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The Orchid Arcade

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1. Description of the Application

Overview

"The Orchid Arcade" (TOA) is a web-based game distribution platform designed to offer a curated selection of cozy and relaxing games. It serves both gamers and indie developers by providing a marketplace where users can purchase, download, and play games, while developers can publish and manage their games. The platform supports various functionalities, including user management, game management, secure transactions, game updates, and community engagement through reviews and ratings.

Definitions

- **User**: A person who uses the platform to browse, buy, download, and play games.
- **Developer/Publisher**: A person or entity that publishes games on the platform and manages their game listings.

Product Functions

The primary functions of "The Orchid Arcade" include:

- **User Management**: Account creation, login, and profile management for users and developers.
- **Game Store**: Browsing, searching, and purchasing games by genre, price range, publisher, etc.
- **Game Library**: Downloading, installing, and updating purchased games.
- **Game Publishing**: Developers can upload, manage, and update their games, including descriptions and pricing.
- **Community Features**: Users can leave reviews and rate games to help others in their purchasing decisions.

User Classes and Characteristics

- **Users**: Casual gamers interested in cozy and relaxing games. Capabilities include account management, browsing and purchasing games, managing game libraries, and engaging in community features.
- **Developers/Publishers**: Indie game developers and publishers aiming to list their games on the platform. They require access to publishing tools, sales analytics, and community engagement options.

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2. Detailed Description and Use Cases

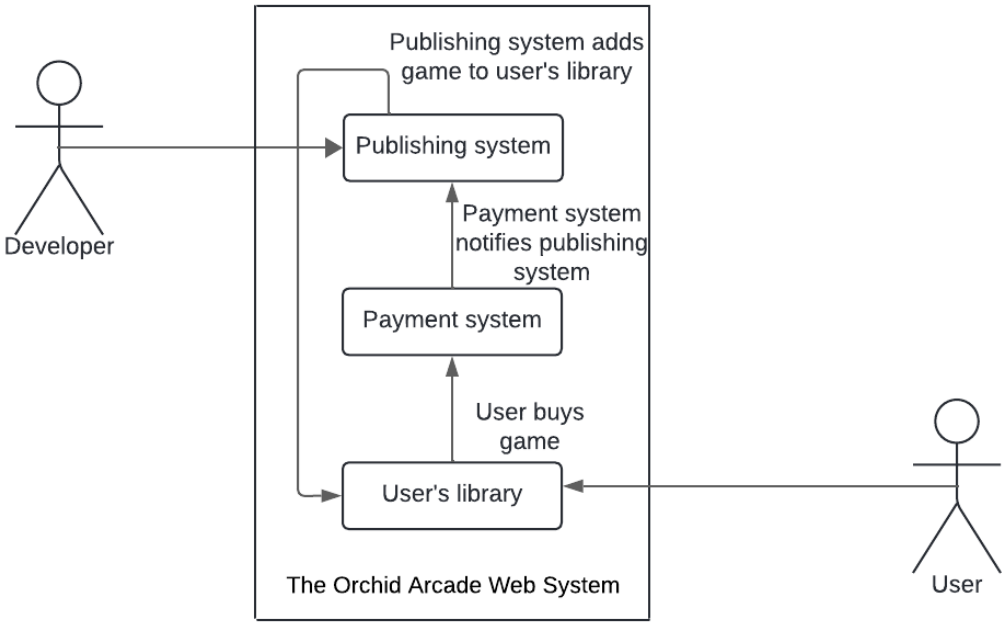

Figure 1 User and developer general use case

User Use Cases

- **Account Management**:

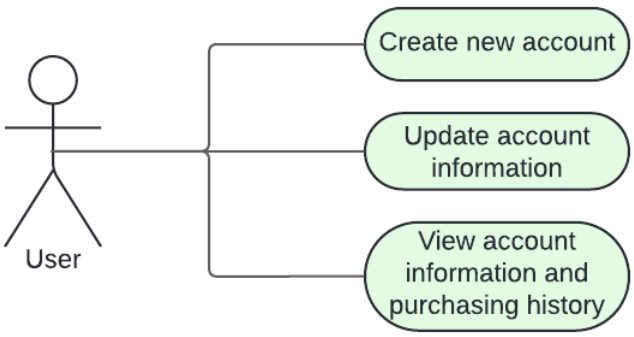

Figure 2 User account management use case

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Brief Description

The user accesses The Orchid Arcade and performs account-related actions such as creating, editing, and deleting their account, managing their profile, or viewing purchase history.

Initial Step-By-Step Description

Before this use case can be initiated, the user has already accessed The Orchid Arcade website.

1. The user selects the account management option.
2. The system displays account management functionalities (create, edit, delete account, change password, update information, etc.).
3. The user chooses a specific action (e.g., create an account, update profile).
4. The system processes the request and updates the user account.
5. If the action is successful, the system confirms the update.
6. If the user views purchase history, the system displays transaction details.

