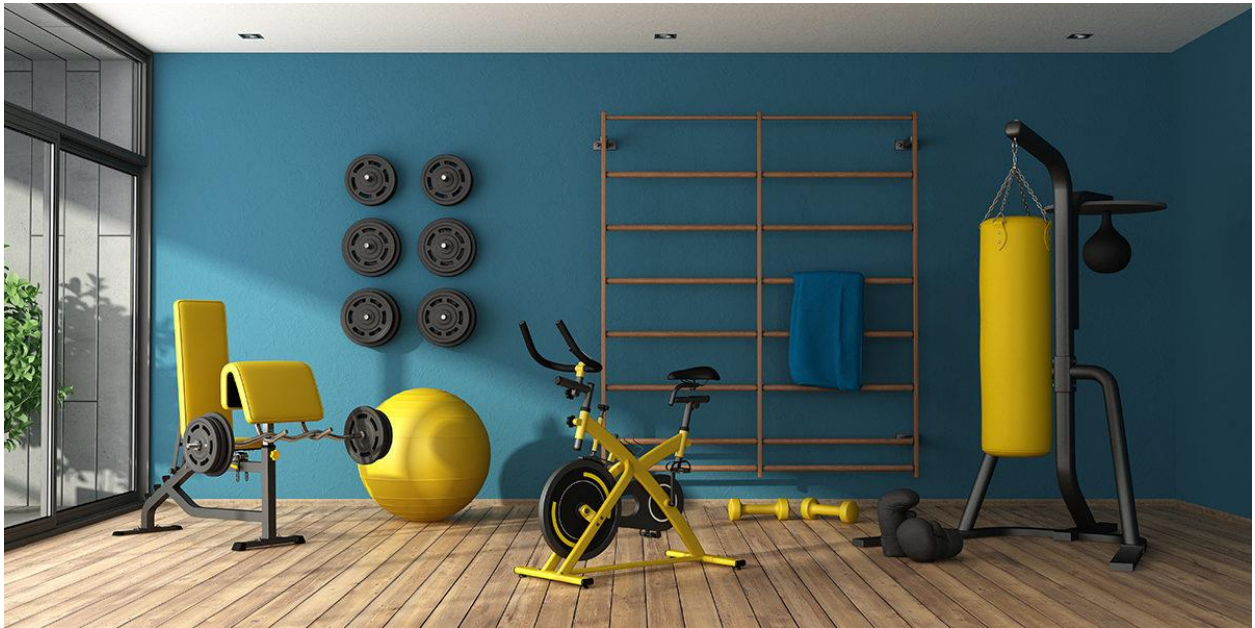


RentAGym Project Report



**Prepared by
Ali Darawsha, Meet Patel, Joshua Gonzales, Vedant Majmudar
for use in CS 440
at the
University of Illinois Chicago**

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I Project Description

1 Project Overview

RentAGym is a mobile application that provides users with a platform to either rent gym equipment they desire, or rent out their own gym equipment. Currently, there is an increased tendency to stay at home throughout the world due to COVID-19, which creates a market for at-home workout equipment. Our application will mainly serve as the medium for users to either rent gym equipment that they desire, or rent out their own gym equipment for monetary gain. The application will also give users the ability to share playlists and personal workout regimes with other users.

2 The Purpose of the Project

2a The User Business or Background of the Project Effort

Fitness product companies will have an incentive to advertise their gym equipment within our application by not only providing exposure for the business, but also letting users, who are already more inclined to purchase gym equipment, see their product. The idea is to give users the ability to choose what they want, and by allowing fitness companies to advertise their product, we can provide the users with the choice to either buy and rent unowned equipment, or rent out their personal equipment for a profit. The user is mainly targeted towards our mobile application users, who will make up the foundation of the applications success.

As mentioned in the overview, the need to stay at home and social distance can be a big challenge for people who want to stay active. For reasons such as financial issues, social distancing, to just personal reasons, this application would help those who need easy accessibility to achieving their fitness goals.

2b Goals of the Project

The overall goals of this project are to improve public health and provide users with an ability to create another source of passive income. In an attempt to improve public health, we not only encourage working out, but also provide a way to acquire equipment to make working out from home possible. By giving people an affordable alternative to gym memberships, more of the public will be inclined to engage in fitness and improve their overall health. Furthermore, this improvement should fuel even further engagement within the application, as people will be satisfied with the improvement in their quality of life.

2c Measurement

In order to measure the user passive income goal, analysing the amount of income being earned by these new sellers within the application will provide a quantification for how successful the goal is. Through keeping track of the amount of money spent within the applications through various transactions, the statistics would help show how successful the app is at engagement within the gym community. Measuring our effectiveness at improving overall public health will be more difficult, as that is not an

inherently quantifiable goal. However, surveys will be sent out to users asking if RentAGym contributed to them working out more after acquiring the application. The surveys can then serve as a measurement of the success of the public health initiative.

3 The Scope of the Work

The work will be the expedition of the process between wanting a piece of equipment and acquiring said piece of equipment, either for rent or as a purchase. Fitness companies will provide another stream of equipment that can be potentially purchased, and our application will provide the rental route as an inexpensive alternative to purchasing.

3a The Current Situation

The three facets of the clients' work that will be addressed are the renting of gym equipment, purchasing of gym equipment, and the renting out of personal gym equipment. Currently, if a user wanted to rent out their own gym equipment they would have to ask their own friends and family members if they are interested, and will have a much lower chance of successfully finding people who are willing. As for purchasing gym equipment, currently users can only purchase from fitness companies, various scattered marketplaces, and friends/family members. The situation is identical for renting gym equipment, and there is usually no person to person interaction, but rather person to a company.

3b The Context of the Work

RentAGym will include a way to list gym equipment to rent out, and a way to rent gym equipment. The core features will be supported by other supplemental features that will serve to bolster the application as a whole. At the core, the work consists of connecting two interested users, a seller and a buyer. Creating the environment in order to facilitate this connection is an important facet of the work, and is improved upon with features such as GymPal, Playlist Sharing, and Workout-Plan sharing.

GymPal will be a supplemental feature that will allow users to connect to one another while listening to music. The idea is to create a voice communication system that will allow users to communicate with one another, while listening to music. The music for both parties would be turned down upon the indication that one party is attempting to speak, once the communication has halted the music will return to its original volume. The GymPal will facilitate communication and connection with our users, and will seek to recreate working out with a friend in-person. This feature could implement Spotify's API and their Group Listening Sessions feature in order to have the music interactions work seamlessly.

The playlist sharing and workout-plan sharing services will be the final supplemental features that will further facilitate the creation of a community within

RentAGym. The playlist sharing will allow users to share favorite gym playlists with one another, in order to assist with personal workouts. The workout-plan sharing service will allow users to share their own workout plans with one another, further bolstering the idea of connectivity within the application.

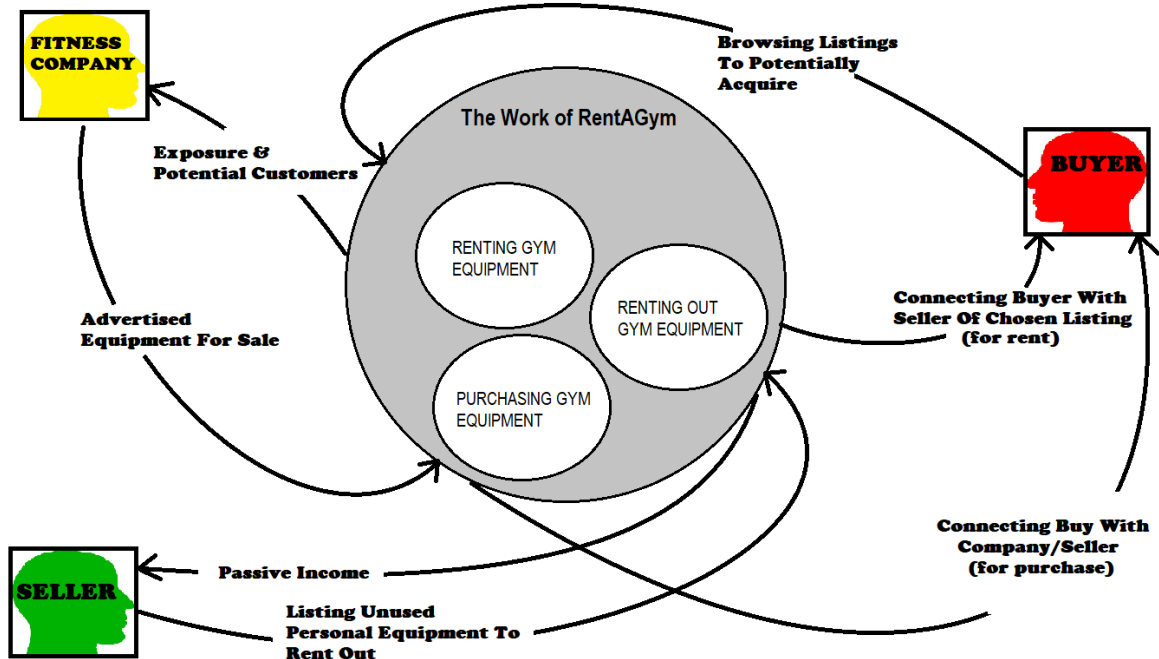


Figure 1: Work Context Diagram for RentAGym, Shows Fitness Company, Buyer, as systems

3c Work Partitioning

| Event | Formatting | Input and Output |
|--|---|--|
| 1. Listing Currently Owned Equipment For Rent/Sale | Seller chooses to form another source of income and lists equipment | User will list equipment up, and will be contacted upon finding Buyer |
| 2. Acquiring Listed Equipment | Buyer interested in specific listing within RentAGym | Buyer will be connected with Seller, and transaction will be facilitated |
| 3. GymPal | Users are interested in mimicking gym environment | Users are connected and able to listen while communicating |
| 4. Playlist/Workout Sharing | Members wish to share personalized playlists and workouts | Users will select another user for which they can share item |

Table 1: Table list for events occurring while interacting the application.

3d Competing Products

RentAGym targets the fitness industry with a different approach to other products offered on the market. Most fitness companies provide services to rent directly from the company itself, we are an alternative where we provide a medium for user to user interaction, rather than user to company. Where instead of being on one end of the transaction, we are in the middle providing a medium. By not being the actual provider of equipment, we are able to facilitate more transactions of this type without actually having to supply the product.

