Project Phase 1

Digital Game Store System

By

6388030 Kulawut   Makkamoltham

6388040 Ariya   Phengphon

6388085 Jirayu   Klinudom

6388169 Huanrong   Liu

6388171 Qiyue   Shi

6388173 Hejun   Wang

Present to

Asst. Prof. Dr. Thanwadee Sunetnanta

Dr. Chaiyong Ragkhitwetsagul

Dr. Morakot Choetkiertikul

A Report Submitted in Partial Fulfillment of

the Requirements for

ITCS371 Introduction to Software Engineering

Faculty of Information and Communication Technology

Mahidol University

Semester 1/2022

Table of Contents

Introduction

Business Overview

Laoganma is a digital game distribution platform on Microsoft Windows that allows the users to buy games licenses online and play games without a full installation of the game on their local machine, they can choose whether they want to keep the game on their machine or save it on the cloud. In addition, the platform also supports in-game item trading by providing a virtual marketplace on the platform for users to buy and sell items.

Games Creators can create a game and upload the executable to the store. Then, they will need to write the game description on the game page and provide the machine specifications for their games. Next, the administrator will review the game whether it's appropriate to put the game on the platform. After the game is uploaded to the platform, the administrator will tag the genres of the game.

Since the system is a native application on Windows, the system can load each page of the store in less than one seconds, and it can handle 10,000 concurrent users at the same time. In addition, the system support multiple languages and currencies, so it's easier for foreign customers to use the application.

The platform revenues streams are the profit from selling the games, fees collected from game developers who want to list their games on the system, and fees from in-game items trading transactions.
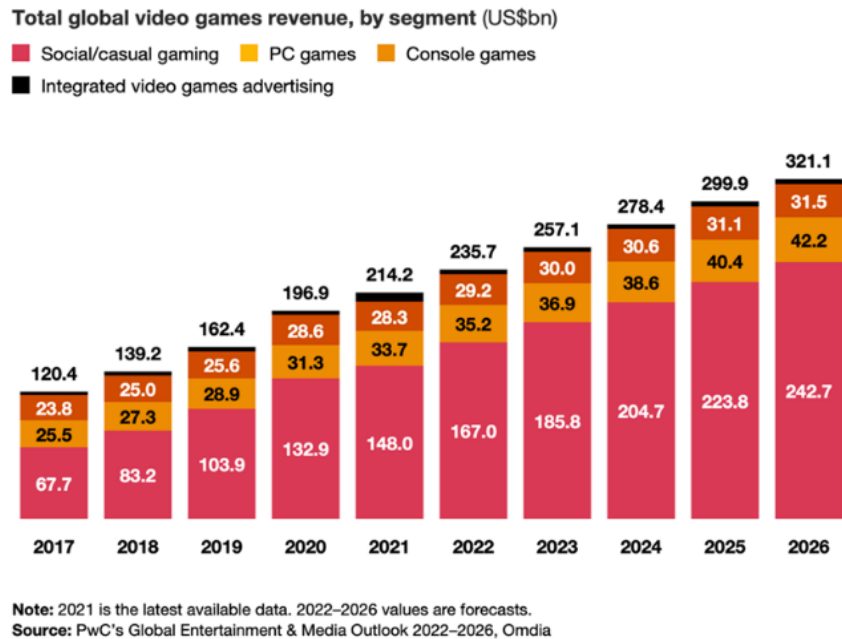

Figure [1]: Total global video games revenue, by segment (US$bn)

According to Figure 1, Gaming industry is growing and is expected to be worth 321.1 billion dollars by 2026. Social/casual gaming is the most popular among all segments with 148 billion dollars in revenue followed by PC games (33.7 billion dollar), Console games (28.3 billion dollar).

In the present, PC Digital Games are now mostly replacing the physical games. Physical games require discs for the game installation, which is not as convenient as the Digital Games because people can download Digital Games from anywhere as long as there is an internet and they don't have to keep the physical discs as the game is saved in their account library. In addition, people will have to go to the store to buy physical games, and it isn't available in the store at the time. However, Digital Games are always available and can be accessed from anywhere.

