM02
Test Scenario:	Opening an unlocked category (ex: Introduction to Computing)
Test Steps:	1. The user navigates to Quiz Mode 2. The user clicks on an unlocked category
Prerequisites:	None
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The screen should display the list of subcategories for the selected category
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCQM03
Test Scenario:	Taking a quiz in a subcategory
Test Steps:	1. The user navigates to Quiz Mode 2. The user clicks on an unlocked category. 3. The user selects and takes a specific quiz
Prerequisites:	The user must have completed the required prerequisite category
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The user is able to start the quiz. A visual change in color confirmed completion only if the score is greater than 5
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCQM04
Test Scenario:	Retaking a quiz in a subcategory
Test Steps:	1. The user navigates to Quiz Mode 2. The user clicks on an unlocked category. 3. The user retakes a specific quiz
Prerequisites:	The user previously scored less than 5 points in this subcategory
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The user is allowed to retake the quiz. Upon completion, the system displays the quiz score and marks the subcategory as completed
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCQM05
Test Scenario:	Quiz is marked as completed
Test Steps:	1. The user navigates to Quiz Mode 2. The user clicks on a category 3. The user selects a quiz subcategory that was already taken
Prerequisites:	The user has previously completed the quiz
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The quiz subcategory is marked as completed via color change. The system shows the score and a message "You have already completed this quiz! "
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCQM06
Test Scenario:	The last subcategory in a quiz category is completed
Test Steps:	1. The user navigates to Quiz Mode 2. The user clicks on a category 3. The user selects and completes the last quiz subcategory
Prerequisites:	The user has already completed all other quiz subcategories under the category
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The system shows an achievement notification, awarding the user a "Category Finisher" badge
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCQM07
Test Scenario:	All quizzes in a category are completed
Test Steps:	1. The user navigates to Quiz Moode 2. The user clicks on a category
Prerequisites:	The user has previously completed all quizzes under that category
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	All quiz subcategories are marked as completed, and cannot be retaken unless progress is reset
Actual Results:	As expected
Test Status:	Passed ✅

AWARD EXECUTION

Test Case ID:	TCA01
Test Scenario:	Viewing different types of awards
Test Steps:	1. User navigates to the Awards section 2. User views the list of available awards
Prerequisites:	None
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The screen displays different types of awards (e.g., Category Finisher, Perfectionist, Overall Perfect) with their icons
Actual Results:	As expected
Test Status:	Passed ✅

SETTINGS EXECUTION

Test Case ID:	TCS01
Test Scenario:	Opening Help
Test Steps:	1. User accesses the Settings 2. User clicks Help
Prerequisites:	None
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	A screen appears with instructions on how to use Flashcards and Quiz Mode
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCS02
Test Scenario:	Reset Progress
Test Steps:	1. User accesses the Settings 2. User clicks Reset
Prerequisites:	The user has existing progress in Flashcards and Quiz Mode
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	All saved progress is cleared; Flashcards and Quiz Mode are reset to default state
Actual Results:	As expected
Test Status:	Passed ✅

Test Case ID:	TCS03
Test Scenario:	Viewing Credits under Settings
Test Steps:	1. User accesses the Settings. 2. User clicks on Credits.
Prerequisites:	None
Tested in:	Android Studio Virtual Device – Pixel, API Level 36
Expected Results:	The app displays a screen showing the **names of the app creators** or contributors
Actual Results:	As expected
Test Status:	Passed ✅

UI WIREFRAMES

STARTING SCREEN & MAIN MENU

Figure 3.1: Starting Screen

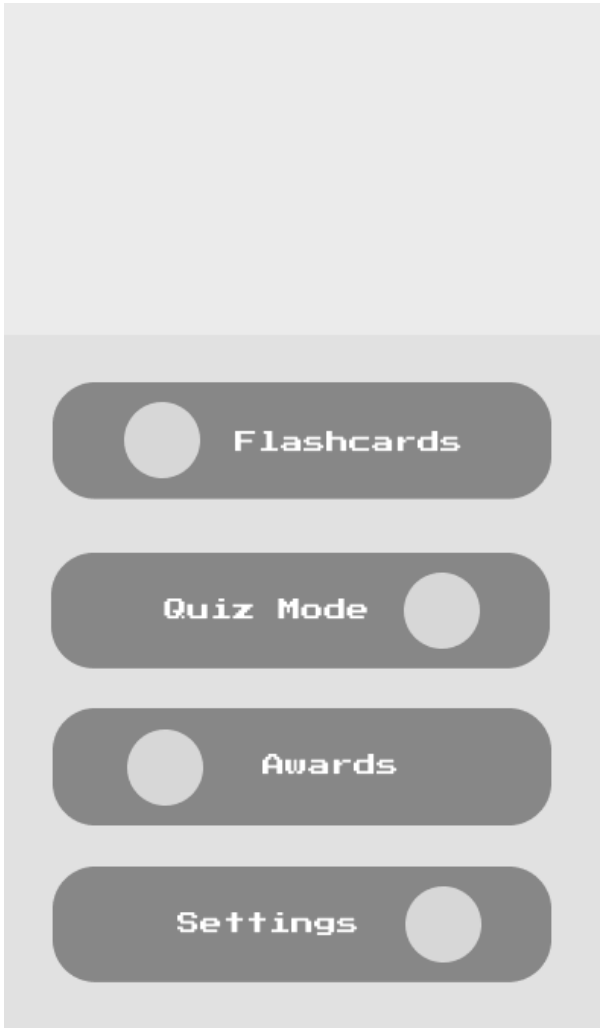

Figure 3.2: Main Menu Screen

Upon opening CacheUp, the starting screen will show. The start button will lead you to the app's main menu. The main menu serve as the navigation to 3 features that the user can access and play: Flashcard feature, Quiz Mode feature, and viewing of the Achievements. There's also the settings button to give the user an option to toggle with the application's audio and look onto simple instructions for the application.

CATEGORIES AND SUBCATEGORIES

Figure 3.3: Category Screen

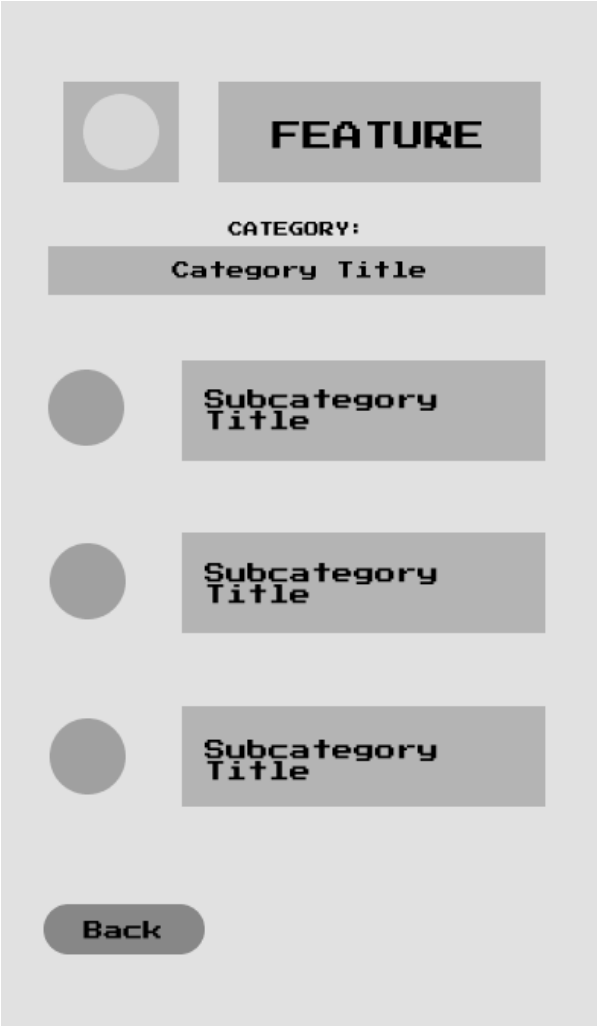

Figure 3.4: Subcategory Screen

CacheUp's category page is shared with Quiz Mode and Flashcard features for organizing to ensure proper navigation of the topics that the users want to tackle. This page comprises buttons of the categories that are scrollable. All buttons with category titles lead to the Subcategory page.