4 The Scope of the Product

The main idea is to put together a strong connection between Customers and sellers, either as a transaction or through personality. In order to achieve this, both customers and sellers would have to keep the environment and equipment clean. There are places in the application to put images of clean equipment. By following this method, there is a guarantee that the business of renting equipment will create a community of positive minded users and will populate the market.

4a Scenario Diagram(s)

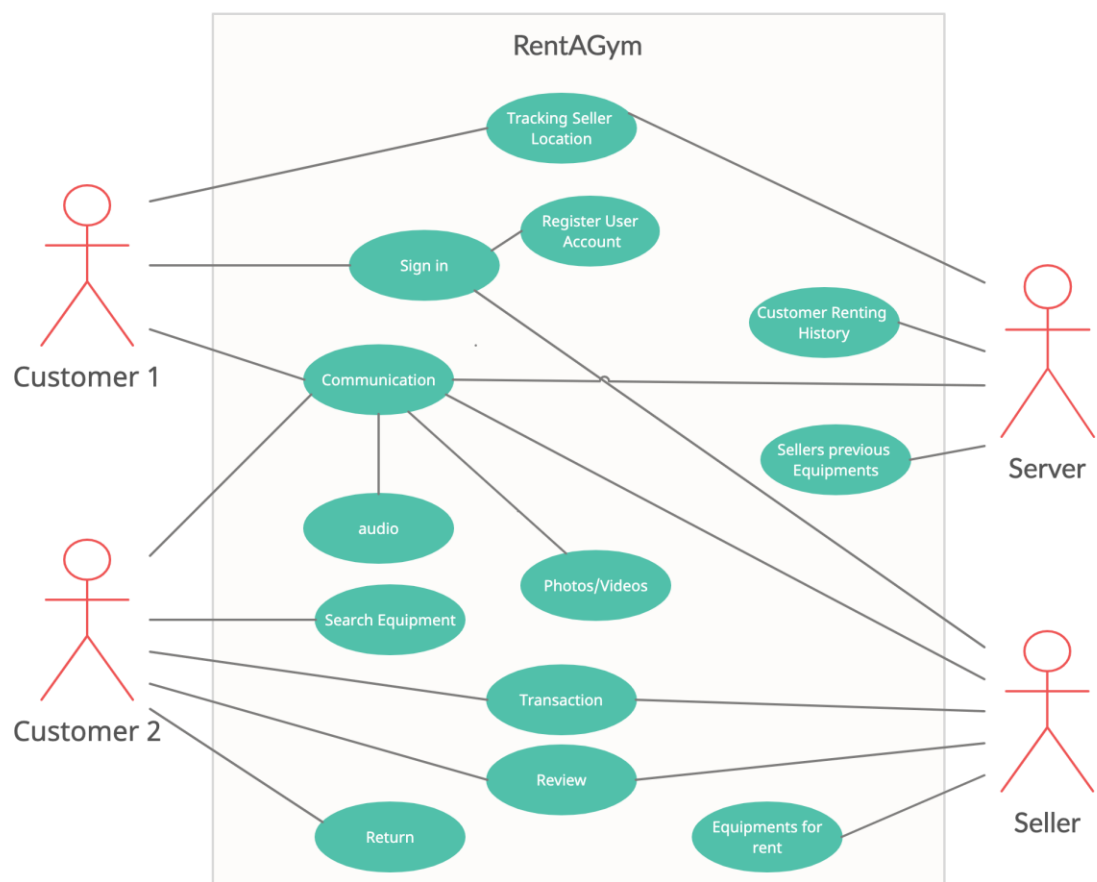


Figure 2: Scenario Diagram of a Renting Transaction

4b Product Scenario List

| Name | External Actors | New relative information |
|---|------------------|---|
| Communicating with friend during workout (GymPal) | Server and Users | An external actor server will be able to send an invitation to connect a user to another user. Presumably friends or other relatives that are in use of this application. Talking while working out will be refreshing. |
| Fitness Advices and Workout plans | Users | The app will give information and/or suggestions on how to do exercise properly. This will help users reach and stay active towards their workout goals. |
| Equip the equipments | Users and server | When a customer selects equipment to work with and agrees with the price that the seller is asking, the customers will go and pick it up from the seller's house or a mutual selected place. This will give customers GPS directions and sellers will get a notification about arrival. |

Table 2: List of scenarios with name and actors that are not present in the scenario diagram

4c Individual Product Scenarios

Scenario 1:

James is very muscular and participates in body building tournaments. He has so many used and unused gym equipment at home and wants to put them out for rent. James downloads the RentAGym app for IOS or ANDROID OS and signs up to create an account. He then selects the seller as an option and interacts with the interface. He then takes out all the equipment that is needed to be put for rent. Next, James takes pictures and videos for sanitizing purposes and adds it to the post. The videos are also proof that if customers damage the equipment, they should be ready to pay the price of the equipment. Lastly, James attached videos, pictures and put what he thinks the right amount for the equipment should be before he posts the ad to the public.

Scenario 2:

Sarah is a very busy person and gives little to no time towards her fitness. She learns about RentAGym from her friends from work and downloads the app. She creates an account and interacts with the homepage interface. On the homepage she clicks on the search bar and searches for beginners yoga kits. She gets a big list of potential sellers

who have put the kit for a given price. She checks if they are correctly cleansed and have necessary equipment for her to use. She checks out the price and finds it really affordable. Later, she selects buy and adds her credit/debit card information. Lastly, she contacts the seller and arranges a time and place to pick up the stuff. The app provides the direction towards the seller's house or a mutually selected place.

5 Stakeholders

5a The Client

The clients for this development are the developing organization team that are working on this application. The clients have paid their time and knowledge in order to fully document the research.

5b The Customer

The people are the users who will download the application. There are two kinds of users, customers and sellers. This application runs for the users, and the users should have the age of 16 and above. Customers will purchase the app in order to buy gym equipment and hangout with their friends. On the other hand, sellers will purchase the app in order to sell their equipment and create a passive income. Finally, users will be able to change their roles. So the Customer becomes the seller and seller becomes the customers.

5c Hands-On Users of the Product

RentAGym app is created for users, customers and sellers. The hands-on users are teenagers and adults. Teenagers who don't want to go to gym and workout in private at home. Adults who are bad in shape and don't want to waste money on the gym membership are also the hand-on users. The minimum age of the hands-on users will be 16 and above. The reason is that in order to pick up the equipment, users need a driving license and 16 is the appropriate age to drive.

5d Maintenance Users and Service Technicians

Users will be able to download and install the app. There will be an update on the app for future features and bug fixes. The less bugs, the better user experience. Whenever a user finds a bug, that person should go to their app store and should be able to leave a review or comment on this particular update with their complaints. This will ensure that other users don't encounter the same error. There are service technicians that work on fixing the bug, making sure the bugs are fixed and working correctly. Not only fixing the bugs, but creating new features on demand of the users. This will create a back and forth relationship between users and service technicians.

5e Other Stakeholders

We have seen by now that the stakeholders are customers which are teenagers and adults. But specifically there are high school students. Other stakeholders are, travelers, Gym membership people who might want to join as a tester, people who want to create passive income, people who wants to work in private and not worry wasting their money on memberships, companies who want to sponsor their products and lastly, travelers. Branded companies like fitness companies. They can advertise their product as well.

5f User Participation

Users will be able to test the product's UI during the development. There will be a case study where few tasks are given to each person with the UI and their goal is to do the task successfully and give the feedback at the end. This will help development teams who are responsible for UI to create a better interface moving forward. If the users have any comments to make, either good or bad, the development team will gladly take into consideration since any information will be for the benefit of the development. Furthermore, users of the development team will also provide answers to all the quick questions. For example, users can ask questions on privacy, etc.

5g Priorities Assigned to Users

There are some users that are more important than others, but there are users who will take this app seriously then the other. Priorities assigned to customers are to create better health for themselves and not for fun. Customers should return the equipment in the same conditions and on time. The sellers who really want to make a passive income will put real good effort into selling their products and will earn better customers than others. Thus, creating an environment with confidence and respect from other customers. This will ensure that the sellers will benefit from their clean working habits.

6 Mandated Constraints

6a Solution Constraints

Description: Our product should be available in the form of a mobile application, for both the Android and iOS operating devices.

Rationale: The product will need an internet connection to look up the available product in the market to be rented, then for adding more products as a seller to sale in that list. The internet is also required to help a customer pay and sellers get their payment in their account.

Fit Criterion: The product fulfills Google and Apple requirements or terms and conditions in order to be able to be posted in their respective app store, to reach out to as many users as possible.

Description: Customer devices are required to have a GPS and camera.

Rationale: This GPS will help connect users and the seller in the real world by sharing location information. cameras are the way for the users to take pictures and videos of a product.

Fit Criterion: The GPS data will be used to help potential customers see how far a certain listing is from their location.

Description: This product should be able to store customer and seller information on a server. Also, provide this information to both customers and sellers as per need.

Rationale: To expedite the gym equipment transaction and provide a support system

Fit Criterion: These servers contain all the information of who is renting, who is the owner of the product, user (customer and sellers user details) details, what are the due dates, what are the renting rate, image, and video of the products, potential location for doing the transactions, late fee, return policy and customer reviews.

Description: We need to have a customer service team

Rationale: This will satisfy our customers, and make sure we hold on to our current customers.

Fit Criterion: This team can help users in any way possible for a better experience with our product.

6b Implementation Environment of the Current System

The product will be in the form of a mobile application, for platforms like Android System and iOS system. Product use server for both connecting sellers and customers. Servers contain all the information such as renting (User), product (Sellers), due/return date, renting rate, image and video of the products, potential location for the product, late fee, return policy, and customer reviews. There should also be customer service response and repair for the bugs and issues that the customer provides to the debug center. The hardware on the customer and sales end requirements GPS, Wifi, mobile internet, and camera.

6c Partner or Collaborative Applications

Since this is an individual application, currently there are few potential growth partners.

Fitness Companies: This partnership will provide an avenue for these types of companies to potentially advertise their own products for purchase to our users.

Spotify: This partnership can integrate Spotify into the application for workout playlist and users will be able to share it with the user community.

Discord: This partnership is to create a Gym loving community, which can connect experienced and new beginners and help each other.

Zoom: This partnership is to create a Gym loving community, which can connect personal trainers and other users to share their knowledge.

6d Off-the-Shelf Software

This product will use Spotify's API for the music section (sharing and synchronous listening) for GymPal and the Google Maps' API for navigation, GPS, and location tracking. A transaction portal for conducting online transactions will also be used.