Despite the fact that digital games are better than physical games, physical games might come with freebies and gamers can collect the discs in the collections. In addition, they can play the games offline and resell the games while the Digital games require internet connection all the time. As a result, PC digital games sales will be growing, but it will not completely dominate the games market since both types of games provide different advantages and disadvantages.

Main Products and Services

Laoganma is a one-stop-service digital game distribution platform for Gamers and Game Developers. Gamers can purchase the game, play a game, and sell or buy in-game items on the virtual market while Game Creators can create their store page to sell the games. The features of the platform includes:

1. **Game Recommendation**
   The system will show interesting upcoming games at the homepage of the store.
2. **Wishlist**
   When users want to purchase a some games, but they are not convenient to buy the games at the time, they can put those games into the Wishlist system and rank the priority, so when they are ready to buy the games, they can just add the games to the cart from the wishlist without searching for the game in the store again.
3. **Shopping Cart System**
   Users can add the game that they want to buy in the virtual shopping cart and check out all games at once.
4. **Supporting in-game items**
   If a game has in-game items that can be dropped for the users. The users can store those items in their account and tradable items can be traded on the virtual marketplace provided by the platform.
5. **Virtual Marketplace**
   The system provides personal storage for storing in-game items for all users. Moreover, they can buy or sell their items to other users on the virtual marketplace.
6. **Game Reviewing**
   After a user plays a game, the user can share their opinions and experiences with the game on the store page.

Target Customers

  There are 2 main groups of the users including Gamers, and Game Developers.
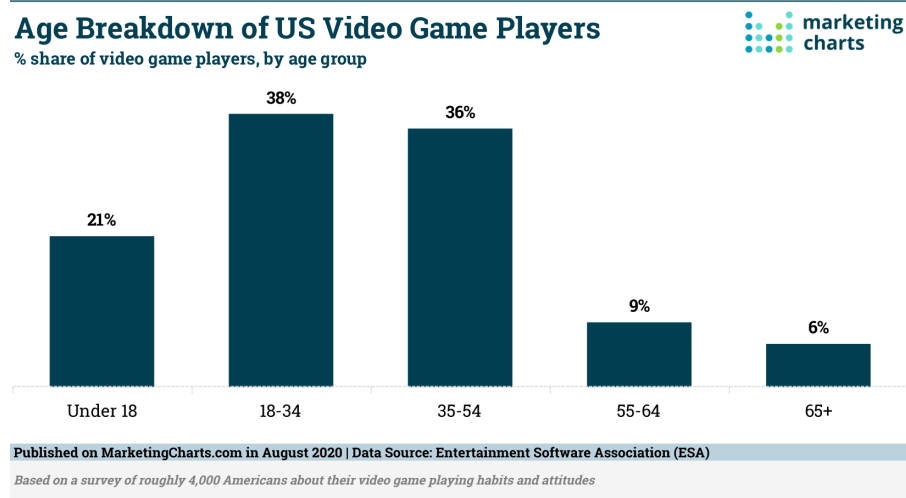
Gamers

Figure [2]: Age Breakdown of US Video Game Players

  According to the bar chart [2], which shows the percentage of video game players in the United States by age group. It can be seen that the age groups that play games the most are 18 - 34 years old followed by the 35 - 54 years old group with only 2 percent lower, and under 18 years old, 55 - 64 years old and over 65 years old respectively.

Persona

Name: Ms. Gawr Gura

Age: 21

Occupation: College Student

Interests: Game, Music, Books

Goals: She wants to buy some games to play for fun, and she wants to play games from her multiple PC devices including her Laptop and Desktop.

Challenges: It's hard to find a game store that sells the game in her local area.

How the application will help: Providing a platform for buying digital games, so she can purchase the game(s) with just a few clicks.