Alternate and Error Flows

1. If the email provided during account creation is already registered, the system prompts the user to log in or use a password recovery process.
2. If a server or network issue occurs during the process, the system shows an error message and suggests trying again later.

Xref: Section 3.2.1, Account Management.

- **Browsing and Purchasing Games**:

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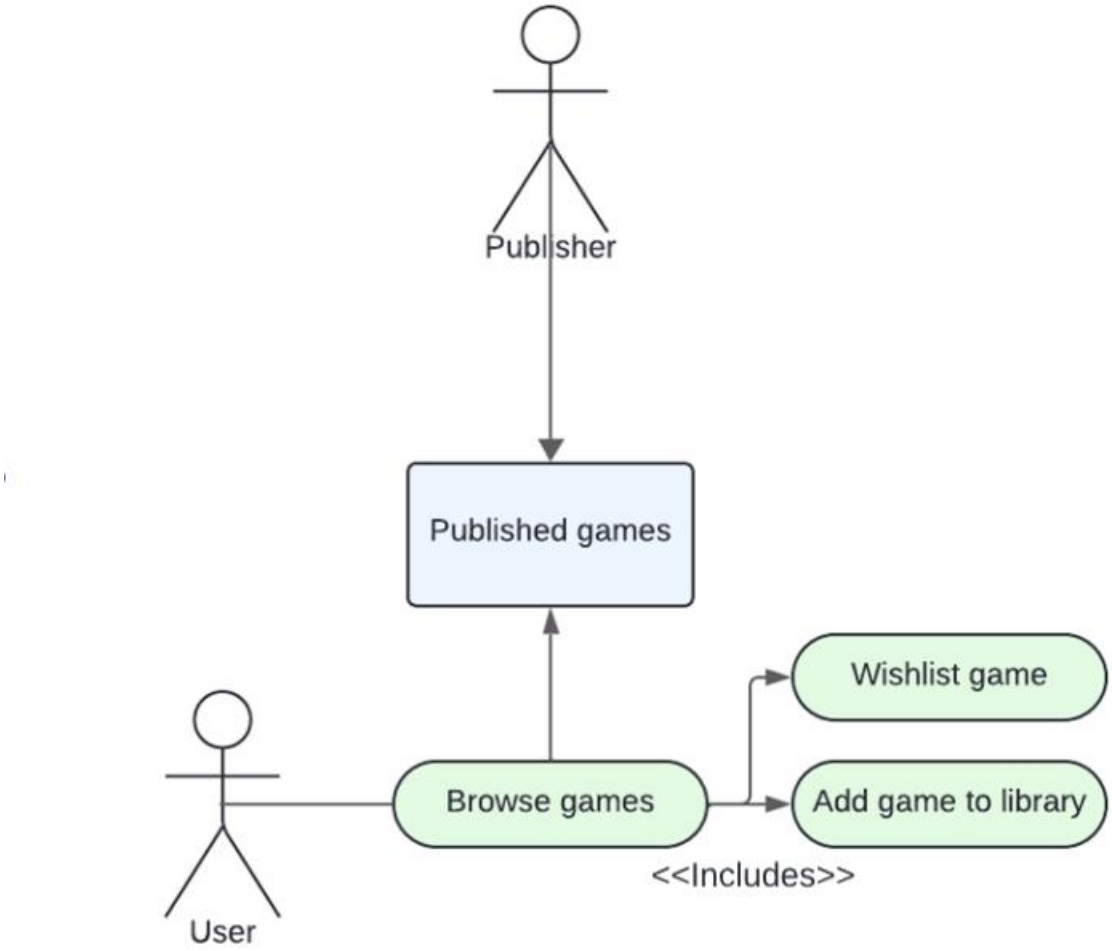

Figure 3 Browsing and purchasing games use case

Brief Description

The user browses games available on The Orchid Arcade, views detailed game pages, and purchases selected games.

Initial Step-By-Step Description

Before this use case can be initiated, the user has already accessed The Orchid Arcade and logged in (if necessary).

1. The user searches for games by genre, popularity, new releases, or developer.
2. The system displays the results based on the search criteria.
3. The user selects a game and views its detailed page, including reviews and ratings.
4. The user chooses to purchase the game.

5. The system processes the payment securely.
6. Upon successful payment, the system adds the game to the user's library.

Alternate and Error Flows

1. If the user has insufficient funds or their payment method is declined, the system prompts them to add a different payment method.
2. If an error occurs during payment processing, the system notifies the user and suggests retrying later.