6e Anticipated Workplace Environment

This product will be used for connecting a consumer (customer) and a provider (seller), thus they must agree to meet each other and should be physically fusible to meet based on their location. The product exchange between both the parties should be standard Gym equipment and clean before and after every transaction.

6f Schedule Constraints

At this time there are no schedule constraints for this product, but it should take around eight months to one year to build this product.

6g Budget Constraints

The budget constraint should include building and testing of the product, running and maintenance of the product, one time policy making services, customer service call centers, transaction portal provider, and server provider.

7 Naming Conventions and Definitions

7a Definitions of Key Terms

Rent: The application uses the word rent as a means to obtain possession and use of equipment for a temporary period in return for a small sum of money

Rent-out: The application uses the word rent-out as a means to grant temporary possession of equipment for a small sum of money

Customer/Buyer: A person who rents equipment

Seller: A person who rents-out their equipment

Item Condition: When renting or returning equipment, it is important to let the receiving entity know if they are getting something that is new, used, or something in

between. Different item conditions may warrant different price ranges depending on the equipment. These condition categories are:

- Excellent: Item is in excellent condition with no wear, includes original accessories if it applies
- Great: No functional defects, may have signs of slight cosmetic wear but is still fully operational and functions as expected
- Acceptable: Has obvious damage including scuffs or cracks but still is operational

GymPal: The feature in the application where the user can interact with others in the gym community through video/audio communication, sharing music through playlist or synchronous sessions, and personal/group guidance for workout plans.

7b UML and Other Notation Used in This Document

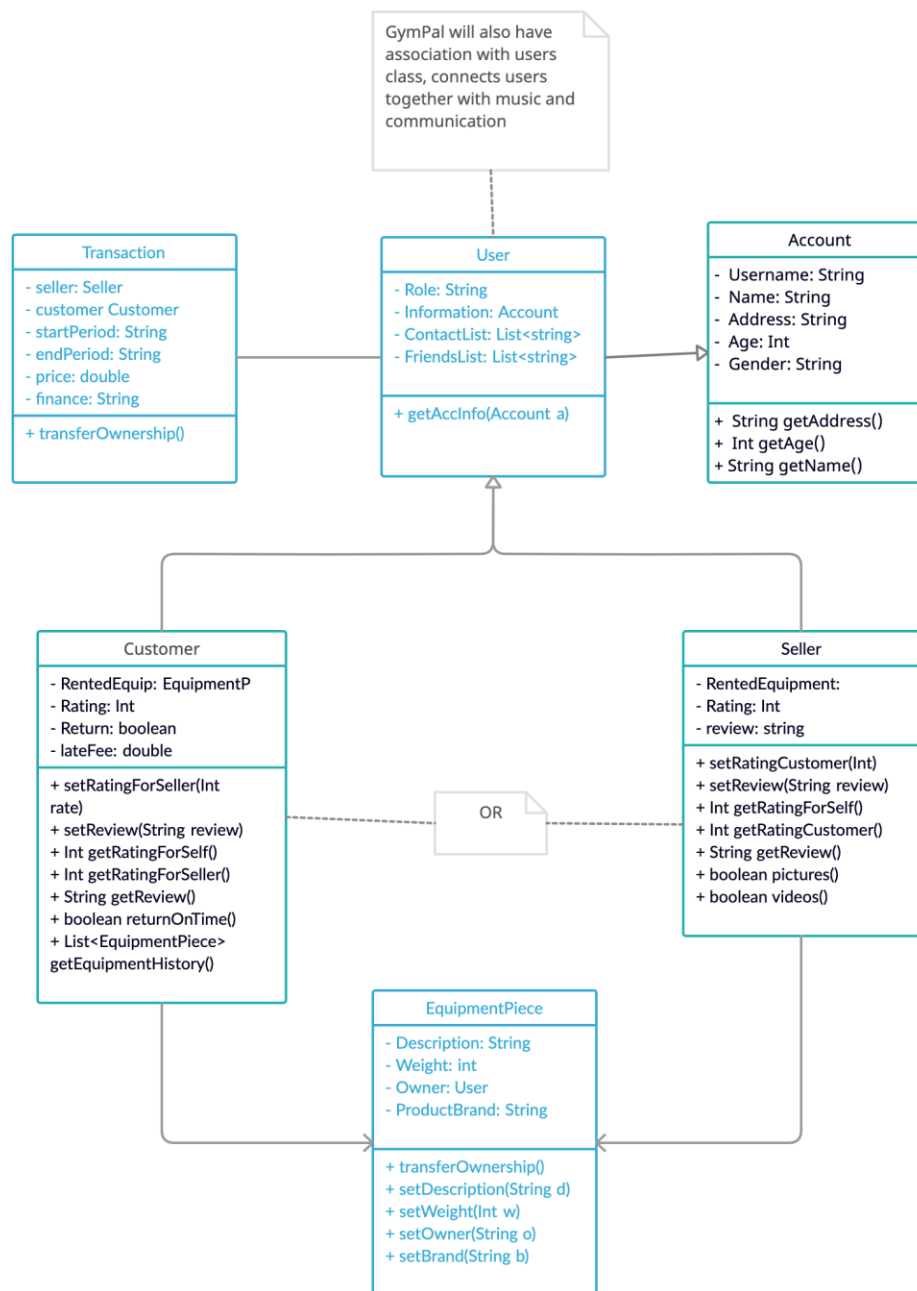


Figure 3: Class UML Diagram for Users

7c Data Dictionary for Any Included Models

Within the interactive map of the user's general location, there is a system which gathers data on what equipment is available to rent. This will then display the type of equipment which could be from specific types of barbell, cardio machines, to other

gym machines. This system then pulls what the brand of the equipment is, the data which the seller provided such as photos, item condition, and how much the seller is willing to rent it out for.

There should be an underlying database containing the different brands that sell gym equipment, the different types of gym equipment sold by each brand, and their average cost to buy in order to provide information to users and sellers through the application in lists and detail pages which are necessary for them to understand what equipment they are handling.

The general contents of a user's account include a friend's list to account for the GymPal feature. A similar list should also be implemented for the different customer/sellers the user has made transactions with. A rating system should also be applied to different users to ensure best customer service and hold people accountable for sanitary and upholding promised equipment quality.

The contents of the customer part of a user's account includes a list of equipment they are currently renting in order to have a convenient log and keep track of what they need to return and when to return it. In addition to the location to return it for each item, this log will show the date and time they rented the equipment and the date and time they need to return it. Another part of the customer's data structure includes the history of equipment they have rented before so they can look back and decide if they would like to rent that or other equipment from the same seller again. This will show the user the item rented and the seller's information such as their username, their message log, and when they rented it.

The contents of the seller part of a user's account includes the list of equipment they currently own which has information such as the brand, the item condition, and information pulled from the gym equipment database based on the item.

8 Relevant Facts and Assumptions

8a Facts

The factual information relevant to the project would persist of general pricing data for pieces of gym equipment, and the GPS data that will be fed into the application after certain actions are taken. The data relating to pricing will be fed in from various fitness websites, and will be used as a benchmark comparison point for users. Allowing users to visually see the benefit of simply renting gym equipment for a period of time, over the alternative of making the financial investment of purchasing said piece of equipment. The GPS data will be fed in when a user acts as a Seller and lists a piece of equipment up for rent, and another user views that listing. There will be location data attached to the listing of the equipment, and also give the viewing user a relative distance from themselves, allowing them to visualize how far they would have to actually travel to pick up the equipment.

The accepted forms of payment through the application between customer and seller should at least be Credit/Debit, Apple Pay, and Google Pay.

8b Assumptions

We are assuming that users of the application will have a general understanding of using a smartphone device, basic understanding of rental agreements, and the ability to read or write in English. Also, we are assuming that those who choose to rent equipment have the ability to actually go and pick up said equipment.

II Requirements

1 Product Use Cases

1a Use Case Diagrams

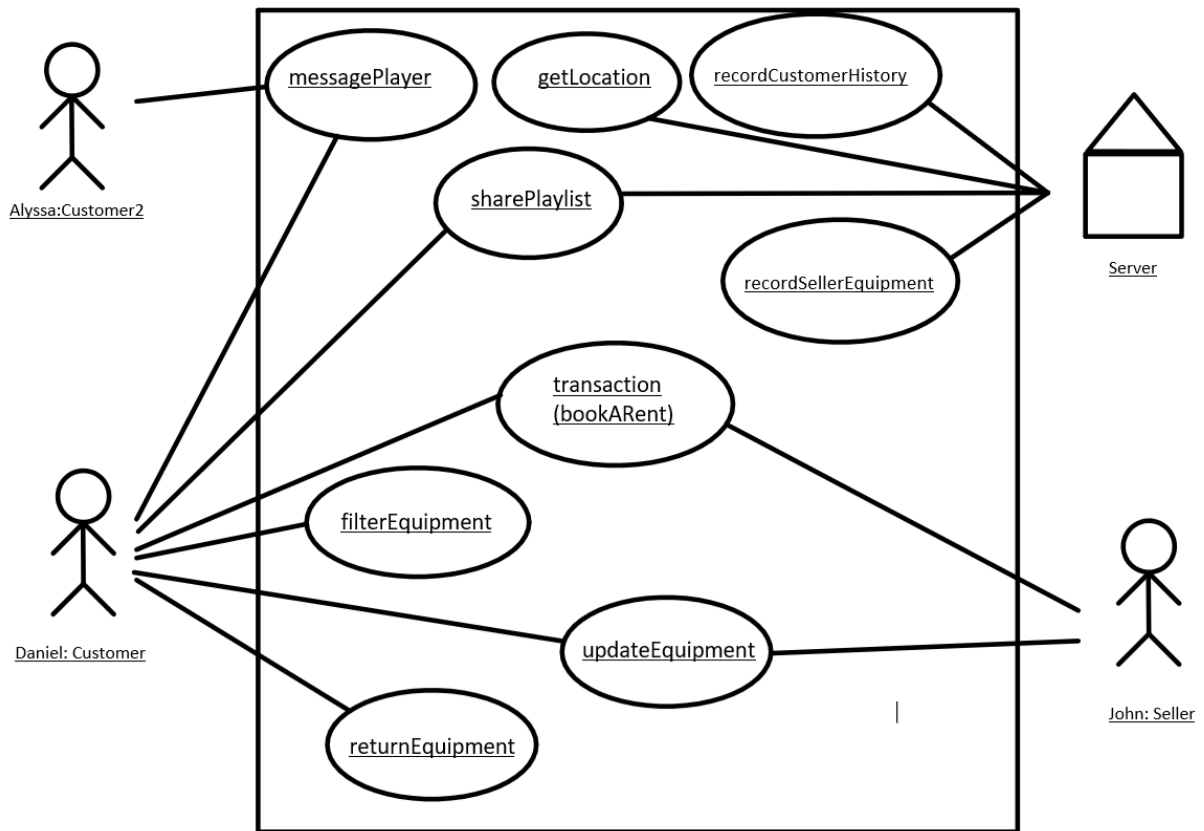


Figure 4: Use case diagram showing GymPal and transaction function

1b Product Use Case List

| ID | Name | Description |
|----|------|-------------|
|----|------|-------------|

| | | |
|---|----------------------|--|
| 1 | Navigate Renting Out | A seller discusses a transaction for their equipment and agrees to meet with the customer at a location. |
| 2 | Transaction by User | After a customer searches for equipment and finds a seller, they make a transaction so the customer rents equipment. |
| 3 | Late Return | A customer rents out equipment for a certain period but does not return it by a specified time, will have a late fee applied to their account given to the seller. |
| 4 | Workout Sharing | A user (seller/customer) shares their workouts with others through GymPal for people who follow their account. |

1c Individual Product Use Cases

Use case ID: 1

Name: Navigating Renting Out

pre-conditions: Seller has equipment to rent out

post-conditions: System updated customer and seller list after payment processes.