PC Game Developers

  When PC game developers want to sell their game, they can create their own website on the store and put the executables in the database for users to download. However, this method is costly, and complicated. Laoganma offers an easy way for them to sell their games, they can create their pages for selling their games and they don't have to spend their resources setting up their own server and storage for storing the files. As a result, they can save a lot of time and money, and be able to focus on the development of their games.
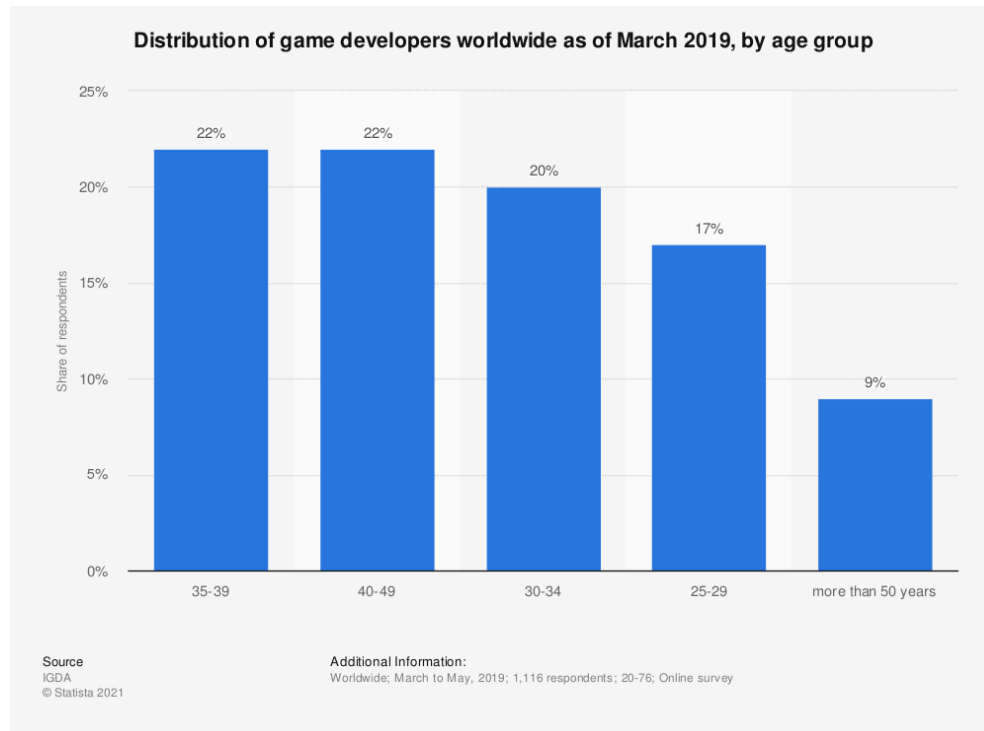
Figure [3]: Distribution of game developers worldwide, by age groups

According to the Figure 3, the groups that have the most game developers are between 35 - 39 and 40 - 49 years old, followed by 30-54, 25 - 29, and more than 50 years old respectively. As a result, our game developers customers are likely to be the people between the ages of 30 - 49 years old.

Persona
Name: Mr. Game Developer
Age: 35
Occupation: Game Developer
Interests: Game Development, UI/UX design, indie-games
Goals: Sell his games, and the game has in-game items to drop for players.
Challenges: Setting up the system to host the game by himself would cost both time and money. Moreover, he has to handle system vulnerabilities on the system he created, so he can't focus on developing the game.
How the application will help: The platform provides that store page for him to list the game to sell and providing the storage for in-game items for users, so he don't have to set up storage on his own.

Key Business Processes

According to the Work Breakdown Structure (WBS), there are seven main business processes of the Digital Game Store System.

To use the system features, users need an account to interact with the system. After customers login to the system successfully, they can browse the game by looking at the recommended games by the system or search the game by genre, name of the game and game creators. When the users want to purchase the games they can add those games into the virtual cart, and checkout all games at once. After they purchase the game, they can install the game on the computer, and they can choose whether they want to keep the game on their machines after finish the game, or remove the game, and save it on the cloud. The users can write a review and give a rating to the the game on the store if they owned the game and play the games more than 2 hours. Lastly, if the games drop in-games item, the users can sell them to other players on the virtual marketplace with 0.25% in fee for both buyers and sellers.

For Game Creators, they also require an account to upload their games to sell on the system. When they upload the game to the system, the administrator will verify whether the game is appropriate to put on the system. If it's good to do so, the game will be uploaded to the system for selling to the customers. Moreover, the Game Creators need to specify the game information, and machine requirements for each game, then the administrator will put the tag on the game for users to search the game.