- **Game Library Management**:

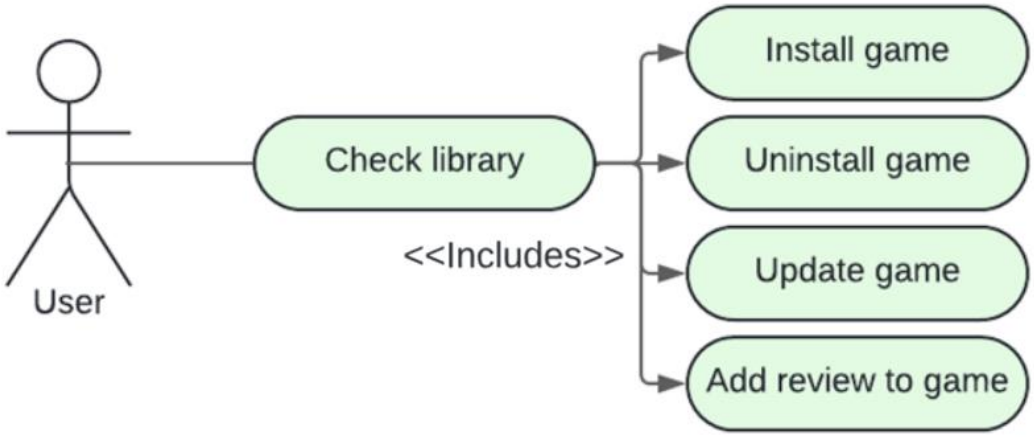

Figure 4 User library management use case

Brief **Description**
The user manages their purchased games, downloading, installing, uninstalling, or updating games in their library.

Initial **Step-By-Step** **Description**
Before this use case can be initiated, the user has already purchased one or more games.

1. The user selects the game library option.
2. The system displays the user's purchased games.
3. The user chooses to download, install, uninstall, or update a game.
4. The system processes the selected action.
5. The system confirms successful download, installation, or update.

Alternate and Error Flows

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1. If a download is interrupted due to a network error, the system pauses the download and allows the user to retry.
2. If there is insufficient disk space for downloading a game, the system notifies the user and suggests freeing up space.

Xref: Section 3.2.3, Game Library Management.

- **Community Engagement**:

Brief Description

The user interacts with the community by leaving reviews and ratings for games they have purchased on The Orchid Arcade.

Initial Step-By-Step Description

Before this use case can be initiated, the user has already purchased and played one or more games.

1. The user selects a purchased game from their library.
2. The system displays an option to leave a review and rating for the game.
3. The user writes a review and assigns a rating.
4. The system submits the review and rating, making it visible to other users.
5. The system confirms successful submission of the review.

Alternate and Error Flows

1. If the user has not purchased the game, the system does not allow them to leave a review or rating.
2. If there is a network or server issue, the system shows an error message and suggests retrying later.

Xref: Section 3.2.6, Community Engagement.

Developer/Publisher Use Cases

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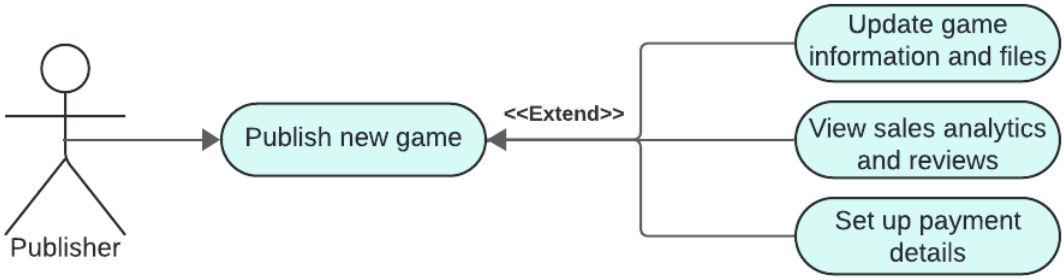

Figure 5 Developer game publishing and management use case

- **Game Publishing and Management**:

Brief **Description**
The developer uploads and manages games on The Orchid Arcade, including game files, descriptions, and prices.

Initial **Step-By-Step** **Description**
Before this use case can be initiated, the developer has created an account and logged in.

1. The developer selects the publishing option.
2. The system displays fields for uploading game files, descriptions, screenshots, and trailers.
3. The developer uploads the game and inputs the required information.
4. The system verifies and publishes the game to the store.
5. The developer can manage or update the game after publishing.

Alternate and Error Flows

1. If the uploaded file format is not supported, the system notifies the developer to upload a supported format.
2. If the price format is invalid, the system prompts the developer to enter a valid price.

Xref: Section 3.2.4, Game Publishing and Management.

- **Sales and Revenue Management**:

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Brief Description

The developer views sales reports and manages revenue generated from games published on The Orchid Arcade.

Initial Step-By-Step Description

Before this use case can be initiated, the developer has published one or more games.

1. The developer selects the sales and revenue management option.
2. The system displays sales reports, revenue generated, and payment details.
3. The developer views and manages payment information.

Alternate and Error Flows

1. If an error occurs while generating a sales report, the system shows an error message and suggests retrying it after some time.

Xref: Section 3.2.5, Sales and Revenue Management.

3. Requirements specification

3.1 External interface specifications

The only external interface for The Orchid Arcade is the integration with an external payment provider (such as PayPal, Stripe, or another service) to securely process all user transactions. The interface will handle real-time communication with the payment provider for purchase transactions and verification of payment statuses and should accept credit/debit cards and digital wallets.