Initiated by: Seller

Triggering Event: Seller equipment is pinged by a possible customer

Additional Actors: Customer

Sequence of Events:

1. Seller puts equipment up to be available to rent out on the application.
 - a. System updates equipment list in database and updates the list in seller's area.
 - b. System will update seller if they have an interested customer
2. Seller discusses the transaction with the customer and a meet-up is confirmed.
 - a. The system marks the transaction as active and sends meet-up date and location to both customer and seller.
3. At the meet-up location, the customer and seller will confirm the transaction through the "Confirm Transaction" button and finish the equipment exchange.
 - a. The system should update the equipment lists on both the customer and seller with date and return information and confirm the payment provided by the customer sent to the seller.
 - b. The system should have a method to get the money to the seller whether third-party or in-application.

Alternatives: The seller offers a delivery option to send to customers with a set shipping cost (if any).

Exceptions: GPS does not work for specified meet-up location

Use case ID: 2

Name: Transaction by User

pre-conditions: Customer has valid account and no active late fees.

post-conditions: Equipment is transferred physically and in system from seller to customer, and payment is authorized

Initiated by: Customer

Triggering Event: “Confirm Transaction” button on the app by both customer and seller

Additional Actors: Seller

Sequence of Events:

1. A customer searches for equipment and finds appropriate seller
 - a. If the seller rejects the pending rent, the system will explain the reasoning provided by the seller to the customer
 - b. If the seller accepts, the customer and seller confirm a meet-up with location and time through app. The customer then needs to update the system with their payment information through PayPal or Debit/Credit Card for the system to activate the transaction at the end of meet-up.
2. At the meet-up location, the customer and seller will confirm the transaction through the “Confirm Transaction” button and finish the equipment exchange
 - a. The system should update the equipment lists on both the customer and seller with date and return information and confirm the payment provided by the customer sent to the seller.

Alternatives: Customer chooses to buy the equipment rather than renting it. The price will be set by the seller and there will be no return date. The system should update both equipment lists accordingly.

Exceptions: The payment is cancelled

Use case ID: 3

Name: Late Return

pre-conditions: Return date has passed and the customer has not returned the equipment

post-conditions: Late fee will be applied to user's account

Initiated by: Customer with equipment past return date and System

Triggering Event: System confirms the seller does not have equipment after return date

Additional Actors: N/A

Sequence of Events:

1. Customer did not return equipment by the return date
 - a. System confirms the seller does not have any equipment after the return date.
 - b. System will apply a recurring late fee set by the seller (with a set maximum built-in) to the customer's PayPal or Credit/Debit Card.

Alternatives: Return is not late, customer returned the equipment by the return date so no late fee is given by the system.

Exceptions: Customer does not return equipment by the time the maximum late fee is applied, seller should have enough money to buy the same equipment at the equipment's MSRP and some more for profit.

| | |
|---|-----------------------|
| Use case ID: 4 | Name: Workout Sharing |
| pre-conditions: User should have GymPal activated with their account public | |
| post-conditions: System allows friends of user to see the workout shared | |
| Initiated by: User with workout to share | |
| Triggering Event: Share button | |
| Additional Actors: N/A | |
| Sequence of Events: 1. The user logs a workout with optional videos to display on their profile. The user then taps on the share button. a. The system takes the workout information (object) provided by the user to be displayed on their account. b. The user's can set their account to public to everyone or public to only friends | |
| Alternatives: User has profile private and saves workouts to their account for only their eyes only. GymPal also has a playlist sharing option which should have the same process as the workout sharing. | |
| Exceptions: N/A | |

2 Functional Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
|---------|-------------|-----------|---------------|------------------|

| | | | | |
|----------------------------|--|--|---|---------|
| FUNC-1 View Listings | User within buyer mode are able to view exact locations of listings on an in-app map | Providing a visualization of listings will expedite the choosing of listings | Unit tests can be made with different listings to test map functionality | Test #1 |
| FUNC-2 Instant Listings | Listings are publicly available right after seller places listing | Minimize time needed for sellers to create listing and begin transaction process | Unit tests can be created to time the delay between the creation of a listing and when it is publicly available | Test #2 |
| FUNC-3 Reporting | Reporting system is robust and is available in two versions, buyer and seller | Reports provide a feedback loop from the users, making it robust will assist both parties involved in the report | Ideally the more reports are used the less they are needed, leading to less reports filed. | Test #3 |
| FUNC-4 Transaction | Transactions should work when various methods are linked through the application | Users should not have to worry about whether the money will go through to each other | Unit tests can test whether the transactions work with necessary APIs | Test #4 |

| | | | | |
|-------------------|--|---|---|---------|
| FUNC-5 Sharing | Sharing playlists, workouts, and communication in GymPal should work if account is public | Users should have access to all the features in the application when the account is set to public. This helps foster community. | Unit tests and simulation testing can check if different users can communicate through GymPal as intended | Test #5 |
|-------------------|--|---|---|---------|

18.

3 Data Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---|--|---|---|------------------|
| PAI-1 Personal Account Information | The system must be able to provide a means for the user to enter personal information. | Users providing information, will be stored in a database for it retrieves data when necessary. The system will ask for the first and last name, address and must verify one piece of information for validation. | When a customer is searching for the equipment, the customer will look into the profile of the seller. Having data public will create a trust between the customer and seller. | Test #6 |

4 Performance Requirements

4a Speed and Latency Requirements

| <u>ID7# - Name</u> | Description | Rationale | Fit Criterion: | Acceptance Tests: |
|--|--|---|---|--------------------------|
| Transaction speed and inventory count. | The application should update the available list of products once that are sold off as soon as the payment has been processed. | This is required, to avoid selling the same product to, two separate customers. | Have a correct number of products available for rent. | Test #7 |

4b Precision or Accuracy Requirements

| <u>ID8# - Name</u> | Description | Rationale | Fit Criterion: | Acceptance Tests: |
|---------------------------|---|---|---|--------------------------|
| Inventory and user count. | The system must keep an accurate count of inventory, and precisely data about the customers and the product they have on rent | This is required in order to avoid conflicts like single product rented by multiple users or vice versa | Have a correct number of products available for rent. Alos correct products affiliated with the correct user. | Test #8 |

4c Capacity Requirements

| <u>ID9#</u> | Description | Rationale | Fit Criterion: | Acceptance Tests: |
|------------------------------|---|--|---|--------------------------|
| Users and inventory capacity | The Application must be able to store about 100000, product and 50000 user at the time of release | This can later be expanded as the number of users grow | This will help ensure all users and their data. | Test #9 |

5 Dependability Requirements

5a Reliability Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|------------------------|---|--|---|------------------|
| RR-1 System failure | The system should not fail more than once per day | If the application fails often, the users may reject the application and choose another. Also could lead to money loss or equipment loss | Unit tests and automation tests can be used to prevent any crashes and avoid error messages. | Test #10 |
| RR-2 Data Loss | The system should not lose data in the event of a crash | Users need to have their data in order to keep up with renting/renting out the required equipment | Unit tests can be used in the event of a controlled crash, checking the database and users in the application | Test #11 |

5b Availability Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|----------------------|---|---|---|------------------|
| AR-1 Availability | The application should be available for use 24/7 | The application's GymPal and searching/ transacting should work any time of day in case of travelling or different work times | Unit tests and automation tests can be used to ensure application is available at all times | Test #12 |
| AR-2 Down System | The application should perform maintenance and alert developers when system is down | Users would appreciate the convenience and update application when needed | Unit tests can be used in the event of an update or maintenance | Test #13 |

5c Robustness or Fault-Tolerance Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-------------------------|---|--|--|------------------|
| FTR-1 Error Messages | The application sends an appropriate error message to the user's display with instructions to restart the application | The user should know what caused the error and know what to do after it happens. | Unit tests can ensure the proper error messages are displayed when the errors happen | Test #14 |

5d Safety-Critical Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------------------------------|--|---|---|------------------|
| SCR-1 Safe Device | The application should not harm the user's device | The user should know what caused the error and know what to do after it happens. | Unit tests can ensure the proper error messages are displayed when the errors happen | Test #15 |
| SCR-2 Liability of Resources | The application takes no responsibility for any lost or damaged equipment before or after transactions | The user should know they are ultimately responsible for distributing and renting their equipment and making their public profile | The application should have a Terms of Service and consult a lawyer who is well versed for compliances. | Test #16 |

6 Maintainability and Supportability Requirements

6a Maintenance Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-------------------------|---|---|--|------------------|
| MR-1 Database system | The System must require maintenance that will be needed for the database. | Required to give the best and frustration free product. | The maintenance of the database system must be done once every two week. This will ensure no problem will exist for more than 2 weeks. | Test #17 |

19.

6b Supportability Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-----------------------------------|---|--|--|------------------|
| SUPPR-1 Helping Documentations | The system must provide a means of documentations in order to keep users informed about functionalities and troubleshooting of the application. | This requirement is necessary because people are usually unaware of the application when they use it for the first time and it's crucial that users must know how to use functionalities that are intended to be used. | The more we spend time on a piece of software, the better the experience gets. However, this is not the case when users don't understand the meaning and how these features are working exactly. Hence, helping documentation is a necessary need for users. | Test #18 |

20.