Functional Requirements (15 requirements)

Requirement ID	Requirement Statement	Comments
Purchasing game(s)		
FR001	The user can buy the Digital Game on the system with a Credit Card.	
FR002	The system must have a shopping cart system that allows the user to put their games in the cart and checkout all items at once.	
Game Searching / Filtering		
FR003	The user can see the lists of games available on the store	
FR004	The user can filter the game list by genre.	
FR005	The user can search the game by genre, name of the game, and creator of the game.	
FR006	The system must have a recommendation system to advertise interesting upcoming games.	
Installing the new games		
FR007	User can manage their Game Storage by saving the games in the User's machine or Cloud system.	
Trading in-game items		
FR008	Users can buy and sell in-game items on the Virtual Marketplace.	
Managing the games		
FR009	Administrators can tag the game's genres in the system.	
FR010	Game creators can upload executables to the system.	
FR011	Game creators can specify or edit information about their game such as system requirements, and price.	

Others		
FR012	The user can create an account with a username, email, and password, and login with a username/email and password.	
FR013	The system should have a wishlist feature, so the user can list the games that he/she wants to buy in the future.	
FR014	The user gives the rating to the game after he/she played the game between 1 to 5 stars.	
FR015	The system must show the System requirements, Price, and Rating of a game.	

Non-Functional Requirements (10 requirements)

Requirement ID	Requirement Statement	Comments
NR001	The interface of the application should be nice looking, attractive, and good UI/UX design.	
NR002	Good performance on their page shouldn't respond later than 1 second.	
NR003	The user data should be encrypted in the database or during the payment information being transferred to the server.	
NR004	The system should be able to handle 10,000 concurrent users.	
NR005	The uptime of the system should be 99.999%.	
NR007	The system must run on Windows PC.	
NR006	The system must check the users to set a strong password. (> 8 characters, contains at least a Capital letter, a number, and a symbol)	
NR007	The system should provide unlimited storage for storing users' game progress.	
NR008	The system can store the login session for 1 month.	
NR009	The system should support multiple languages.	
NR010	The system should support multiple currencies.	

Work Breakdown Structure (WBS)

Digital Game Store System

Review a Game
- Retrieve user login status from *Account Registration/Login* process (Complete/Fail)
- Check whether or not the user matches "Allowed to rate" condition
- Check all required information is filled in (reviews, 1 - 5 stars)
- Return process status message (Complete/Fail)

Register an Account
- Return the *Login and Registration page*
- Check user options (Login or Create account)
- Validate input user's information with the User's database
- Return the *Store page* with user account

Search a Game (Filter included)
- Retrieve user login status from *Account Registration/Login* process (Complete/Fail)
- Return the *Store page*
- The system retrieves and shows all information matches with the query / selected options
- Return the page of the game that includes the game information, hardware specifications, and rating
- (Optional) The user adds the game(s) that they want to buy in the future to the wishlist.

Purchase a Digital Game
- Retrieve user login status from *Account Registration/Login* process (Complete/Fail)
- Return the *Store page*
- Check all games in the cart and display the total prices with details
- Return the *Checkout page*
- Show the payment form
- Validate the payment
- Generate the e-receipt

Install a Game
- Retrieve user login status from *Account Registration/Login* process (Complete/Fail)
- Check if the game already exists and has free space
- Add the game into the user selected storage

Manage Games in the Store
- Retrieve user login status from *Account Registration/Login* process (Complete/Fail)
- Check whether or not the game information and system requirements provided by Game Creators is all provided
- Verify the game and put the genre(s)
- Upload the game executable
- Return the game information (Complete/Fail)