3.2 Functional requirements

3.2.1 Manage User Account

Field	Description
Use Case Name	Manage User Account
XRef	Section 3.2.1, Account Management
Trigger	User selects the account management option.
Precondition	User has accessed The Orchid Arcade.

Basic Path	1. User selects account management. 2. System displays account options (create, edit, delete). 3. User chooses and completes a specific action. 4. System processes the request. 5. System confirms the action (account created, updated, or deleted).
Alternative Paths	If creating an account: - System prompts for personal information. - System checks if the email is already registered. - If so, prompts the user to log in or recover the password.
Postcondition	The account is successfully created, updated, or deleted, and the system reflects the changes.
Exception Paths	If a server or network error occurs, the system displays an error message and suggests trying again later.

3.2.2 Browsing and Purchasing Games

Field	**Description**
Use Case Name	Search and Buy Games
XRef	Section 3.2.2, Browsing and Purchasing Games
Trigger	User selects the search or browse option.
Precondition	User has accessed The Orchid Arcade.
Basic Path	1. User selects search or browse by genre, popularity, new releases, or developer. 2. System displays search results. 3. User selects a game and views its details. 4. User selects the purchase option. 5. System processes payment and adds the game to the user's library.
Alternative Paths	- If searching by different criteria (genre, popularity, etc.), the system adjusts the results. - If the game is added to a wishlist instead of being purchased, the system reflects the change.

Postcondition	The game is added to the user's library upon successful payment.
Exception Paths	- If insufficient funds or declined payment, the system prompts the user to change the payment method.
	- If a payment processing error occurs, the system suggests retrying later.

3.2.3 Game Library Management

Field	**Description**
Use Case Name	Manage Game Library
XRef	Section 3.2.3, Game Library Management
Trigger	User accesses their game library.
Precondition	User has purchased games and logged into their account.
Basic Path	1. User opens the game library. 2. System displays a list of purchased games. 3. User selects a game to download, install, uninstall, or update. 4. System processes the action and confirms completion.
Alternative Paths	If the user selects to update a game, the system checks for available updates and processes the request.
Postcondition	The game is downloaded, installed, uninstalled, or updated successfully.
Exception Paths	- If the download is interrupted due to a network error, the system pauses the download and provides a retry option. - If there is insufficient disk space, the system shows an error message.

3.2.4 Game Publishing and Management

Field	**Description**
Use Case Name	Publish and Manage Games

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XRef	Section 3.2.4, Game Publishing and Management
Trigger	Developer selects the publishing option.
Precondition	Developer has logged in to their account.
Basic Path	1. Developer selects the publishing option. 2. System displays fields to upload game files, descriptions, and media. 3. Developer uploads the game and inputs details. 4. System verifies and publishes the game to the store. 5. Developer can manage or update the game after publishing.
Alternative Paths	If a developer chooses to update an existing game, the system reflects the changes in the game store.
Postcondition	The game is successfully uploaded and published in the store.
Exception Paths	- If the file format is not supported, the system displays an error and prompts for a valid file format. - If an invalid price is input, the system prompts the developer to enter a valid price.

3.2.5 Sales and Revenue Management

Field	**Description**
Use Case Name	Manage Sales and Revenue
XRef	Section 3.2.5, Sales and Revenue Management
Trigger	Developer accesses the sales and revenue management page.
Precondition	Developer has published one or more games.
Basic Path	1. Developer selects the sales and revenue option. 2. System displays sales reports and revenue data. 3. Developer views or manages payment information.
Alternative Paths	None
Postcondition	Developer successfully views sales reports and revenue details.

Exception Paths	- If an error occurs while generating the sales report, the system displays an error message and suggests retrying later.

3.2.6 Review and rate games

Field	Description
Use Case Name	Review and Rate Games
XRef	Section 3.2.6, Review and Rate Games
Trigger	User selects a purchased game from their library to leave a review and rating.
Precondition	User has purchased and played the game.
Basic Path	1. User opens a purchased game. 2. System displays an option to leave a review and rating. 3. User submits a review and assigns a rating. 4. System processes the review and makes it visible to other users.
Alternative Paths	None
Postcondition	The review and rating are successfully submitted and visible to others.
Exception Paths	- If the user has not purchased the game, the system prevents them from leaving a review. - If a network error occurs, the system displays an error message and suggests trying again later.

3.3 Non-functional requirements

- Performance Requirements: Every operation made on the application, including payments, searches and updates, should take no more than 5 seconds under normal network conditions.
- Usability Requirements: Users should receive immediate feedback on transaction outcomes (success, failure, or pending status) for every operation made on the application
- Reliability Requirements: All the interfaces must have a minimum uptime of 99.9%, ensuring that the services are available without interruption.