6c Adaptability Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-----------------------------|--|---|--|------------------|
| ADR-1 Integrated OS apps | The system must allow accessibility for a set of pre-build music and communication applications. | Music improves work productivity, and in some cases it helps build a positive mindset which can help users stay healthy. Music apps like Apple Music, Spotify and communication apps like Zoom or Ring. | Users must allow permission to use microphone and/or camera when communicating with friends and family. Only then it is possible to communicate featuress. | Test #19 |

6d Scalability or Extensibility Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---|---|---|--|------------------|
| SER-1 Ads providing to expands business growth | The system must be possible to use as an advertisement platform for the interests of our users and business growth. | The advertisement will be of fitness and for integrated applications that allowed. It is the developers choice to design on how to show the ads. This will create a big community and encourage more applications to be integrated inside the | The advertisement will generate revenue and it will also help inform users about fitness. This also helps business grow when their advertisement is heard by a group of users who are present at a certain spot. | Test #20 |

| | | | | |
|--|--|--------------|--|--|
| | | application. | | |
|--|--|--------------|--|--|

22.

6e Longevity Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-------------------------|--|--|--|------------------|
| LONGR-1 App duration | The system must be able to stay active for more than 3+ years. | The application is a huge factor this year. Due to the pandemic, people are more afraid of experiencing outside closed work spaces like gyms, so it will be a long time from users to live normal lives again. | The system will also receive updates through the years. Updates on new features and updates on bug fix that user encounters and which getssss reported. The cycle continues as long as the application stays active. | Test #21 |

23.

7 Security Requirements

7a Access Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
|---------|-------------|-----------|---------------|------------------|

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|-------|---|---|--|----------|
| ACS-1 | Sellers have access to listing functionality, and can change their listings at their discretion | Sellers must have this access in order to provide equipment to potential buyers | Sellers will have listing capabilities while buyers will have renting capabilities | Test #22 |
|-------|---|---|--|----------|

24.

7b Integrity Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|---|---|--|------------------|
| INT-1 | Login system and password requirements will be made with maintaining security a top priority | By ensuring users have strong individual passwords, the overall security of accounts will be strengthened | Passwords will have to clear at least four password formatting conditions | Test #23 |
| INT-2 | Financial information will not be saved server side, and will only be saved client side for convenience | By saving client side, we allow users the ability to make purchases or listings without have to reenter financial information | Client side saving will give the users an ability to automatically enter in financial information for transactions | Test #24 |

25.

7c Privacy Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|--|---|---|------------------|
| PRIV-1 | User information will not be shared with third party users unless user gives consent | By limiting the amount of user data that is shared, users are more secure | Provide a direct prompt to users, inquiring as to whether or not they wish to have their information shared | Test #25 |

26.

7d Audit Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|--|--|---|------------------|
| AUDT-1 | Audits will be done regularly and will included report reviews for both buyers and sellers | Regularly reviewing this will allow developers to improve and remove low-rated users | Audits will be performed by a designated report team on a monthly basis | Test #26 |

27.

7e Immunity Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
|---------|-------------|-----------|---------------|------------------|

| | | | | |
|--------|--|--|---|----------|
| IMMU-1 | The application will use servers and technologies from already proven concepts | By building upon pre existing concepts, a secure environment is more easily maintained | Servers will be hosted on well known hosting companies that provide guarantees of reliability | Test #27 |
|--------|--|--|---|----------|

28.

8 Usability and Humanity Requirements

8a Ease of Use Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------------------|--|--|---|------------------|
| EAR-1 Simplicity | The System must provide a simple user interface that can be friendly with different ages of users. | Sometimes developers create UI for a single type of audience but this application is for teenagers as well as adults. A simple UI would only do a single function instead of multiple functions. | Simple UI also has different attributes, choosing the correct font, UI doesn't need to be chaotic. Buttons should be large and displaying only required and necessary data. | Test #28 |

8b Personalization and Internationalization Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
| | | | | |

| | | | | |
|------------------------------------|--|---|---|----------|
| PINTR-1 Personal Preferences | The system must provide a means to change certain preferences to satisfy users' needs. | The application once done will be used worldwide, and different countries use different languages, measuring units, currency and symbols. Changing preferences will be a better experience for the users. | Users must also be able to change the User Interface from using dark mode or light mode. This sense of freedom will cause great bonds between user and application. | Test #29 |
|------------------------------------|--|---|---|----------|

8c Learning Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|----------------------|---|--|--|------------------|
| LR-1 Learnability | The system must not mislead users while users navigate through the application. | The application must not have repetitive content that requires additional clicks just to do a job. | Having to worry less about getting lost while navigating could save a lot of time and leads to learning the application quickly and efficiently. | Test #30 |

8d Understandability and Politeness Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
|---------|-------------|-----------|---------------|------------------|

| | | | | |
|--------------------------------------|---|---|--|----------|
| UPR-1 Acceptability/ recognize | The system must show the information that is respectful and easy to maintain users' judgements. | This means that users should be able to recognize symbols, like home, map and settings. The system should communicate with users in a polite manner. Showing users that the system cares as much as the users cares about the system. | With the help of big fonts, users should be able to navigate through the application. If for some reason users forget to add certain details while filling data, the system should be able to provide a message to users, informing them about errors. | Test #31 |
|--------------------------------------|---|---|--|----------|

8e Accessibility Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-----------------------|---|--|---|------------------|
| ACCR-1 Convenience | The system must be able to provide additional features only for users that have disabilities. | The application is designed for all individuals with or without disabilities. The application should only highlight important key aspects for people who need fast access even if they are not capable of doing it themselves. | Additional features such as screen reader. With a press of a button, the application should be able to read the screen out loud for the user. That includes reading images' alt text, buttons, text and other import messages and alerts. | Test #32 |

8f User Documentation Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---|---|---|--|------------------|
| UDR-1 FAQs and additional informations | The system must have documentation for the users to rely on when users require help features that are already integrated and/or new features. | With the available documentation, users will be able to save crucial time when using the application. Users will also be able to view answers and questions for FAQs. | The documentations will be able to show texts that explain features with visuals like images. Furthermore, there will be a search bar to search for specific information necessary for users, hence users learn quickly. | Test #33 |

8g Training Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-------------------|---|--|---|------------------|
| TRR-1 Tutorial | The system must provide a tutorial of somesort to familiarize users with the functionality when they first log in to the application. | This is a crucial step of the requirements because this is a first impression of the application and if it's done correctly, then users would find it appreciative and if not then vice versa. | The user can decide if they want to follow training or skip it and learn it on their own. On the other hand, if they first skip and later decide to look at the training, they can do that as well. | Test #34 |

9 Look and Feel Requirements

9a Appearance Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
|---------|-------------|-----------|---------------|------------------|

| | | | | |
|--------|---|--|---|----------|
| APER-1 | Buyer and Seller mode should provide unique color schemes to UI | Being in different modes will be accompanied by a visual representation of which mode you currently are in | The application will have a visually different appearance when switch modes | Test #35 |
| APER-2 | Product must provide different layouts for different devices, and provide both Android and iOS versions | More potential devices will equal more potential users | A cross-platform approach should be taken in an attempt to broaden potential market | Test #36 |

29.

9b Style Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|---|--|---|------------------|
| STYL-1 | Simple UI with a vibrant color scheme that matches mode | By limit amount of buttons and keeping UI simple, the user is not overwhelmed and can intuitively navigate application | Users should be able to navigate without having to ponder on how to perform a specific function | Test #37 |

30.

10 Operational and Environmental Requirements

10a Expected Physical Environment

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|----------------------|---|---|--|------------------|
| EPR-1 Permissions | The application need to have permission for GPS and internet access | This is an application to rent available items thus to keep track of the most recent available product in the local area. | Have the internet required to make the purchase. In case of no connection the application will not work. | Test #38 |

10b Requirements for Interfacing with Adjacent Systems

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|---|--|---|------------------|
| EPR-2 | System must be able to handle the transaction portal and process all the transactions securely. | This will make it easy to handle money exchange. | This will be a primary way of monetizing using our application. | Test #39 |

10c Productization Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|---|--|--|------------------|
| EPR-3 | The application will be made available on google play store and | With two largest platforms we can cover most of the US market. | This can make it possible to reach all the possible users. | Test #34 |

| | | | | |
|--|------------------|--|--|--|
| | Apple app store. | | | |
|--|------------------|--|--|--|

10d Release Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|---|--|--|------------------|
| EPR - 4 | Update on the application will be based on the user base and user suggestions. At the time of release all the function of the application need to be functioning and the availability of the application will be limited to North America | Required to give the best and frustration free product. Update will be based upon the required patches and adding new functionality. | Patches are required to run the application smoothly and make sure the customers are happy with the application. Also, adding new features will attract new customers. | Test #41 |

31.

11 Cultural and Political Requirements

11a Cultural Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------|-------------|-----------|---------------|------------------|
|---------|-------------|-----------|---------------|------------------|

| | | | | |
|-----------------------------|--|--|---|----------|
| CULTR-1 Language Support | The application should offer various different languages | This would allow the application to reach different markets (especially with travelling demographic) | English, Spanish, German, are examples of the different languages | Test #42 |
|-----------------------------|--|--|---|----------|

11b Political Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|---------------------------------|---|--|---|------------------|
| PR-1 Terms of Service Stores | The application should comply with the terms of service provided by Android and iOS stores | The application should follow the ethics and level of functionality in order to meet basic standards for users | Lawyer and application testers should check with terms of service | Test #43 |
| PR-2 License & Permissions | The application should obtain necessary licenses and/or permissions and agreements from fitness companies to allow users to rent/rent out equipment | The application offers users to rent out equipment for profit from various fitness companies which may affect copyright or trademark | Lawyer and application testers can check with fitness companies | Test #44 |

12 Legal Requirements

12a Compliance Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-------------------------------|--|--|--|----------------------|
| COMR-1 Data Permissions | The application should only take data and preferences if allowed by the user for when (if ever) marketing methods are used | The application should make what data they are collecting clear to gain user's trust and avoid any legal conflicts in the terms of service | Developers (and data privacy experts if necessary) should work together to test data collection of application | Test #45 Test #47 |

12b Standards Requirements

| Name-ID | Description | Rationale | Fit Criterion | Acceptance Tests |
|-----------------------------|--|--|---|------------------|
| STDR-1 Fair Use Rules | The application should encourage fair use of sharing music, data, and workouts | The application aims to make fitness something everyone can easily have access to, which can be assisted in encouraging a good gym community | Rules and guidelines should state correct behavior for all aspects of the application | Test #46 |