Buy or Sell in-game items
- Retrieve user login status from *Account Registration/Login* process (Complete/Fail)
- Return the *System's virtual marketplace page.* (or selected game)
- Check whether or not the user has this game
- Display the box for filling game details (.e.,g Price, Qty)
- Check whether or not all of the required information is provided
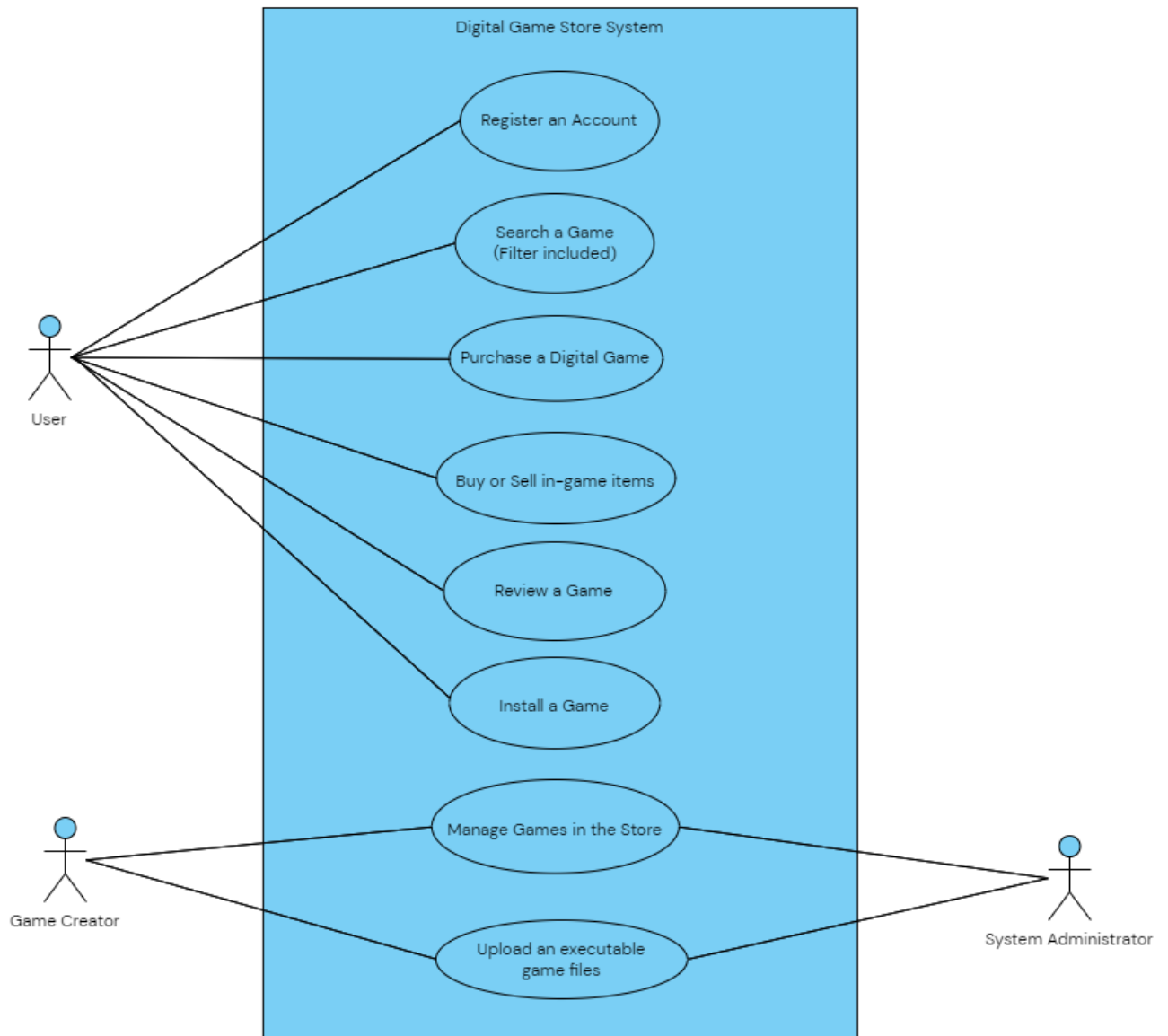- Return process status message (Complete/Fail)