CacheUp's subcategory page is shared with Quiz Mode and Flashcard features just as similar to the Category page. It comprises buttons of the subcategories on the chosen category from the Category page. The design contains additional icon designs besides the buttons, which reflect on the design allotted for the Quiz Mode variation of this page.

QUIZ MODE GAMEPLAY

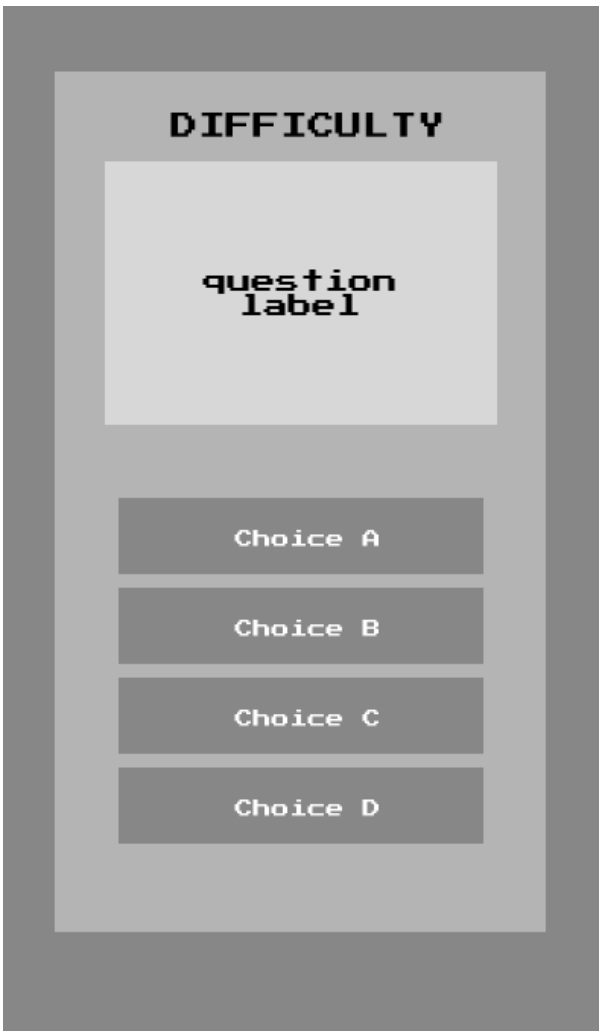

Figure 3.5: Quiz Mode Gameplay

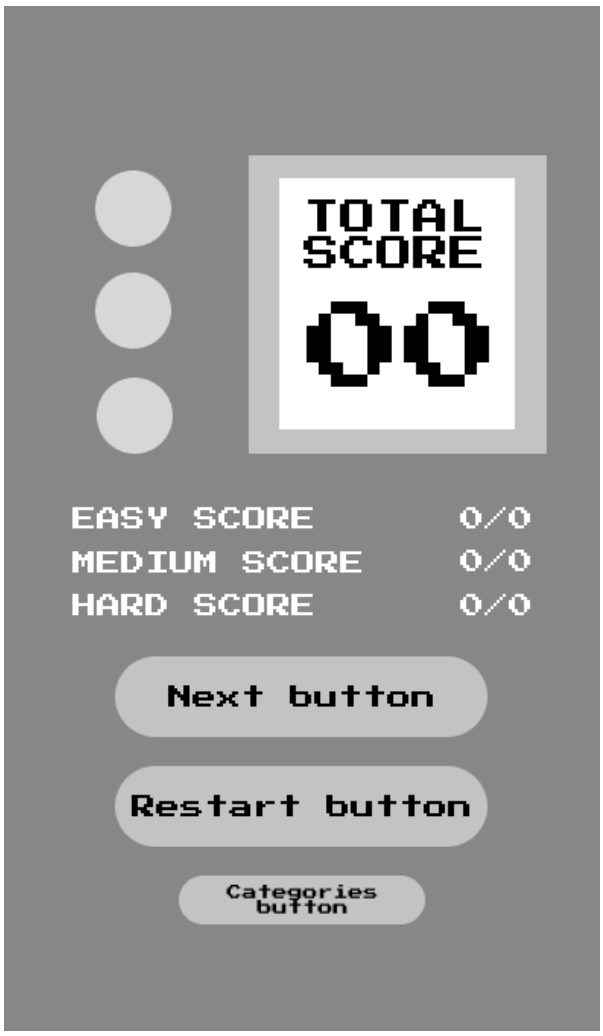

Figure 3.6: Quiz Mode Result Screen

CacheUp's Quiz Mode gameplay has a similar design to common quiz games. Comprising a large panel for the question, with 4 choices to choose from. Questions are arranged by difficulty, and it will show on top of the question to let you know what difficulty you are taking during the quiz.

CacheUp's Quiz Mode Result Screen will pop up after every quiz taken. This will show the results of your quiz: Your overall score and how many points you earned in each round. It has 3 buttons to choose your next move: The Next button will take you to the next subcategory quiz, the Restart button will repeat the current quiz, and the Category button will take you to the Category screen.

FLASHCARDS

Figure 3.7: Flashcard Showcase - Front face Screen

Figure 3.8: Flashcard Showcase - Back face Screen

CacheUp's start-up menu is shown when opened for the first time. The application will ask the user to enter their desired username for the game.

ACHIEVEMENTS

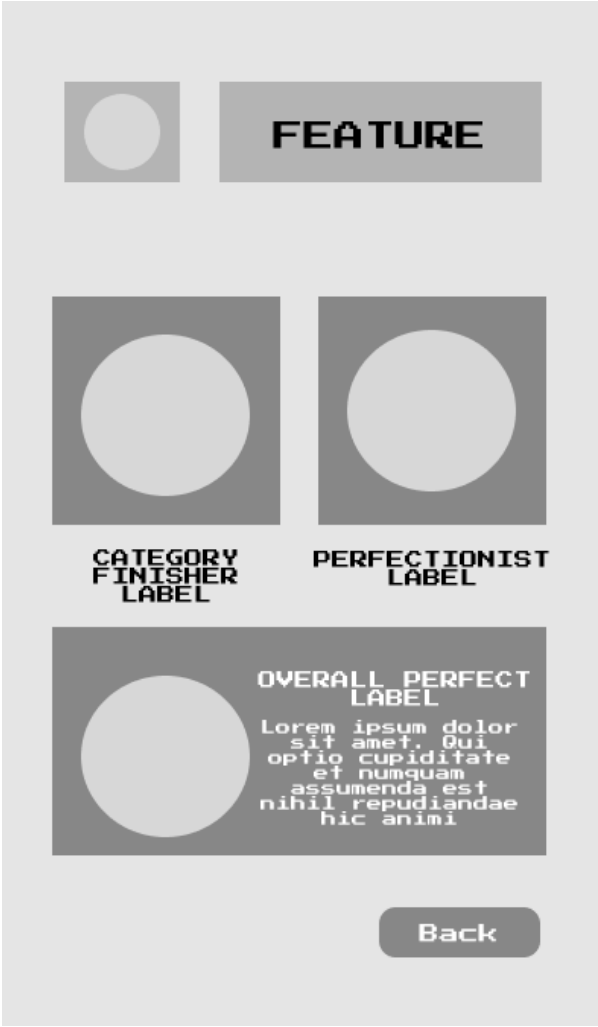

Figure 3.9: Achievement View Screen

Figure 3.10: Achievements Unlock Screen

CacheUp's start-up menu is shown when opened for the first time. The application will ask the user to enter their desired username for the game.