13 Requirements Acceptance Tests

13a Requirements – Test Correspondence Summary

| Test | R 0 | R 1 | R 2 | R 3 | R 4 | R 5 | R 6 | R 7 | R 8 | R 9 | R 10 | R 11 | R 12 | R 13 | R 14 | R 15 | R 16 | R 17 | R 18 | R 19 | R 20 | R 21 | R 22 | R 23 | R 24 | R 25 | R 26 | R 27 | R 28 | R 29 | R 30 | R 31 | R 32 | R 33 | R 34 | R 35 | R 36 | R 37 | R 38 | R 39 | R 40 | R 41 | R 42 | R 43 | R 44 | R 45 | R 46 | R 47 | |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| Test 1 | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 2 | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 3 | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 4 | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 5 | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 6 | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 7 | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 8 | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 9 | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 10 | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 11 | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 12 | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 13 | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 14 | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 15 | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 16 | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 17 | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 18 | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 19 | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 20 | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 21 | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 22 | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 23 | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 24 | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 25 | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | |
| Test 26 | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| Test 27 | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | |
| Test 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | |
| Test 29 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | |
| Test 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | |
| Test 31 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | |
| Test 32 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | |
| Test 33 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | |
| Test 34 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | |
| Test 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | |
| Test 36 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | |
| Test 37 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | |
| Test 38 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | |
| Test 39 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | |
| Test 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | |
| Test 41 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | |
| Test 42 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | |
| Test 43 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | |
| Test 44 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | |
| Test 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | |
| Test 46 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | | |
| Test 47 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | | |

13b Acceptance Test Descriptions

| Test | Description |
|---------------------------|---|
| Test #1: View Listings | The system must give the user the ability to enter "Buyer mode" and then view potential listings on an in-app map. The in-app map should display the users location as well as nearby listings. |
| Test #2: Instant Listings | The system must give the user the ability to enter "Seller mode", and the user must be able to create rental listings for owned equipment. The delay between posting the listing and its public visibility should be minimal. |
| Test #3: Reporting | The system must provide a robust reporting system that is custom made for both Buyer and Seller mode. The reporting system should be able to create meaningful analytics to contribute to application improvement. |
| Test #4: Transaction | The system should provide a secure transaction system for multiple payment methods, allowing the user to choose between multiple forms of payment. |
| Test #5: Sharing | The system should provide a sharing medium for users, to give the ability to share playlists, workouts and communications. |

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| Test #6: Personal account information | The user must be able to edit their personal information, if they have misspelled their information wrong or they have changed their name in the future. Databases should be able to update their information without any interference. |
| Test #7: Update Data | Simulate a transaction and call the function to update inventory. Test to call this function and ensure the count. |
| Test #8: Data Count | Update the count and make sure the data is been update |
| Test #9: Process Data | Test the system is able to hand the amount of data in the application. |
| Test #10: System Failure | The system should run smoothly throughout the day, not failing more than once as the application relies heavily on server-side functions. |
| Test #11: Data Loss | The system should keep data in the event of a system or server crash. The system should perform data security checks in the background daily or more often. |
| Test #12: Availability | The system should run background checks daily to make sure the servers are running as intended for GymPal and the renting services. |
| Test #13: Down System | The application should handle system malfunctions elegantly by maintaining the database and updating the users when necessary. |
| Test #14: Error Messages | The system should display the correct, respective error messages and assure the users the status of the system and their data. |
| Test #15: Safe Device | The application should not cause harm to the device by over-exerting the hardware with inefficient processing and through making sure the user's data is safe and protected. |
| Test #16: Liability of Resources | N/A |
| Test #17: Database system | The Developers who have worked on the system must be able to maintain the database by looking over the data and looking for any unusuals activities. They should be able to add their own data to check if the database has correctly been working and storing. |
| Test #18: Helping Documentatio ns | The users will be able to look up solutions to how to use a specific feature. There they must be able to use images and videos to see how certain features works. |
| Test #19: Integrated OS apps | The user must be able to listen music by pressing an integrated button which opens an option to select the music app. This is even possible to use video or audio calling features, just have to select which app to use once pressed on video call button in app. |
| Test #20: Advertisement from Partners | The system must showcase advertisements from various types of business. All the users must be able to see and hear ads from fitness, music, and workout plan options to the users. |
| Test #21: App duration | The application must be able to work after the pandemic is over. There is still a chance of people not going to gym to workout, so this app will very much likely play a huge role once pandemic gets end. |

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| Test #22: | The system shall give different abilities to users depending on the chosen user mode. In Seller mode, the user shall have ability to both create and edit existing rental listings for owned gym equipment. In Buyer mode, the user shall have the ability to interact with preexisting listings and begin the transaction process. |
| Test #23: | The system shall create robust password formatting conditions, in order to force users into creating stronger passwords. |
| Test #24: | The system shall not save financial information of the user server side, unless explicitly given permission to. |
| Test #25: | The system shall not share user personal information with third party clients, unless explicitly given permission to. |
| Test #26: | The application report system will include scheduled audits that will be performed on a monthly basis. |
| Test #27: | The application will be built upon pre existing proven technology, as well as be hosted upon reliable well known server hosts. |
| Test #28: Simplicity | The application should not confuse the users on what the UI represents. Each item inside the UI should do one and only one job. UI must have a nice font and very clear and big font to show what the feature would do. |
| Test #29: Personal Preferences | The application must be able to change very crucial key features that make these apps very efficient. Different people need different languages, metric systems, background themes and symbols to make their work done efficiently. |
| Test #30: Learnability | The users must be able to read the UI really clearly, without making them think two features do exactly the same activity. If users want to learn the app on its own, the application should chase straight to the point. |
| Test #31: Acceptability and recognize | The system must communicate with users politely and should send comments from one user to user monitoring their level of acceptability. Any harsh words must be replaced which can lead to a better experience and ban users for other's safety. |
| Test #32: Convenience | The disabled user must be able to navigate through exactly the same as users without disability. With additional features should work really well with the users. |
| Test #33: FAQc and additional informations | The users must be able to find the answers and other solutions about their confusions of a feature or a bug if they encounter one. |
| Test #34: Tutorial | The application should provide a visualization or media to show users how functionality is to be used once in a while asking for user's permission. |
| Test #35: | The system shall adapt the UI color template to the chosen mode of the user. |
| Test #36: | The application will provide functionality and layouts for all major device carries, to ensure broadening of potential market. |
| Test #37: | The system style shall be kept simple with vibrant colors that correspond to chosen user mode. |
| Test #38: Permission | Test if the internet and gps permission is available to the application. |
| Test #39: | Process several transactions and ensure its integration in the system. |

| | |
|--------------------------------------|---|
| Transaction | |
| Test #40: system compatibility | Test Compatibility with android and ios system |
| Test #41: Compatible | Test if the system is able to work with all the target device out in the market |
| Test #42: Language Support | The user will be able to select the region they are in as well as change the language displayed independently in order to account for a diverse, inclusive community of users. |
| Test #43: ToS: Stores | The application should protect the users as well as the developers from any breach of rules and regulations from the distributors of the application, making the environment safe and easy to use for the best user experience. |
| Test #44: License & Fitness | The application should protect the users as well as the developers from any breach of rules and regulations from corporations and the government through a thorough Terms of Service. |
| Test #45: Data Permissions | The application should make sure the only actors that have access to a user's data is only the user and whatever they permit the application to show publicly through preferences and GymPal. |
| Test #46: Fair Use Rules | The system must provide a way to promote a safe environment for the gym community as well as ways to report those who break the peace and well-beings of other users. |
| Test #47: Safety Checks | The system should run background tests on the database on a regular basis to check the security and keep it up to date. The system must be able to alert the users of any dangerous behavior, such as anyone else trying to access their account who is not authorized to by the users permission |

III Design

1 Design Goals

There are multiple designs that we want to achieve in this mobile application. In order to satisfy users we want to have a simplistic UI design that makes it visually clear to users overall for both customer and users. The other design goal is to have a viable framework that ensures that both parties are satisfied with the outcome of the transaction and that connecting with the database should be solid. Lastly, we want to quickly refresh and update maps with real-time listings.

2 Current System Design

no pre-existing system needs to be replaced but system design for GymPal was added to the current system design.

3 Proposed System Design

3a Initial System Analysis and Class Identification

The classes that we have currently are the most obvious classes that need to be in System Design. We have design sections such as GymPal, Navigation, Users that have their designated place and other classes related to the parent class. GymPal has child classes and the same with users. The class names are correct and do not need to change because the names are nouns and having nouns helps our system design organize the overall structure of the class diagrams. This helps to figure out the design patterns that we have incorporated in the class diagram.