Link: https://drive.google.com/file/d/1LjG9Tc4STE6uGKyk7ROjq0WVXQ44kC2O/view?usp=sharing
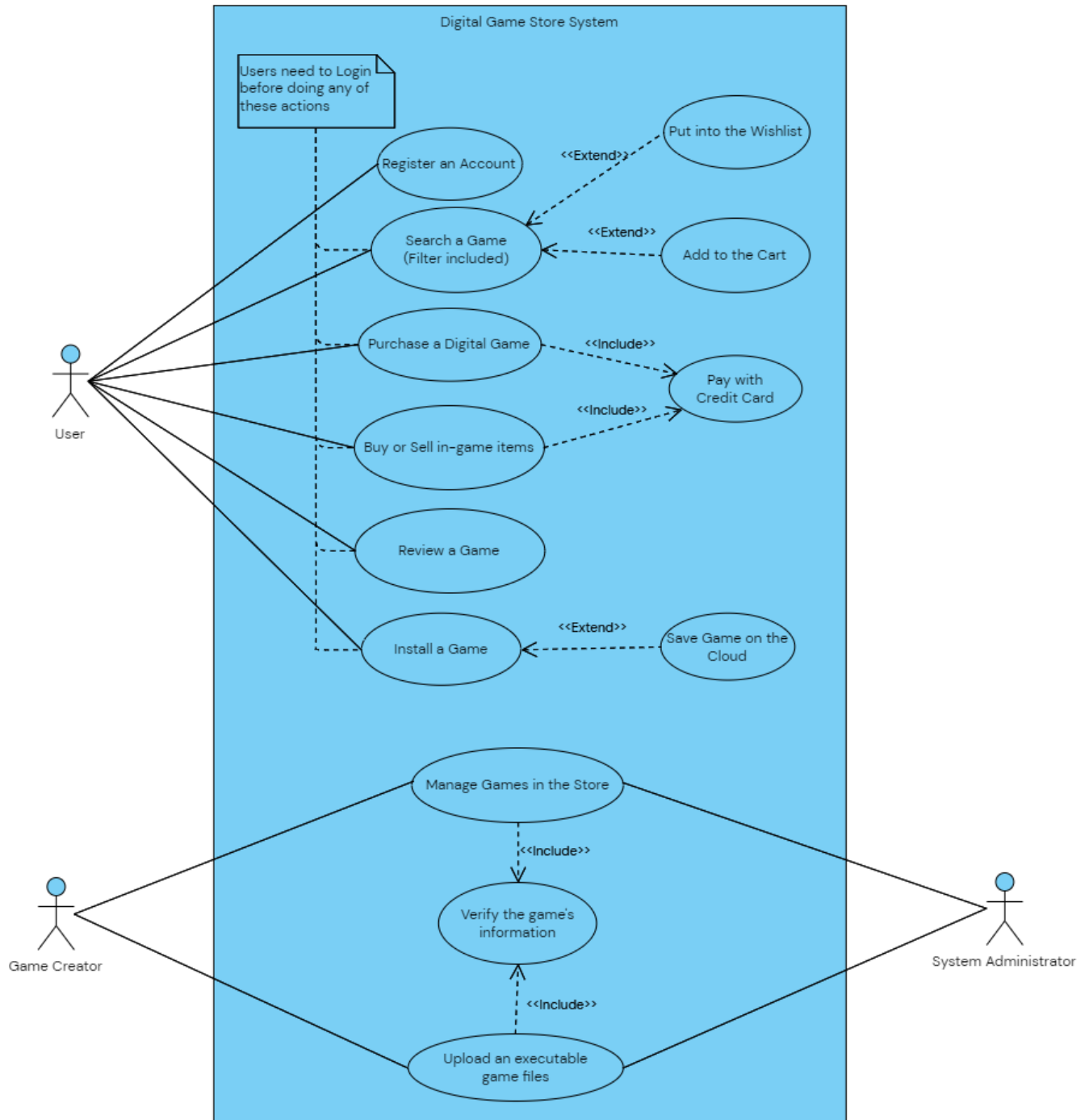
9

Identifying Actors

Actor	Associated Uses Cases

Authenticated User	1. Register an Account & Sign In
	2. Search a Game (Filter included)
	3. Purchase a Digital Game
	    a. Pay with Credit Card
	4. Install a Game
	    a. Save Game on the Cloud
	5. Review a Game
	6. Buy or Sell in-game items
	    a. Pay with Credit Card

Administrator	1. Managing Games in the Store
	    a. Manage the games and tag genres
	    b. Ensure the performance of the overall system (e.g., stable, Do the maintenance (e.g., new version)

Game Creator	1. Managing Games in the Store
	    a. Upload an executable game files
	    b. Specify the price and system requirements of the game.