CacheUp's main menu as opened by the user. This will serve as the navigation to 3 features that the user can access and play: Flashcard feature, Quiz Mode feature, and viewing of the Achievements

SETTINGS

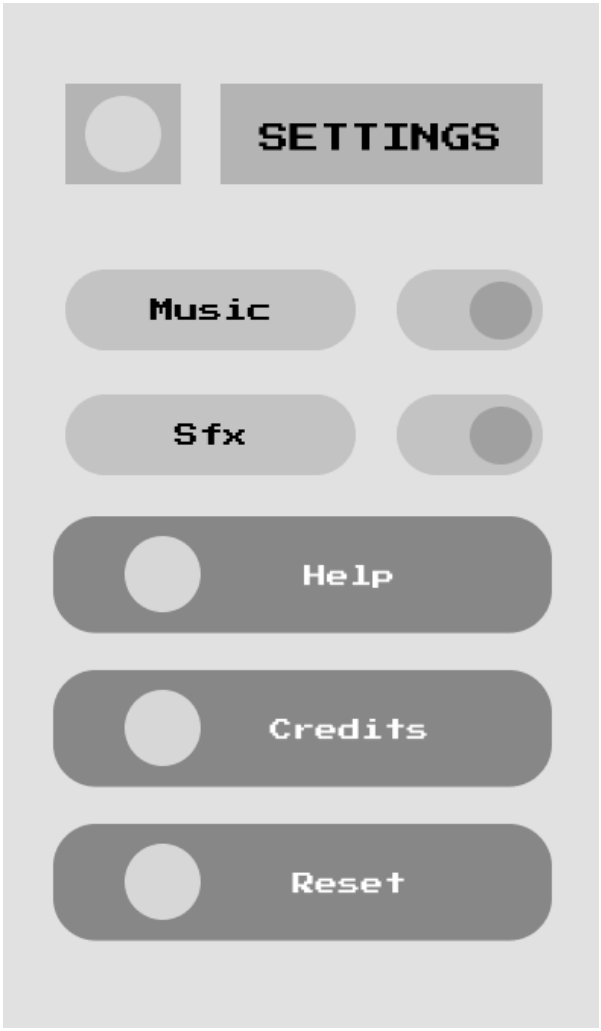

Figure 3.11: Settings Screen

CacheUp's settings icon will show up in every instance of the app except for the results of Quiz mode and the achievement pop ups. The settings will allow the user to turn the music and sound effects on and off. They also have an option to look at the instructions in the "Help" button, look up to the developers of this application in the "Credits" button, and reset their progress using the "Reset" button.