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- Security Requirements:
    - Authentication and Authorization: Implement a robust authentication and authorization system with support for two-factor authentication (2FA) to secure access.
    - Input Sanitization: All user inputs must be sanitized to prevent injection attacks, including SQL injection and cross-site scripting (XSS).
    - Logging and Auditing: Log all user transactions and critical events, such as login attempts and changes to account or application data, for auditing and traceability.
    - Rate Limiting: Apply rate limiting on requests to protect against abuse, such as excessive login attempts or resource-intensive actions.
    - Session Management: Ensure secure session handling, including session expiration and protection against session hijacking.
    - Data Encryption:
        - Encryption in Transit: Enforce HTTPS across all data exchanges to protect data integrity and confidentiality in transit.
        - Encryption at Rest: Encrypt all sensitive data stored in the database, including personally identifiable information (PII) and payment information.

4. Misuse cases

We used the Microsoft Threat tool to give some pointers on possible threats to our application using the following model:

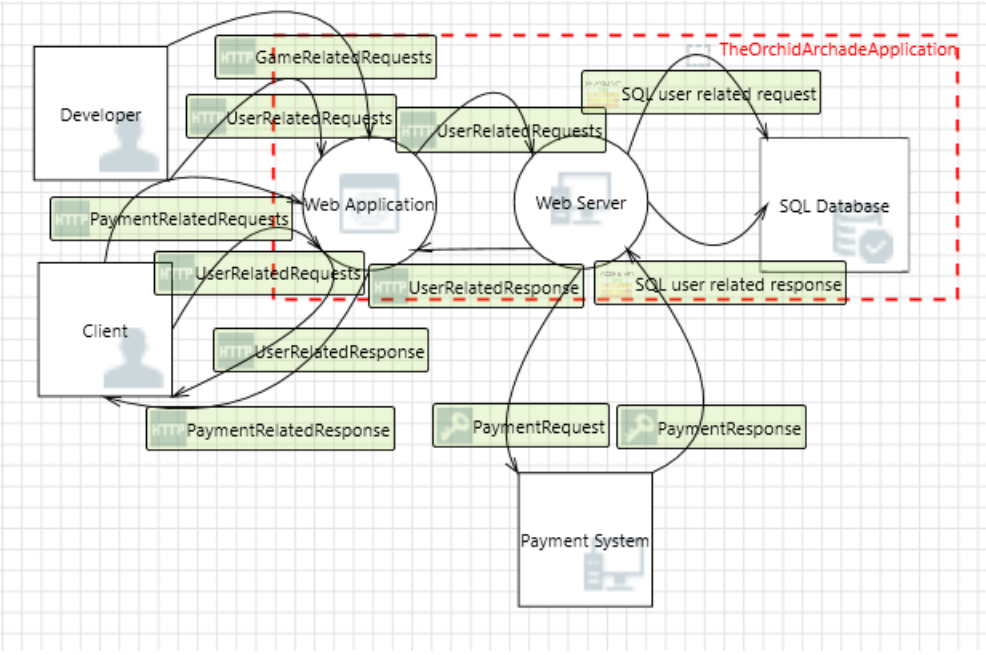

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Figure 6 Flow modeling of the application

According to this some of the feasible attacks on the application might be the following:

4.1 Spoofing Misuse cases

- Spoofing the Client External Entity
  Actors Involved: Attacker, Web Application, Customer
  Since no authentication mechanisms are in place, an attacker may impersonate legitimate users, gaining unauthorized access to accounts and sensitive information.
- Spoofing the Developer External Entity
  Actors Involved: Attacker, Web Application, Developer
  Since no authentication mechanisms are in place, an attacker could gain control over game listings, altering game availability or pricing.

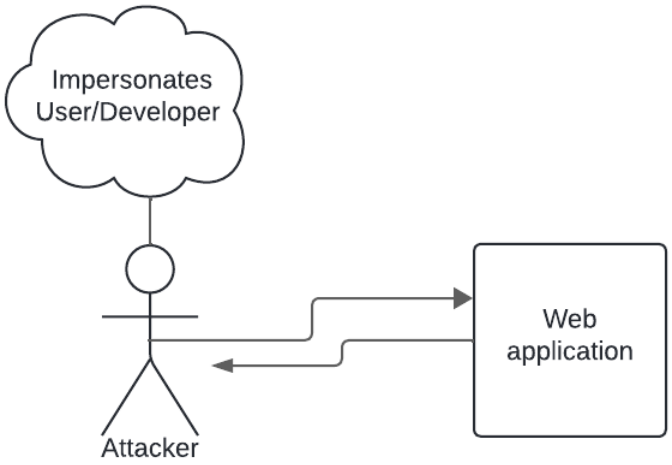

Figure 6 Spoofing misuse case 1

- Spoofing the Web Application Process
  Actors Involved: Attacker, Web Application, User
  Since HTTPS is not being enforced currently, the web application is not being authenticated to the user via the certificate, meaning that an attacker could spoof the web service identity to steal user information or credentials.