High-Level Use Case Diagram

Detailed Use Case Diagram

Use Case Narrative

Use Case 1: Sign in

Use Case Name	Sign in
Goal in Context	User can sign in with his/her username and password.
Primary Actor	User, Game Creator
Secondary Actor	-
Precondition	User needs to register an account with name, email, username and password on the registration page first.
Trigger	User wants to do activities in the game store, such as downloading a game, playing a game, or checking the game's price.
Scenario (Typical Flows of Events)	1. User needs to download the Digital Game Store System. (can be found on the social media such as FaceBook or gaming website) 2. User fills in the username, and password and signs in. 3. System will check the database whether there is data of these username, and password or not. 4. User is now signed in to the system. (Link to the home page)
Exceptions	1. If the user owns this program/hasn't enough free space, it will show the error message reporting about the issues. 2. If the user doesn't have an account, the user needs to go to the registration page and register with username, password, and email. **//go to Registration use case** 2. If the user forgets the user's username, or password then just **//go to Reset the username/password use case.** 3. If the system doesn't find any information, the administrator should try to refresh the database and check whether or not all the existing databases remain consistent.
Channels to actors (Medium)	Personal Computer

Use Case 2: Registration

| Use Case Name	Registration
Goal in Context	Create a user/game creator's account
Primary Actor	Game Creator, User
Secondary Actor	-
Precondition	User needs to have a verified email that hasn't been registered to the system before.
Trigger	1. User wants to create a new account, or create an avatar account to play a game. 2. User sees the game advertisement. 3. User wants to create a game community with their friends.
Scenario (Typical Flows of Events)	1. User needs to download the Digital Game Store System. (can be found on the social media such as FaceBook or gaming website) 2. User goes to the Registration page to register a new account with their username, password, and email. 3. System will check if the password meets the guideline for a strong password or not. 4. System will check if the email has been registered already or not. 5. System will send a verification email to confirm your account registration in the registered email. 6. User confirm the registration, and the account is created.
Exceptions	1. If the user own this program/hasn't enough free space, it will show the error message reporting about the issues. 3. If the password doesn't meet the guideline for strong password, the system will remind the user to follow the guideline. (e.g., the password must contain 1 uppercase letter) 4. If the email has been used already, the system will send an alert message that the email has already been used. 5. If a verification email hasn't been replied in a certain period of time, the system will decline the account's registration.
Channels to actors (Medium)	Personal Computer

Use Case 3: Reset the password

Use Case Name	Reset Password
Goal in Context	Reset an account password
Primary Actor	Game Creator, User
Secondary Actor	-
Precondition	1. User can access the registered email. 2. The registered email has to be in the system database.
Trigger	1. User forgets his/her password. 2. User wants to change the password for security purposes. 3. User wants to recover the account from the hacker.
Scenario (Typical Flows of Events)	1. User goes to the Login page. 2. User clicks on the forget password button. 3. Enter the email that binds to the account. (email that the user want to change the password) 4. User receive the password reset link in the input email. 5. User follow the link and enter a new password. 6. User can login with the new password.
Exceptions	3. User forget the email that binds with the account. (email that the user want to change the password) 3. The user enters the wrong email address. 5. The input password is the same as the old password. 5. The input password doesn't meet the guideline for strong password 5. The link to reset the password is expired.
Channels to actors (Medium)	Personal Computer

Use Case 4: Purchasing a product

Use Case Name	Purchasing a product
Goal in Context	Purchase a game.
Primary Actor	User
Secondary Actor	-
Precondition	1. User needs to own the Digital Game Store program on their Windows machine. 2. User needs to have and log in to the account. 3. User needs to enter a valid credit card number, name and address. 4. User needs to have enough money on the credit card to buy a product. 5. User needs to follow a term of agreement before buying a product. 6. User's age needs to be above the age restriction of that product. 7. User needs to comply with the moderation policy of their region.
Trigger	1. User wants to buy a game as a gift to his/her acquaintance. 2. User wants to play games with his/her friends. 3. User sees the game advertisement from social media.
Scenario (Typical Flows of Events)	1. User visits the Game's store page in the game store. 2. User adds the game they want to purchase to a cart. 3. User checks the list of items in the cart, and checks out. 4. User inputs and checks the credit card number, name and address. 5. System/Admin sends the receipt to the user's email and adds the purchased game to the user's library/account.
Exceptions	2. If the user's age doesn't meet the requirement of the age restriction of the game, the system will decline the request to visit the store page 2. If the game has already been added to the cart, the system will change the option "add to cart" to "remove from cart". 3. If user makes a mistake by adding the unwanted game to the cart, the user can remove it before checking out. 4. If the user inputs the wrong/unmatched with the existing/uploaded information, the system will report an error message showing what is incorrect. 4. If the user's card is invalid (e.g., banned credit card, not