UI MOCKUPS

Starting Screen & Main Menu

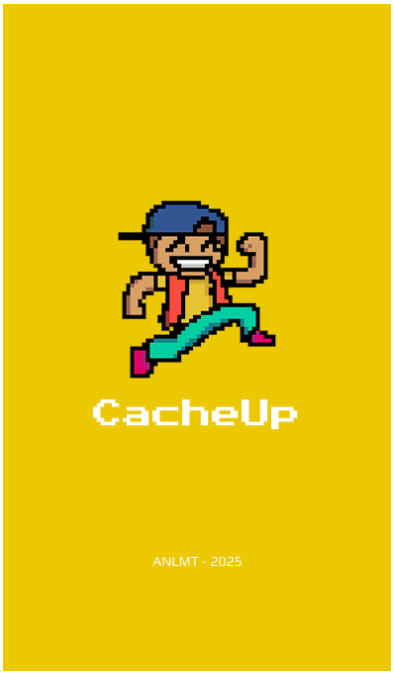

Figure 4.12: Welcome Screen

Figure 4.13: Starting Screen

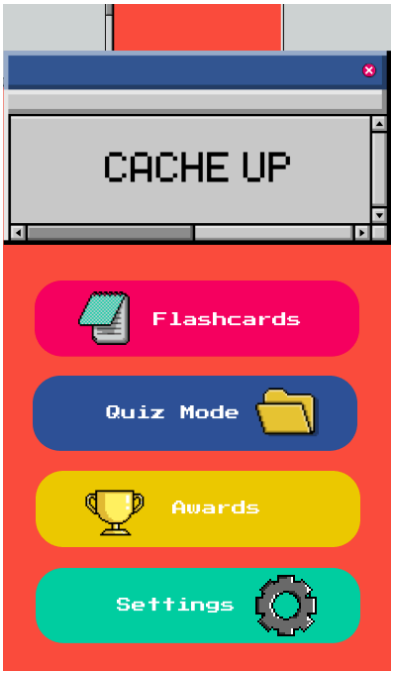

Figure 4.14: Main Menu

Flashcard Categories & Subcategories

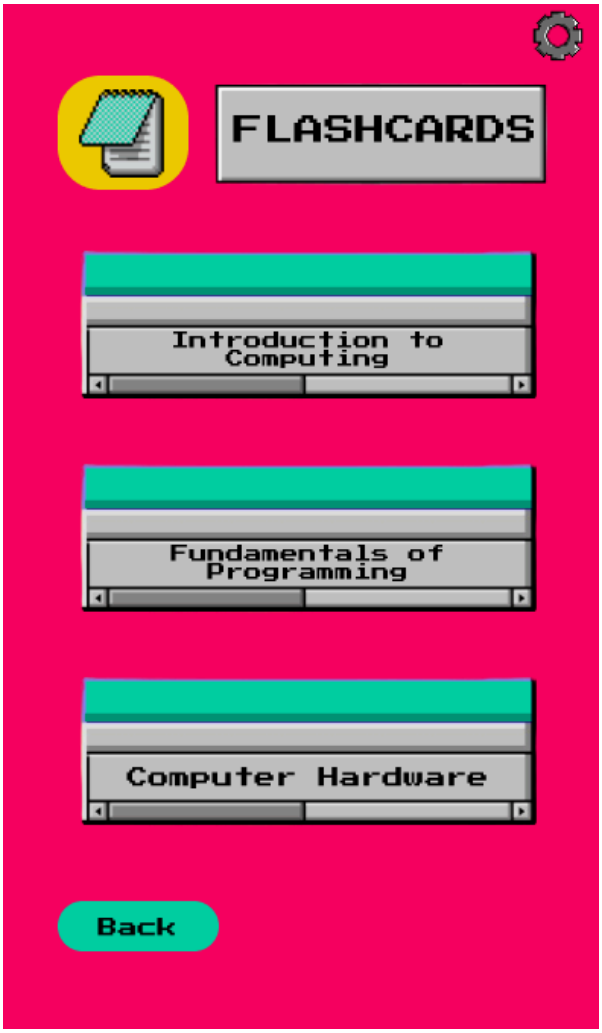

Figure 4.15: Flashcard Categories

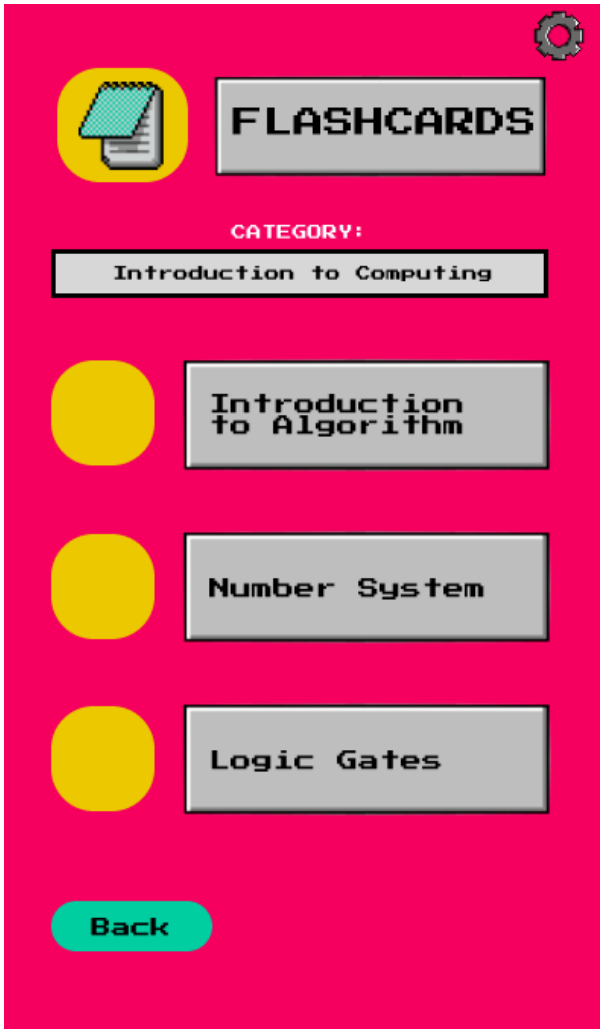

Figure 4.16: Flashcard Subcategories

Flashcard Showcase

Figure 4.17: Flashcard showcase - Front

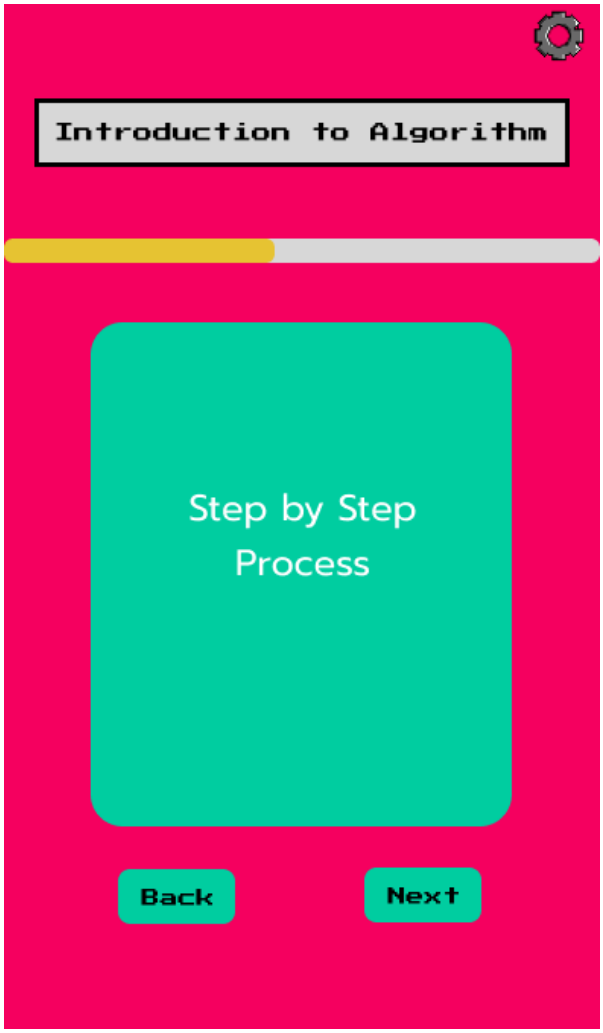

Figure 4.18: Flashcard showcase - Back

Quiz Mode Categories & Subcategories

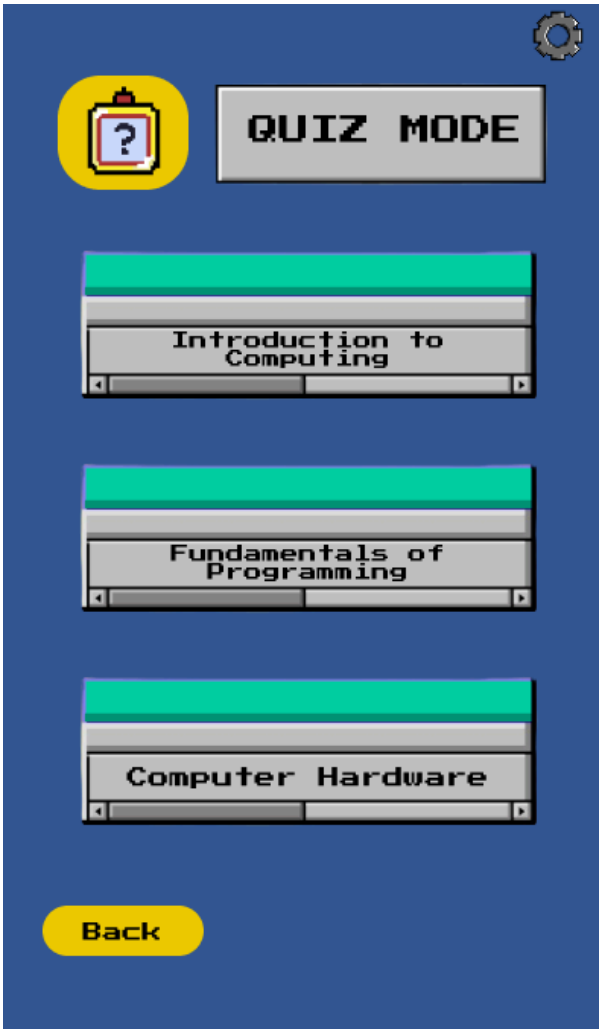

Figure 4.19: Quiz Mode Categories

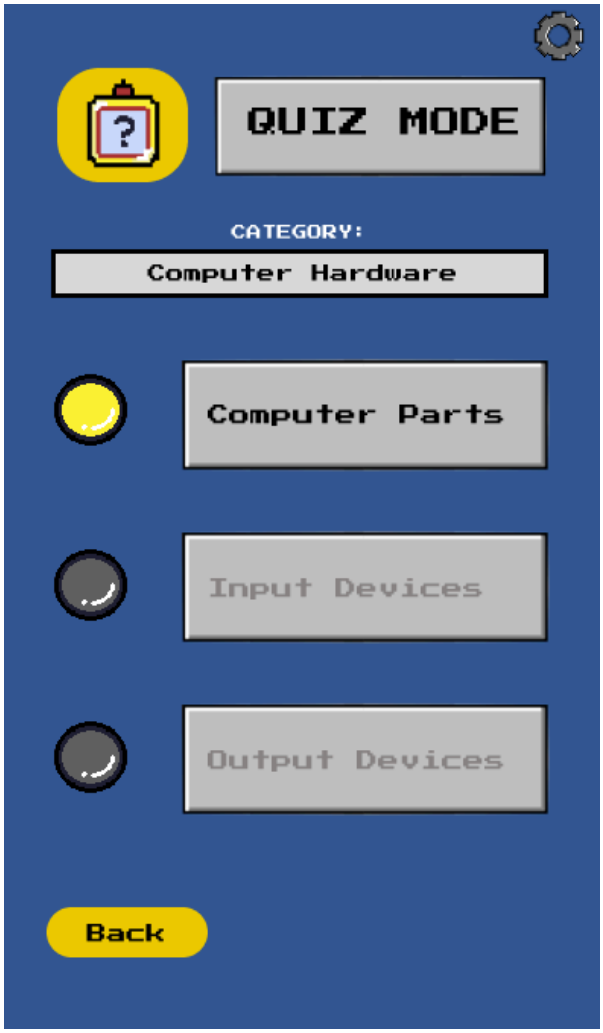

Figure 4.20: Quiz Mode Subcategories