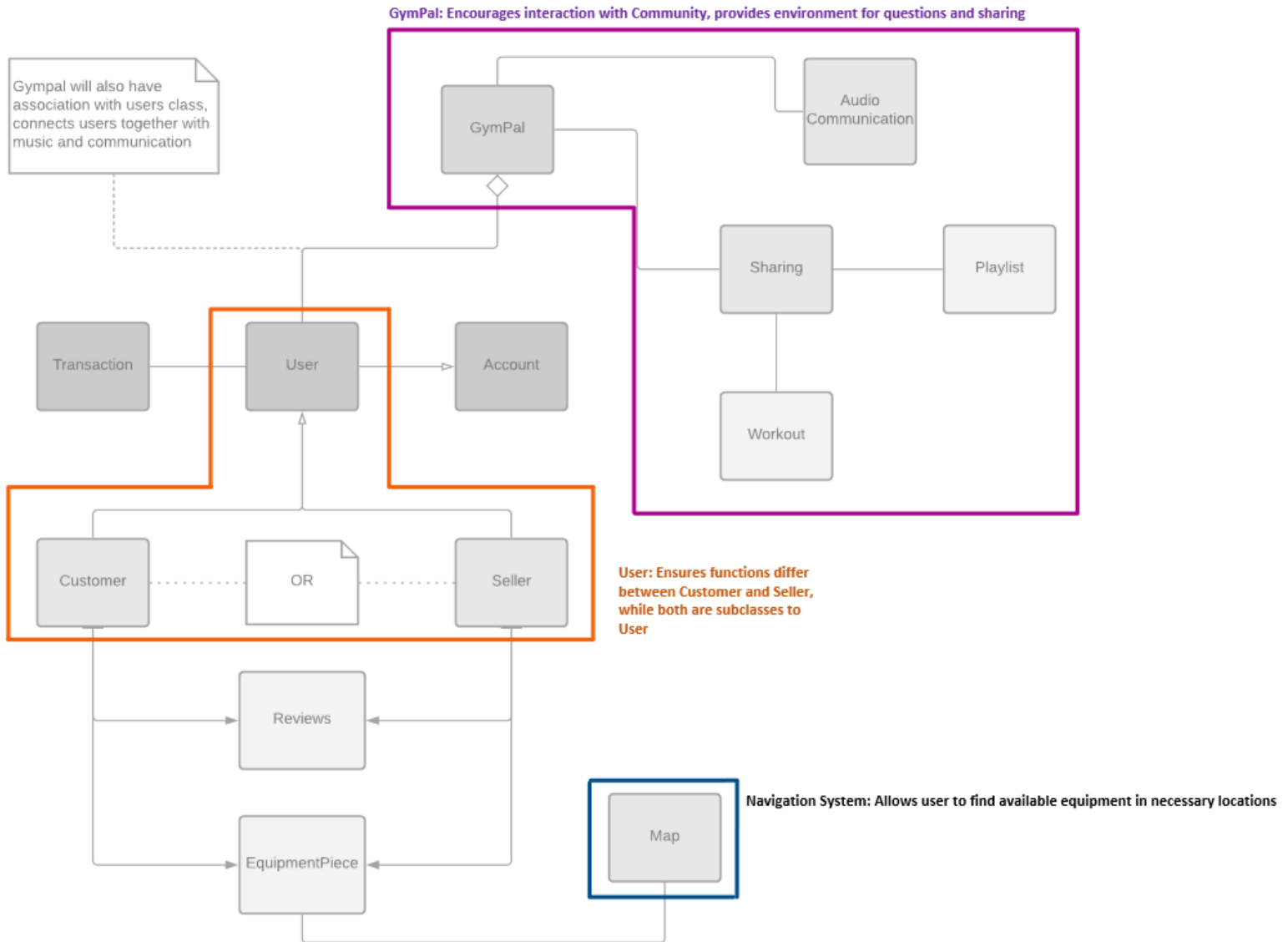
3b Dynamic Modelling of Use-Cases

The use-case diagram has not changed since the beginning. In the use case diagram, we have 4 actors. From 4 actors, 3 are clients and the 4th actor is the server. We were able to figure out classes by the help of use-case diagrams. In the diagram, we have given each actor responsibilities and the responsibilities tell us how to organize the modelling.

3c Proposed System Architecture

We are going to have Client-Server Architecture incorporated in our application. The Clients are the one using the device, such as Customers and Sellers. Server on the other side handles all the transactions, location tracking, storing information that are private and personal, such as SSN, address, and contact information. Server manages both users and makes sure the connection between two clients is strong. Server also helps clients to share playlist and workout plans for our clients for the GymPal.

3d Initial Subsystem Decomposition



4 Additional Design Considerations

4a Hardware / Software Mapping

The system needs a server which serves both of our customers' sets. This server will keep track of the item on the list for rent and records. The records consist of all the customers previous and present rental orders and the seller previous and present rent

outs. All this information will be reflected on the user device based on their accounts. Thus the only hardware required in our system is a server which can fulfill above requirements. On the user side they can use our application to log in and access the information.

4b Persistent Data Management

For this system the server contains all users data, like account detail and preview and the current transaction details and so on. All this data is persisted and to be stored in a backup system as on the daily bases. Thus our system will sync every day once and store new data to the backup system. All the data will be sorted by account bases and stored accordingly with an unique encryption.

4c Access Control and Security

Access Control and Security will be under the control of the admin and the senior management of the company. The most important detail in the class is user information as it consists of user personal details and the payment information. Thus a special class will be required to store this information and should be increased. .

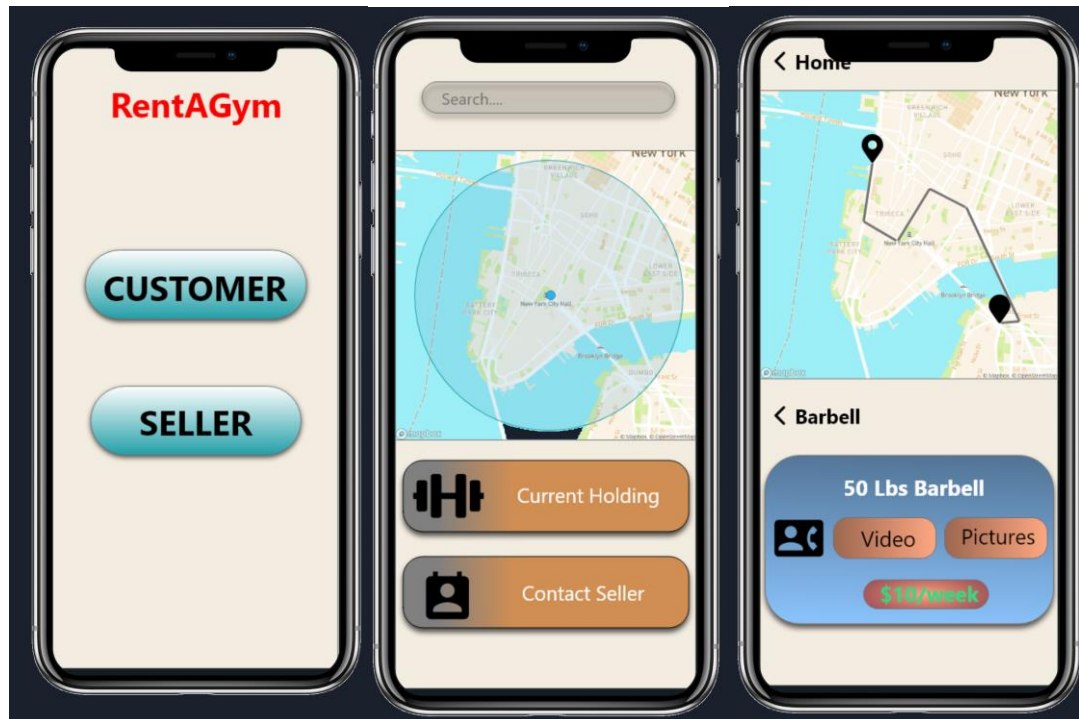
4d Global Software Control

This application is limited to the US and thus we need not to worry about the border and international business rules. Although this system can be started as a pilot project in a small city and then we can further develop Software Control.

4e Boundary Conditions

The main all data will be backed up on the daily bases and will we all link to the user account details. So keeping account details secure in the most important part of the application.

4f User Interface



The above are the three different Mockups of the application.

Image 1 is the screen you see when log in to the application and giving the user to select if he/she wants to be a customer or seller.

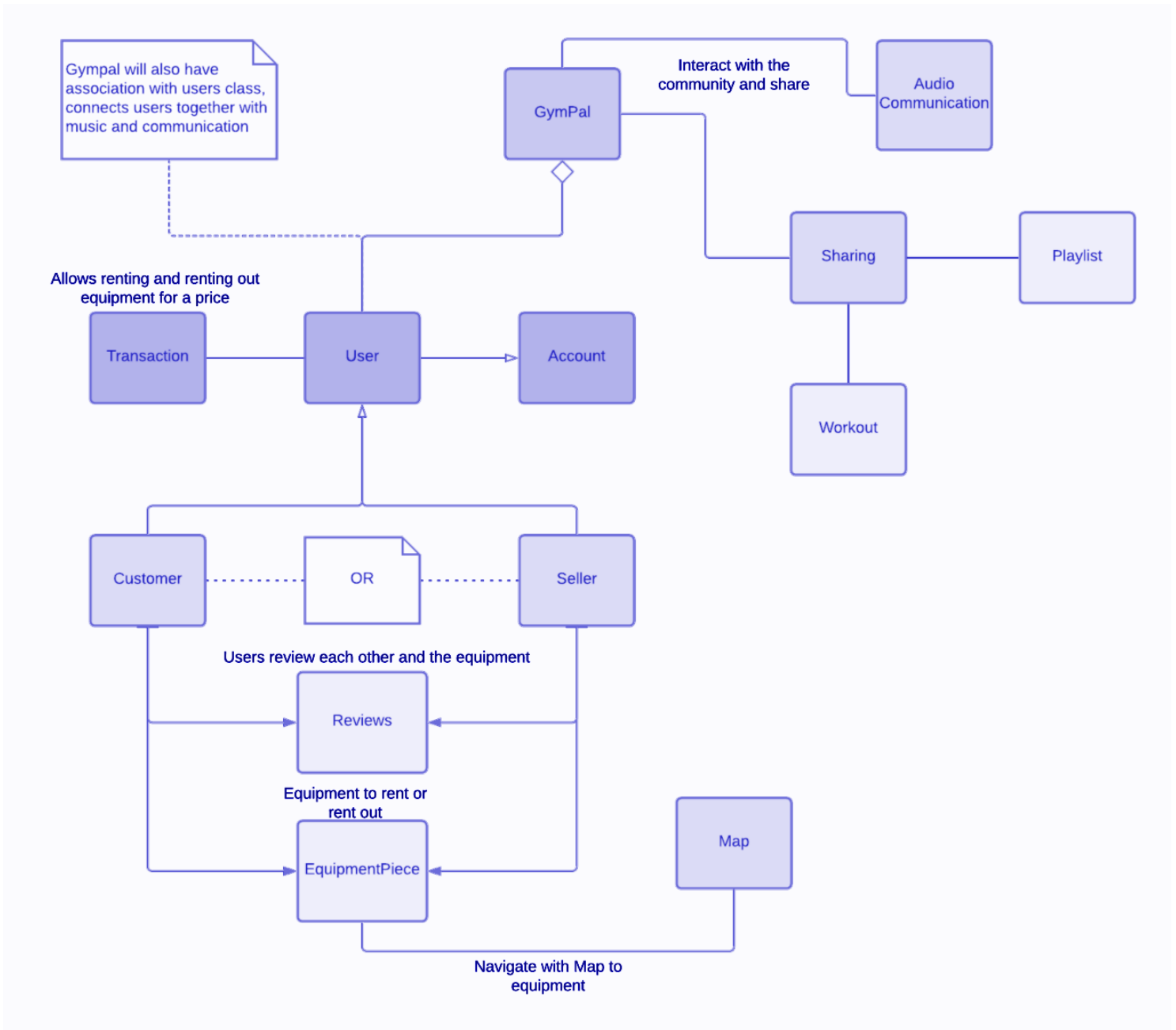
Image 2 is showing a user option to contact a seller on the given location on the map.