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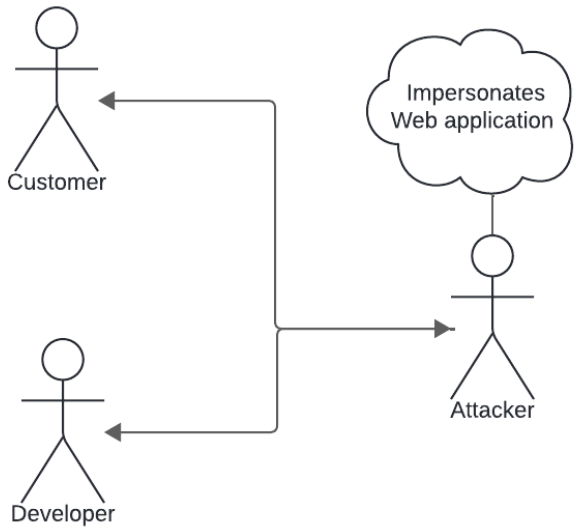

Figure 7 Spoofing Misuse case 2

4.2 Tampering Misuse Cases

- Cross Site Scripting
  Actors Involved: Attacker, Web Application, User
  The web server 'Web Application' could be a subject to a cross-site scripting attack because it does not sanitize untrusted input when a developer enters game information.

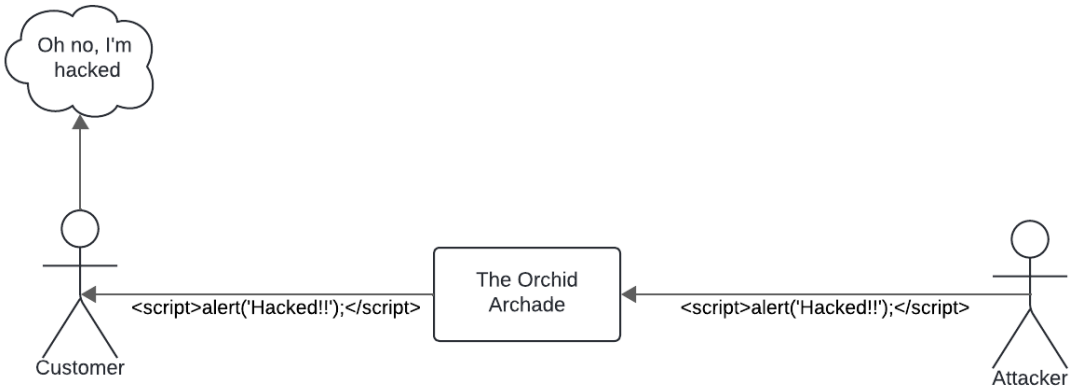

Figure 8 Cross site scripting

- SQL Injection for SQL Database
  Actors Involved: Attacker, Web Application, User
  An attacker could inject malicious SQL code, accessing or manipulating stored data because the inputs are not being sanitized.

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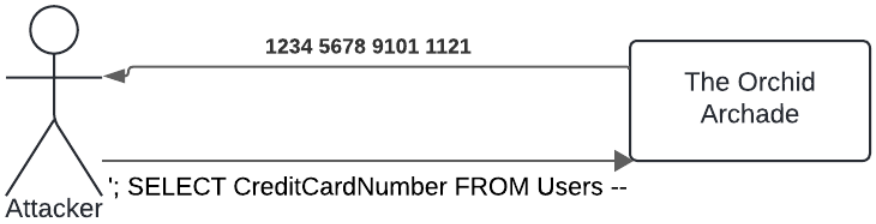

Figure 9 SQL injection

- Data Flow Compromised
  Actors Involved: Attacker, Web Application, User
  Since HTTPS is not being enforced an attacker can read or modify the data being transmitted.

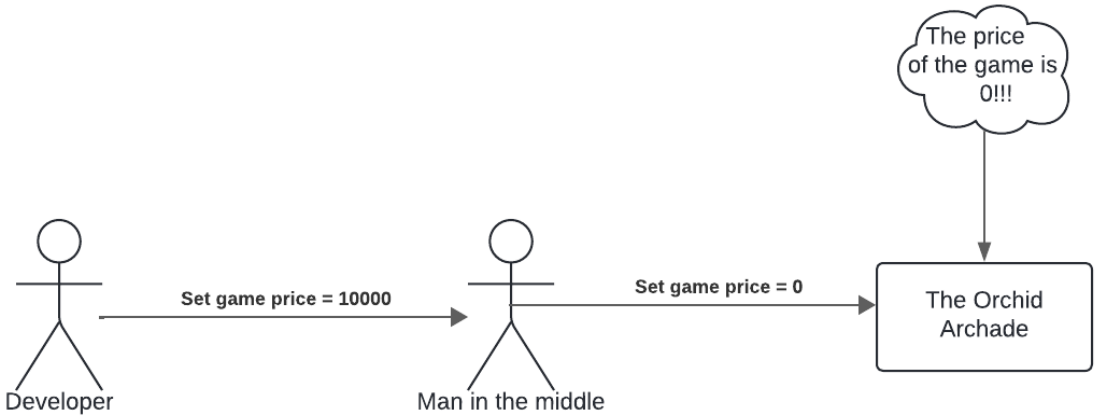

Figure 10 Man In the Middle

4.3 Repudiation Misuse Cases

- External Entity Client Potentially Denies Receiving Data
  Actors Involved: Attacker, Web Application, Client
  Since there is no logging in place, a user can deny having purchased a game and try to ask for money returns even though they did purchase the game.