Quiz Mode Gameplay

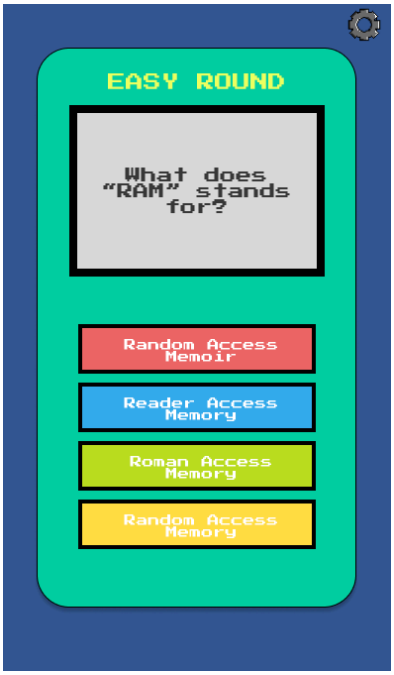

Figure 4.21: Quiz Mode Gameplay - Easy Difficulty Question

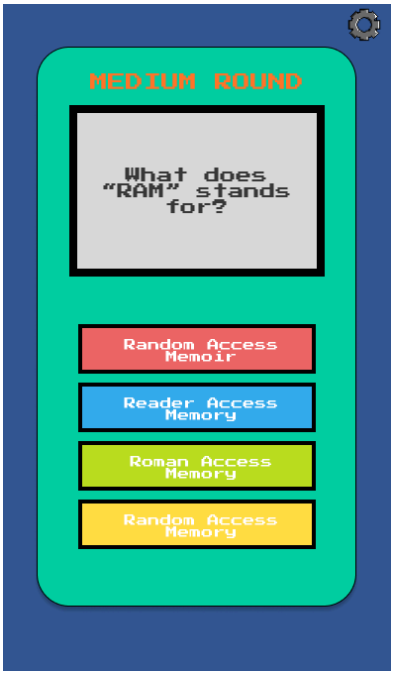

Figure 4.22: Quiz Mode Gameplay - Medium Difficulty Question

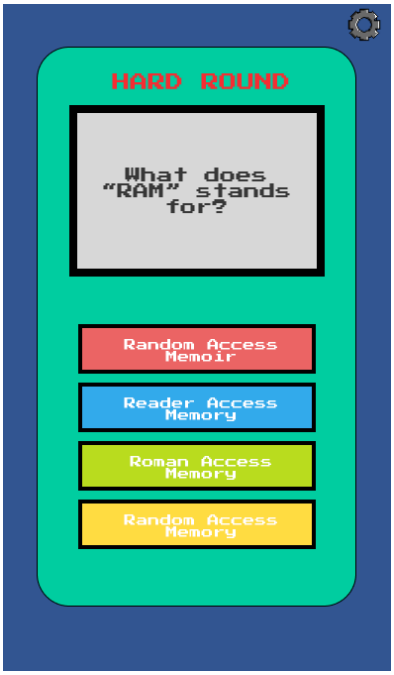

Figure 4.23: Quiz Mode Gameplay - Hard Difficulty Question

Quiz Mode Gameplay & Results

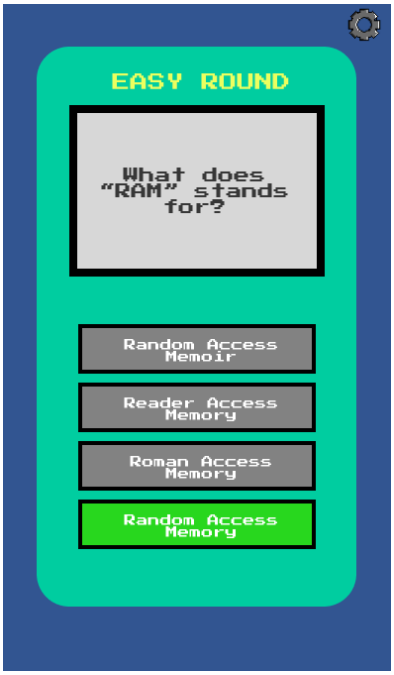

Figure 4.24: Quiz Mode Gameplay - Correct Answer

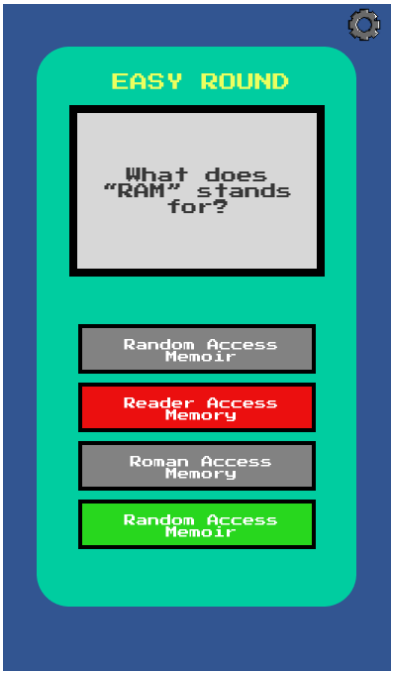

Figure 4.25: Quiz Mode Gameplay - Wrong Answer; Correct Answer shown

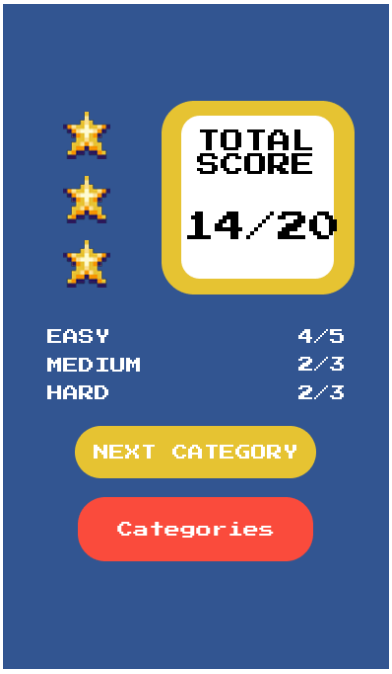

Figure 4.26: Quiz Mode Gameplay - Results

Unlockable Achievements

Figure 4.27: Unlocked Achievement Screen - "Category Finisher"