	enough money to do the payment), it will report an error message showing what is incorrect. 5. If a user cannot receive a verification payment by email or doesn't have any purchased game in the user's library/account, they should contact the staff within the period.
Channels to actors (Medium)	Personal Computer

Data Flow Diagram Level 0 (Context Diagram)
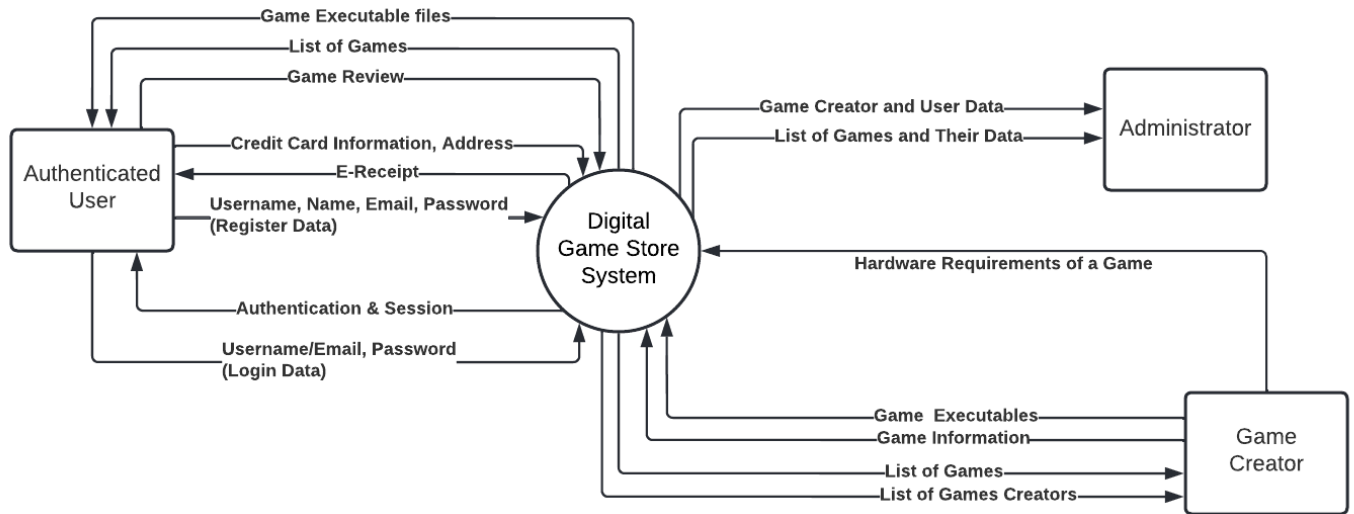
References

[1] S. Read, "Gaming is booming and is expected to keep growing. This chart tells you all you need to know," World Economic Forum, 28-Jul-2022. [Online]. Available: https://www.weforum.org/agenda/2022/07/gaming-pandemic-lockdowns-pwc-growth/. [Accessed: 08-Oct-2022].

[2] J. Clement, "Global Game Developer Age 2019," *Statista*, 19-Aug-2021. [Online]. Available: https://www.statista.com/statistics/453780/game-developer-age-distribution-worldwide/. [Accessed: 09-Oct-2022].

[3] J. Lashbrook, "Video games provide entertainment for all ages," *Marketing Charts*, 06-Aug-2020. [Online]. Available: https://www.marketingcharts.com/cross-media-and-traditional/videogames-traditional-and-cross-channel-114168. [Accessed: 08-Oct-2022].