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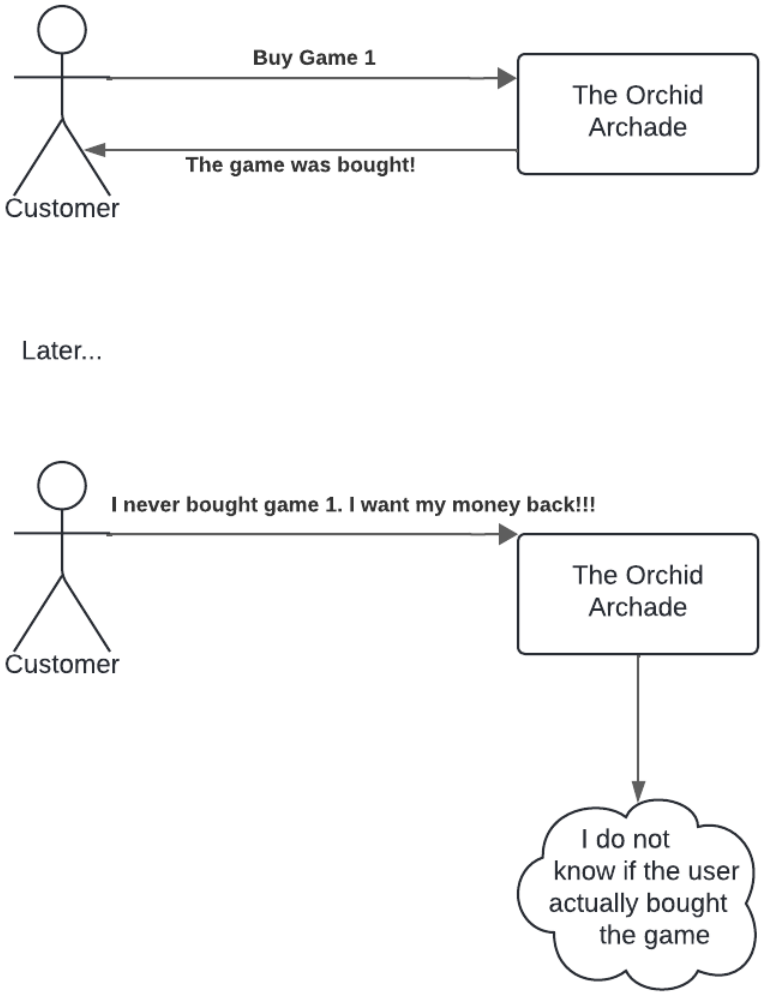

Figure 11 User repudiation

- External Entity Payment System Potentially Denies Receiving Data
  Actors Involved: Web Application, Payment system
  The external payment system could deny receiving payment data from the user since there are no logs or records of the information being sent.

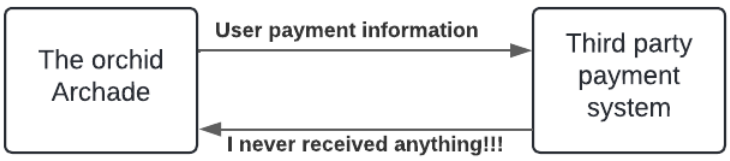

Figure 12 Payment system repudiation

4.4 Information Disclosure Misuse Cases

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- Data Flow Sniffing
  Actors Involved: Attacker, Web Application, User
  An attacker could sniff all the packets with the information being sent by the users, including private information like credit card information; this is because HTTPS is not enforced meaning that the traffic is not encrypted.