Figure 4.28: Unlocked Achievement Screen - "Perfectionist"

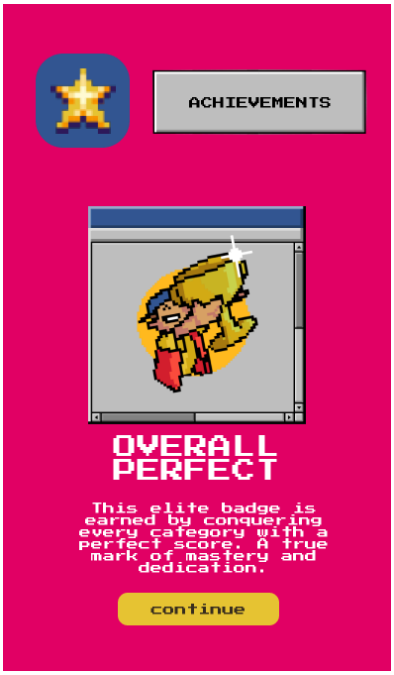

Figure 4.29: Unlocked Achievement Screen - "Overall Perfect"

Achievements List & Settings

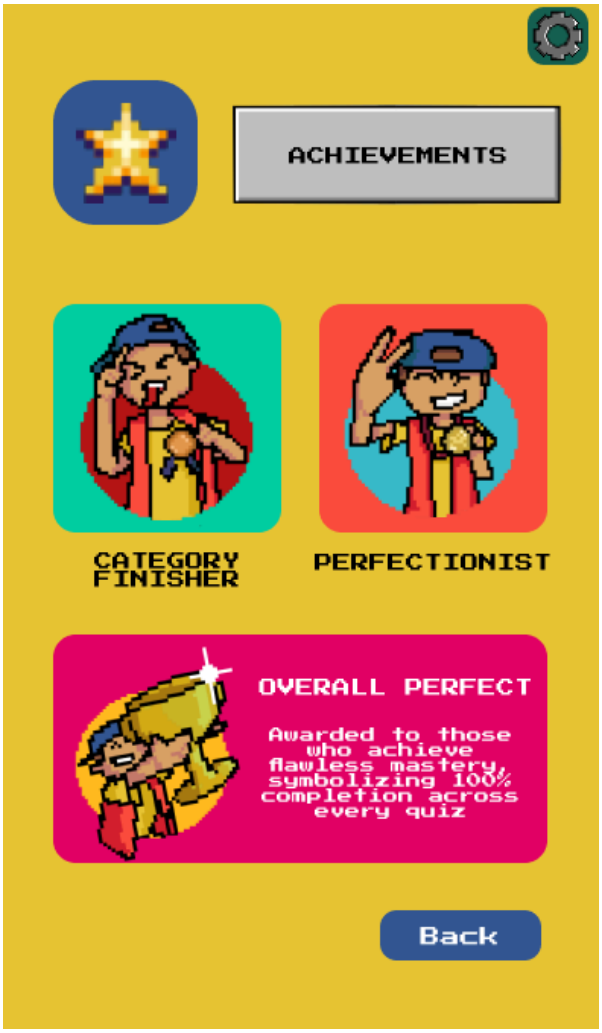

Figure 4.30: Achievements List

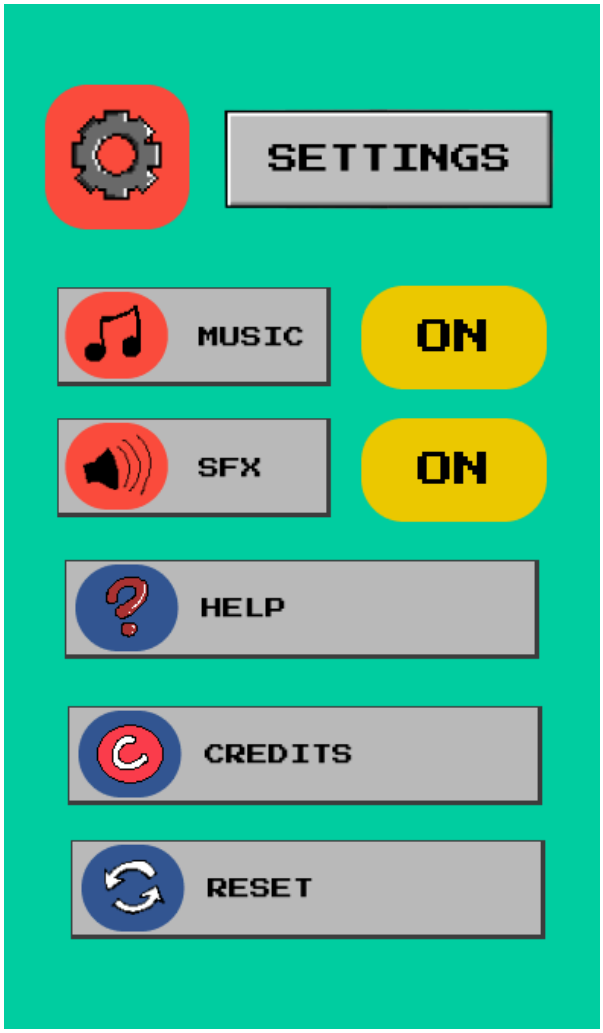

Figure 4.31: Settings

Achievements List & Settings

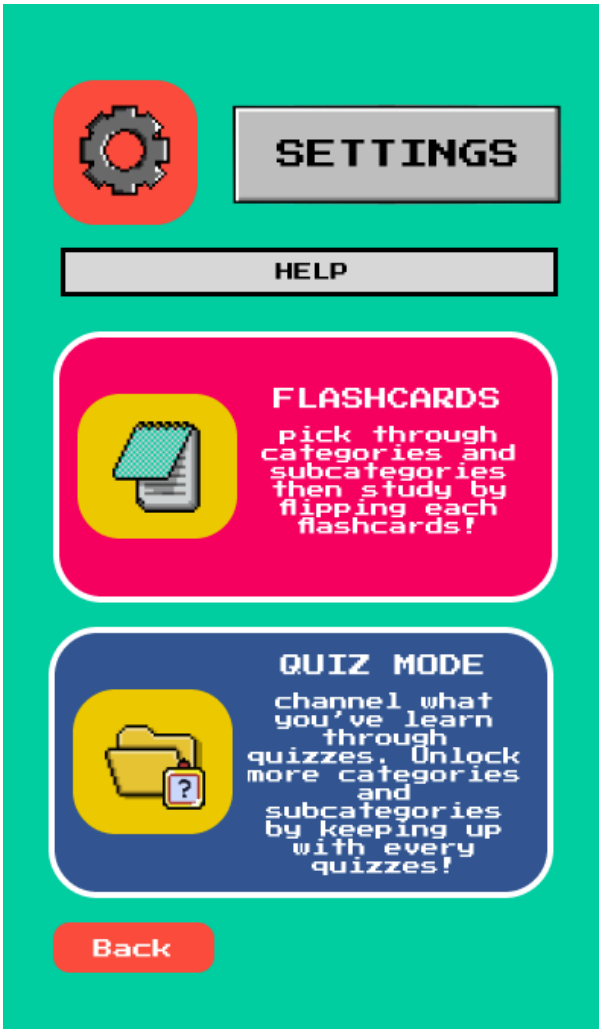

Figure 4.32: Settings - Help

Figure 4.33: Settings - Credits

USER MANUAL

SYSTEM REQUIREMENTS & DEVELOPMENT

CacheUp is an application compatible with mobile devices that uses the Android Operating System. It requires the following:

