# BRENDA SANCHEZ

Software Engineer

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## Brendalis Mystery Game: Core Development and Cross-Platform Porting

*Key Skills: Swift, Java, Agile Development, Test-Driven Development (TDD)*

- Ported the **Brendalis Mystery Game** from **Java** to **Swift**, ensuring feature parity, code optimization, and improved performance.
- Developed a **SwiftUI-based user interface** with real-time feedback, command processing, and game state management.
- Implemented **Test-Driven Development (TDD)** principles, writing comprehensive **unit tests** to validate core functionalities, including navigation, clue collection, and game state transitions.

## Advanced Algorithms and Data Structures

*Key Skills: Breadth-First Search (BFS), Graph Theory, Hashing*

- Implemented the **Breadth-First Search (BFS)** algorithm for dynamic room navigation, ensuring efficient pathfinding across the game environment.
- Designed an **adjacency list-based RoomGraph**, efficiently managing room connections while allowing real-time updates to game logic.
- Utilized **hash-based data structures** for inventory management, ensuring fast lookups and memory efficiency.

## Database Integration and Persistent Storage

*Key Skills: MySQL, SQL, RESTful APIs, Relational Database Design*

- Integrated a **MySQL database**, creating relational tables for **rooms**, **inventory**, **player progress**, and **suspects**.
- Developed **SQL schemas** for efficient database design, ensuring optimal indexing, data integrity, and query performance.
- Enabled **CRUD operations** for real-time game state management, including saving and loading player progress and inventory items.
- Implemented **RESTful APIs** for secure and seamless communication between the game client and the database.

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## Secure Coding Practices and Error Handling

*Key Skills: Data Security, Input Validation, Vulnerability Mitigation*

- Applied **input validation**, **exception handling**, and **error logging** to protect sensitive game data and prevent exploitation.
- Integrated **secure data storage** practices, including encrypted communication between the game and the MySQL database.
- Implemented **multi-layer authentication** for database access, ensuring only authorized users could modify game data.

## Inventory and Game State Management

*Key Skills: Swift, Set Data Structure, MySQL Integration*

- Developed an **Inventory Management System** in Swift, enabling users to collect, manage, and persist game items using a **Set** data structure.
- Integrated **database operations** for real-time inventory updates, ensuring data consistency through `REPLACE INTO` SQL statements.
- Enabled **persistent game state storage**, allowing users to save and reload progress across sessions.

## Unit Testing and Quality Assurance

*Key Skills: XCTest, Swift Testing Framework*

- Wrote comprehensive **unit tests** for core game functionalities, achieving high code coverage and validating system robustness.
- Tested **room navigation**, **clue collection**, **inventory management**, and **game state transitions** under multiple conditions, including encountering the murderer with and without required clues.
- Implemented **mock objects** to simulate user interactions and ensure stable functionality across environments.

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### Professional Documentation and Collaboration

*Key Skills: Technical Writing, Agile Development, Stakeholder Communication*

- Authored detailed **technical documentation**, including system architecture, API endpoints, database schemas, and deployment guidelines.
- Collaborated in an **Agile development environment**, using **sprint-based project management**, **peer code reviews**, and **version control** to maintain project quality.
- Produced professional **narratives** highlighting project achievements, technical challenges, and solutions for portfolio inclusion.

## Key Outcomes and Impact

- **Cross-Platform Development:** Successfully transitioned the game from **Java** to **Swift**, improving code maintainability and user experience.
- **Efficient Algorithms:** Implemented **BFS pathfinding** for room navigation, reducing search complexity while enhancing game performance.
- **Persistent Data Storage:** Integrated a **MySQL database**, enabling users to save and resume game sessions without losing progress.
- **Secure Coding:** Applied **input validation**, **error handling**, and **multi-layer authentication** to protect user data and system integrity.
- **Enhanced User Experience:** Created an intuitive **SwiftUI-based interface**, allowing seamless interaction, real-time feedback, and smooth gameplay.