Image 3 is showing a particular 50 Lbs barbell in the on the map and contact details of the seller.

4g Application of Design Patterns

The main design pattern in our system will be template design pattern. This design pattern will be under the user class and can choose either Customer or Seller. Also, another one place where template design pattern is under share class is the primitive operation for workout and playlist make sharing different. Take a look at this in the diagram under Final System Design.

5 Final System Design

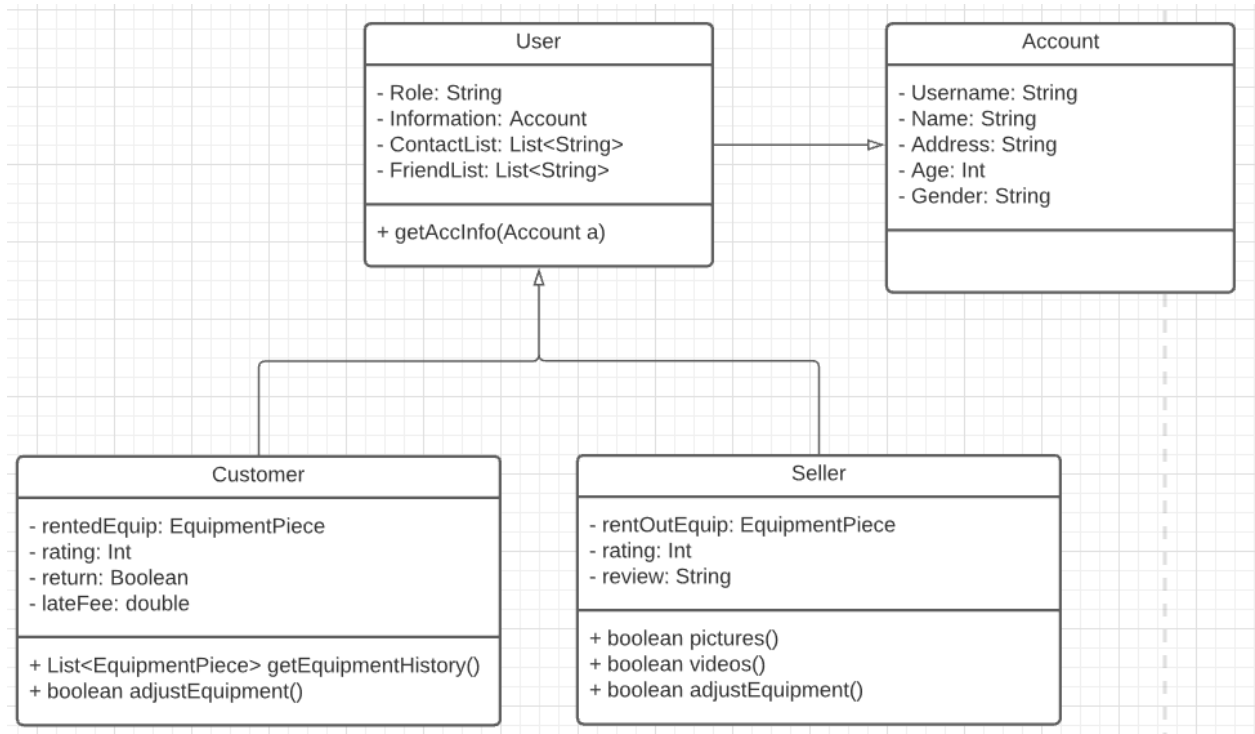


6 Object Design

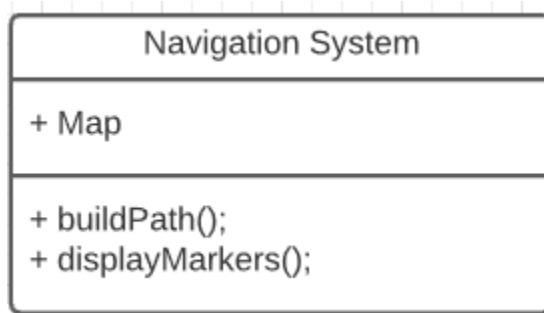
6a Packages

Google Maps API package

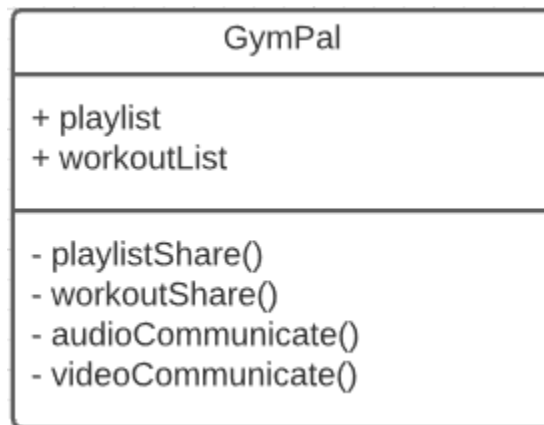
6b User



6c Navigation System



6d GymPal



IV Project Issues

1 Open Issues

- Properly addressing possible sanitation issues if users do not properly sanitize gym equipment before renting out to other users.
- How negative reports are handled within the system
- The design of a robust penal system for bad actors within the application.

2 Off-the-Shelf Solutions

- Draw concepts and ideas from already pre-existing penal systems in other applications, these applications should have a similar framework in that user-to-user interaction is the primary source of reports.
- Mimicking parts of customer support systems that are available in other applications, in order to respond and deal with reports.

2a Ready-Made Products

- Zoho Analytics reporting tool as it helps create cross-functional reports easily and will give the application necessary tools to tackle certain issues.

2b Reusable Components

- Components of the Izenda Report system can be beneficial for usage in the application or by the development team.

2c Products That Can Be Copied

- Components from a past project we worked on, Travel Advisor, could be copied. More specifically, the usage of the GoogleMaps API can be imported with tweaks in order to match this application's desired functionality.
- Subscription-based models offered by trainers and nutritionists within the premium membership gyms

3 New Problems

3a Effects on the Current Environment

- People traveling now have the opportunity to work out where they are temporarily staying without needing to pay for a membership at a premium gym.
- Potential Sellers now have a viable option to create another revenue stream if they have equipment to rent out, this can have the adverse effect of causing people to work less as they now have another option.

3b Effects on the Installed Systems

- The application does not interact with other hardware or software systems currently, and may only affect them in that they mimic this system.
- Potential partnerships with certain companies may introduce new effects on their software systems in order to somehow incorporate ours.

3c Potential User Problems

- The overall user experience should remain unaffected due to the system changes

3d Limitations in the Anticipated Implementation Environment That May Inhibit the New Product

Bad/disastrous weather can prevent meetups for transactions, lack of connection can prevent users from using the main functions of the application like renting or using GymPal.

3e Follow-Up Problems

People could commit fraudulent actions and cause problems with renting. Late return fees may need to be implemented to ensure responsibility and accountability.

4 Migration to the New Product

4a Requirements for Migration to the New Product

- In the case of migration to a new system, the old and new system will not have to run in parallel, simple migration and implementation of the new system is sufficient.
- New reporting system that will handle feedback that specifically pertains to the migration will be created, and these reports will be used to guide new features that address the concerns with the new system.

4b Data That Has to Be Modified or Translated for the New System

- Specifically, the data that must be preserved and translated to the new system will be account information. The account information must include but will not be limited to:
 - Account name and email address
 - Account transaction history
 - Account personal score (rating)
 - Account report history
- Information that will not be preserved

- Financial information, ie: credit card information

5 Risks

Pandemic could be the main cause for this to perform well, so the product could underperform if people are more comfortable with going to the gym in the future. People also could just not be interested in renting out their gym equipment, especially if it was paid with a premium price.

6 Costs

The Cost of this project mostly includes the building of this application thus the cost of development and maintenance. We also need to keep a good legal team to write up terms and conditions in case of dispute between customer and seller, and similar issues. We might also need a customer care department, where customers can call and ask for assistance, depending on the amount of the users. .

7 Waiting Room

We can consider adding more products like a nutrition specialist and personal Trainer available on Demand. So, it can be like a subscription service where a user can subscribe for them on a monthly basis or plane basis. This can be a way to attract more customers. Also we could cover more market by opening our product outside US.

8 Ideas for Solutions

The overall system design of RentAGym could use the Template behavioral pattern in various places like the User->Customer & Seller subsystem. An object-oriented language would help in designing it around a Template behavioral pattern, so using Android as a programming language could definitely work (Java/Kotlin). Implementing the navigation system using Google's Map API could also be a way to save time and explore a popular, top of the line API. SQL could then be used for database storage.

9 Project Retrospective

In retrospect, the development of the ideas and application of RentAGym was greatly aided by the weekly meeting minutes. This gave some time to reflect and get input from each other as the project sat in the back of the team's minds. After each session which was focused on this application, the project eventually became more solidified and brought in inspiration from other similar products out there such as Amazon and Uber. One thing that was discovered early was that the GymPal sub-application of RentAGym may be out of the scope of a prototype, instead maybe being more in place of a v2.0 of a prototype because the main aspect of renting would need to be focused on first. Working on both projects was difficult, although it helped that RentAGym was more of a development than a coding project so the members were able to think about it anytime of the day. The Discord meetings were also a very organized factor in the team's group work. In the future, an improvement would be to spend more time

fleshing out the UI and feeling of the application as it is important to the audience's overall experience with the product.

V Glossary

Rent: The application uses the word rent as a means to obtain possession and use of equipment for a temporary period in return for a small sum of money

Rent-out: The application uses the word rent-out as a means to grant temporary possession of equipment for a small sum of money

Customer/Buyer: A person who rents equipment

Seller: A person who rents-out their equipment

Item Condition: When renting or returning equipment, it is important to let the receiving entity know if they are getting something that is new, used, or something in between. Different item conditions may warrant different price ranges depending on the equipment. These condition categories are:

- **Excellent:** Item is in excellent condition with no wear, includes original accessories if it applies
- **Great:** No functional defects, may have signs of slight cosmetic wear but is still fully operational and functions as expected
- **Acceptable:** Has obvious damage including scuffs or cracks but still is operational

GymPal: The feature in the application where the user can interact with others in the gym community through video/audio communication, sharing music through playlist or synchronous sessions, and personal/group guidance for workout plans.

VI References / Bibliography

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