Operating System	Android 8+
RAM	Minimum of 2 GB
Storage	27 MB
Processor	Quad-core ARM-based
Internet	Not Required; fully functional Offline
Screen Size	5.0 inches / 12.7 centimeters
Resolution	1080 x 1920 (Full HD)

CacheUp was made on Android Studio using the Java Language. The database used is SQL Lite, as it doesn't necessary internet use, only asking to access the Local Storage of the device used. The team made a GitHub repository for its version control, allowing it to track and easily update the code of the program. CacheUp was tested in an Android Emulator, notably model is Pixel3. It had undergo testing through multiple physical smartphones, notable brands are Samsung, OPPO, and Nothing. It was also tested on an Android Tablet.

NAVIGATION

Starting Screen

When the application is opened, the user is greeted with a starting screen with the logo and the title, along with the company's name and the year it was created.

Main Menu

After entering the game, they will meet the main menu screen, which consists of 4 buttons leading to 3 features of the game and the settings:

- ★ "Flashcards" - the button that will lead to the Flashcards showcase feature.
- ★ "Quiz Mode" - the button that will lead to the Quiz Mode gameplay feature.
- ★ "Awards" - the button that will lead to the list of Achievement features.
- ★ "Settings" - the button that will lead to the settings for the Application.

Flashcard showcase

The Flashcard showcase feature can be accessed by tapping the "Flashcards" button in the main menu. When opened, the user will see a list of categories. There are 8 categories to choose from. When a category is opened, at least 2 to 3 subcategories will show for the user to choose. Each subcategory has 10 flashcards to show.

The following categories and subcategories are:

Table 4.1: Categories and Subcategories of subjects covered in CacheUp	
CATEGORY	**SUBCATEGORY**
Introduction to Computing	Introduction to Algorithms
	Number Systems
	Logic Gates
Fundamentals of Programming	Fundamentals
	Basics of Java
Computer Hardware	Hardware Parts
	InputDevices
	Output Devices
Data Structures and Algorithms	Foundational Data Structure
	Basic Algorithms
Database	Database Fundamentals
	Core SQL Commands
	SQL Constraints
Networking	Networking Fundamentals
	Devices & Equipment
	Network Structure
Operating Systems	Introduction to Operating Systems
	Process Management
	Memory Management
Web Development	Introduction to Web Development
	HTML, CSS, and JavaScript Basics

When one subcategory is opened, the user will be led to the flashcard showcasing screen. All flashcards are animated and can be flipped. There are buttons “back” and “next” to control the cards you want to view. There is a bar to tell you how many flashcards you have viewed.

All screens under this feature include a back button and a settings button.

Quiz Mode Gameplay

The Quiz Mode Gameplay feature can be accessed by tapping the “Quiz Mode” Button in the main menu. Similar to the Flashcard showcase feature, the user will be greeted by a list of categories, and when a category is opened, a list of subcategories will be showcased. The difference compared to the other feature is that Quiz mode locks all categories, with the exception of the “Introduction to Computing” category. To open the other categories, the user must progress by playing all quizzes in each category. The user can see the required category through a pop-up message by tapping the button of any locked category.

Here are the following categories and the required category to be unlocked:

- ★ Introduction to Computing - unlocked as the application is first opened.
- ★ Fundamentals of Programming - must answer all quizzes in “Introduction to Computing”
- ★ Computer Hardware - must answer all quizzes in “Fundamentals of Programming”

★ Data Structures & Algorithms - must answer all quizzes in “Computer Hardware”

★ Database - must answer all quizzes in “Data Structures & Algorithms”

★ Networking - must answer all quizzes in “Database”

★ Operating Systems - must answer all quizzes in “Networking”

★ Web Development - must answer all quizzes in “Operating Systems”

As said, when a category is tapped, it will showcase a list of subcategories that consists of an 11-item quiz. All buttons have a gray circle beside them that can turn yellow when the quiz has been completed with a score of 5 and above.

Each quiz is divided into 3 rounds: Easy, Medium, and Hard. Each question has 4 choices to select from and will automatically tell you if you are correct or wrong as soon as you answer, along with the actual answer shown when the input answer is wrong.

When the user has gone through the 11 questions, they will be led to the quiz mode result screen to see their scores. It showcases the total score, the breakdown of the scores through each round, and buttons as an option to proceed.

The settings button can be accessed in the Category and Subcategory list screen.

Achievements

When a goal is achieved by the user through quiz mode, an achievement-unlocked screen will pop up, usually after the quiz mode gameplay. The achievements differ based on the achievement unlocked.

The following achievements can be obtained along with the badge they can obtain:

Figure 5.1: Category Finisher

Figure 5.2: Perfectionist

Figure 5.3: Overall Perfect

All achievements that can be achieved can be viewed through the "Awards" button in the main menu. This screen also features a back button and a settings button. Refer to the Features under the Project Proposal Chapter on page 7.

Settings

The settings can be accessed in almost every screen/page of the application through the settings icon. The settings pop-up screen includes an option to turn on/off the music and the sound effects of the application, a "help" button for the instructions, a "credits" button to view the developers of this game, and a reset button to reset the data implemented.

KEY TASKS

CacheUp's goal is to give users an opportunity to review and recall the topics under Computer Science and Technology subjects. So the developers of ANMLT created 2 main features with this objective in mind:

- ★ Flashcard Showcase - to review freely through each category and subcategory.
- ★ Quiz Mode - to relearn each category and subcategory.

The Flashcard Showcase feature is an open module reviewer in the form of flashcards. The contents of the flashcards lean more on the terminology under the subject. There is no specific goal aside from reading through the flashcards to learn.

The Quiz Mode Gameplay feature is a quiz game that encourages players to progress more to unlock the corresponding modules. The unlocking system gives the users an opportunity to go through every category and subcategory to review, with a pointing system to analyze their knowledge regarding the system. Each round has corresponding points to earn: The Easy round gives 1 point, the Medium round gives 2 points, and the Hard round gives 3 points. There are achievements to unlock based on your performance in the Quiz Mode.

TROUBLESHOOTING

	Possible Cause	Troubleshooting Steps
App crashes on startup	Possible the device does not meet the minimum system requirements	● Device is on Android 8.0 or higher ● Reinstall the application to r/o installation errors
App freezes or lags	Processor limitations or insufficient RAM	● Have at least 2GB of RAM and a quad-core ARM based processor ● Close any background applications to free up memory ● Restart the app
Visual Elements are not displaying	Screen resolution and aspect ratio is not compatible	● Ensure the device supports full hd resolutions ● Adjust the display setting on lower resolution devices but it will have minor misalignments
Audio is not working	Device sound settings	● Make sure the device is not on mute ● Test the audio using headphones ● Restart the application
Slow navigation of the flashcards and quizzes	Slow CPU performance	● Restart the app to refresh ● Close any background apps ● Use a device with a higher processor capacity

CONCLUSION

SUMMARY

The CacheUp application meets its users' expectations as a learning platform for individuals in Computer Science and Information Technology, providing an interesting and functional learning platform. CacheUp takes studying tasks and makes them into an interactive experience through its primary features, Quiz Mode and Flashcards, with the intention of enabling retention of information, understanding of tech subjects, and movement through tech topics.