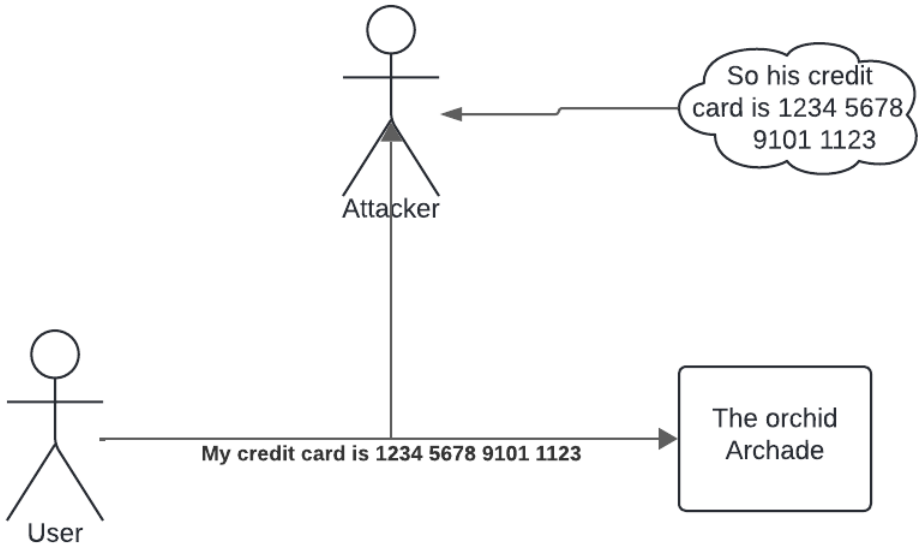

Figure 13 Sniffing misuse case

- Reading information from SQL Database
  Actors Involved: Attacker, Web Application
  Since the SQL Database does not encrypt vulnerable information like passwords at rest, an attacker can read all this information in plain text.

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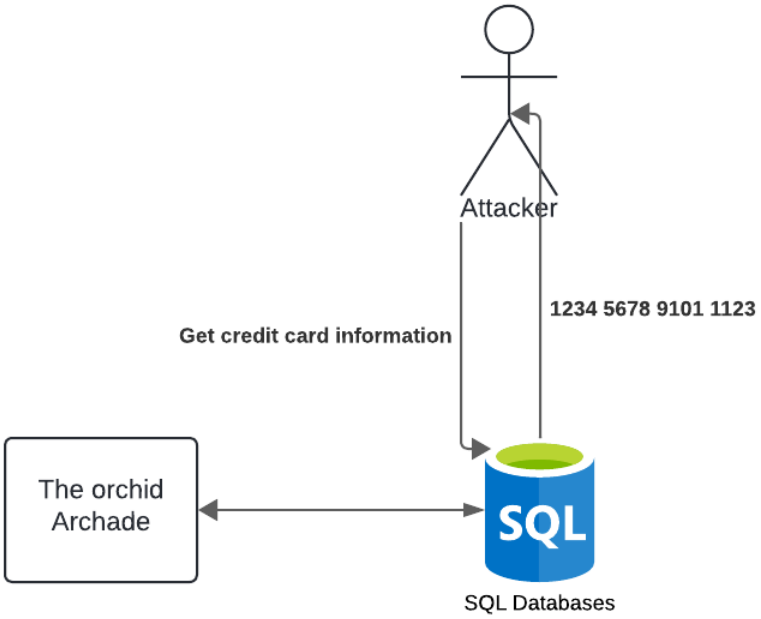

Figure 14 Information disclosure on database

4.5 Denial of Service (DoS) Misuse Cases

- **Potential Excessive Resource Consumption for Web Server or SQL Database**
  Actors Involved: Attacker, Web Application
  An attacker could cause high traffic or resource consumption, crashing the application or causing slowdowns.

Figure 15 Denial of Service misuse case

4.6 Elevation of Privilege Misuse Cases

- Elevation Using Impersonation
  Actors Involved: Attacker, Web Application
  Since no session information is being used, an attacker could send their request as if they were a specific customer or developer. This is a similar situation to the one shown in figure 6.

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4.7 Final STRIDE table

Considering the mentioned abuse cases given by the Microsoft Thread Modeling tool is the final table with each STRIDE category and its possible vulnerabilities:

STRIDE Category	Threat Description	Threat Level
Spoofing	**Spoofing the Client/Developer**: Impersonation to gain unauthorized access to user or developer accounts.	High
	Spoofing the Web Application: Attacker mimics the application to steal user credentials or data.	High
Tampering	**Cross-Site Scripting (XSS)**: Injecting malicious scripts via unvalidated input fields.	Medium
	SQL Injection: Direct manipulation of the SQL database through unsanitized inputs.	High
	Data Flow Compromised: Attacker intercepts and modifies data in transit due to lack of encryption.	High
Repudiation	**User Repudiation of Transactions**: Users deny having purchased games without audit trails.	Medium
	Payment System Repudiation: Payment provider denies transaction receipt due to lack of records.	Medium
Information Disclosure	**Data Flow Sniffing**: Attacker intercepts unencrypted network traffic, exposing sensitive data.	High
	Reading Plaintext Data from Database: Sensitive data (e.g., passwords) in plaintext is accessible to attackers.	High
Denial of Service (DoS)	**Excessive Resource Consumption**: High volume of requests overwhelms the server, causing slowdowns or crashes.	High

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Elevation of Privileges	**Elevating privileges to specific user:** An attacker could hijack the account of any user to elevate its privileges.	High

5. References:

- Lane, G. K. C. (2023, January 17). How to write an SRS Document (Software Requirements Specification Document). Perforce Software. https://www.perforce.com/blog/alm/how-write-software-requirements-specification-srs-document
- TianyaoHan. (n.d.). GitHub - TianyaoHan/Steam-Recommendation-System: Steam Database Design and Game Recommendation System. GitHub. https://github.com/TianyaoHan/Steam-Recommendation-System