CacheUp enables categorization of content with categories and subcategories to allow for independent study on focused subjects or fields, thus eliminating distractions. The achievement and point based system stimulates the learners' interest. The simple interface is designed for smooth and fun navigation and supports intuitive learning and self-study.

CacheUp succeeds due to its specific goals and objectives, educational content, and ease of use, making it viable for students, educators, professionals and tech enthusiasts, or anyone basically looking to review or solidify foundational knowledge of the technology sector.

RECOMMENDATION

The following are a few suggestions to further develop and strengthen the CacheUp project:

1. **Timed and challenge modes**
    - Adding new types of gameplay, like quizzes with time limits or friendly competitions, can make the app more fun and exciting to use.
2. **Leaderboard or Collaborative Features**
    - Including a leaderboard or social feature can help keep users motivated by creating fun and friendly competition. They can see how their scores compare with others, move up in rankings, and share their achievements with friends
3. **User-Created Quizzes**
    - Allowing users to create their own quizzes adds a personal and flexible way to study. They can input questions, set difficulty levels, and organize them into categories. This helps users review specific topics and tailor the content to their own learning needs.
4. **Customized Gameplay Experience**
    - Allowing users to adjust to their own preferences in their gameplay. They may organize the Difficulties in ascending or descending manner, turn on or off the shuffling of the flashcards, and plenty more of what could be found.

REFLECTION

★ **Dela Cruz, Beatriz S. -** *Layout Designer, Front-end Developer*

Working on the “CacheUp” project was a valuable and enriching experience for me as a designer and also a developer. The application was designed to make learning Computer Science and IT topics more interactive and enjoyable through features like flashcards, quizzes, and achievements. As someone who focused more on design, returning to Android Studio after a long break was definitely a challenge; it felt like starting over. Re-familiarizing myself with the development environment reminded me of how much I missed building interactive systems.

One of the difficulties I encountered was managing my time effectively, especially when juggling multiple tasks and deadlines. Additionally, the technical limitations of my laptop made it difficult to render and test the application smoothly, especially with animations and transitions. These hardware constraints sometimes slowed down my workflow, but they also taught me how to be more resourceful and patient.

★ **Paat, Margarete A. -** *Analyst, Backend Developer*

I was part of collecting data for the Flashcards and Quizzes and applying it to the code as part of the backend development. Also, an analyst role by examining the diagrams to understand the system flow and determine what steps to follow moving forward. One of the challenges I faced was wondering if I was overanalyzing ideas or going beyond our initial planned scope. It was a bit difficult to consider many factors at once, but my teammates communicated clearly, which helped all of us cooperate with our goal. Being focused on the diagram and test cases allowed me to grasp the app's flow, appreciate the value of each feature, and spend time answering my own questions until I gradually gained a clearer understanding.

I've come to appreciate inquisitiveness—being curious about how ideas are formed and making sure they are reasonable. I learned how analysts think, although as a humble beginner, and how crucial deep understanding is as a foundation for improving the app. I also learned to stay positive even when things felt overwhelming. Having group mates with diverse strengths really helped. Through combining our efforts, I saw what real collaboration looks like. We became stricter with our progress, which helped bring everything together in the end.

This is one of the things I'm proud of: our team has come this far without procrastinating, mainly because we set clear deadlines from the very beginning. Time management is our improvement as a team. We regularly discussed our progress and ideas to make sure we were on the same page. Questions were raised openly for clarity and improvement. Our communication and collaboration grew stronger, thanks to everyone's commitment to the project.

★ **Pascual, Allana Jade E. -** *Documentation, Layout Designer*

In this project, I am the one in charge of documenting the whole project. The one assigned to write here, as well as to prepare what my members will show for presenting our project. However, I helped with the layout design, specifically for the look of the Quiz Mode gameplay. I'm also responsible for the identity of the application, the one who made the music, and some of the pixel art. The challenges I've encountered in this project is battling with pressure and time, as well as making sure the help I offer for the Layout met the capabilities of our backend developers. In the end, all of the things I made were made possible with no complaints or comments. All the designs I've made for them met their expectations, which I'm proud of. As for the pressure, I found the whole project fun and had less struggles, and that is because of the good communication with my teammates.

The skills I've improved here are my art skills, and the ones I've learned are adapting to new tools like SQ Lite. Learning Android studio further was fun too, and I've learned how to use GitHub more, where I think this knowledge would be important in my path as a developer.

Finally, the communication between my teammates is transparent. Nothing to hide from, nothing to keep inside. Everyone has opinions and ideas, and all of them are welcome. From the designs of what the application would look like to what we need to input into the application. I'm pretty proud of being in this team, and I couldn't ask for more.

★ **Pascual, Mary Louisse A. -** *Project Manager, Android & Backend Developer*

First of all, I never knew I would build a game this year. Even for just academics. Since Game Development was not really my thing. But nothing's really impossible, and never say never indeed. The first time I knew that we were tasked to create a "game", I was honestly worried. Not because I doubted our team, but because the idea is very new to me. Learning Android Studio is fun, but using it to build something I had no experience with made it felt like learning a whole new language all over again.

Two months passed, and we actually built a game. And I'm very grateful to work alongside such passionate and hardworking people. They are the kind of members any team leader could ask for. They made the process fun and bearable. Everyone's participating, everyone's ideas were considered. Even though all of us don't have any prior experience in this kind of project, I saw how enthusiastic they were to contribute and present something great. And as the lead developer, that fueled me to give my best as well and develop something our team would be very proud of showing. And thankfully, we did.

★ **Ramos, Micaella C. -** *Layout Designer, Front-end Developer*

Working on this project was an incredibly fun and memorable experience, made even more enjoyable by the fact that I got to collaborate with my friends. Our original idea for the project was geared more toward an educational tool something simple and effective like a flashcard-based study app but later ended up being a game.

Early in development, one of our main discussions centered around the design of the color palette. We wanted something that would immediately catch the eye, so we decided on a mix of bright, poppy colors. The team gave Bea and me full creative freedom to design the layout, which was an exciting opportunity. Growing up exposed to a variety of video games gave me a good sense of what kind of visual style could work for Cache Up. The vibrant colors reminded me of old-school 8-bit games, which inspired the direction we took for the overall aesthetic. To add an extra layer of nostalgia, we decided to combine the 8-bit style with a vintage Windows XP interface. This blend gave the game a retro charm that made it stand out while still supporting its educational goal.

Overall, this project allowed me to explore both my creativity and technical skills. It was fulfilling to see how a simple idea turned into a full-fledged game we were proud of. Using Android Studio for the first time was a great learning experience. It was challenging at first, but I gained a solid understanding of how mobile apps are built. Most importantly, working as a team made the whole process both fun and inspiring. Special thanks to Mary, our team lead for this project, who spent countless sleepless nights on the back end of our application. Working with everyone in this group has been a great privilege to have.

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